



## MDDP & DBPS AMENDMENT

### BENT GRASS DEVELOPMENT

El Paso County, Colorado

PREPARED FOR:  
**Challenger Communities, LLC**  
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:  
**January 2021**  
**Revised: March 2021**  
**Revised: April 2021**

#### Engineering Review

06/09/2021 10:46:31 AM

*dsdrice*

JeffRice@elpasoco.com

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**EPC Planning & Community  
Development Department**

**PCD-ENGINEERING REVIEW COMMENTS  
IN BLUE BOXES WITH BLUE TEXT**

**Galloway responses**

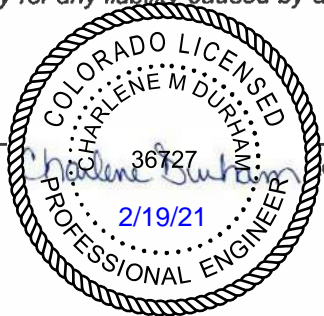
**PUDSP-20-005**



**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.*

\_\_\_\_\_  
Charlene Durham, P.E. #36727  
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: \_\_\_\_\_

\_\_\_\_\_  
2/19/21  
Date

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

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

\_\_\_\_\_  
2/19/21  
Date

Address: Better Land 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.*

\_\_\_\_\_  
Jennifer Irvine, P.E.  
County Engineer/ECM Administrator

\_\_\_\_\_  
Date

Conditions:



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## I. Purpose

This document is to serve as an amendment to the previously approved Master Development Drainage Plan (MDDP) for Bent Grass Meadows, submitted in 2019, and to the Falcon Drainage Basin Planning Study (DBPS). The changes to the MDDP include the analysis of the flow from Meadows Filing 3 subdivision, which is now routed to the east and through the Middle Tributary of the Falcon Basin, as opposed to the West Tributary as previously studied. Drainage calculations, including an update to the HEC-HMS from the approved DBPS has been included as a portion of this report.

## II. General Description

The site is located in the Northwest  $\frac{1}{4}$  and Southwest  $\frac{1}{4}$  of Section 1, Township 13S, Range 65W, of the Sixth Principal Meridian, County of El Paso, State of Colorado. This report will incorporate the improvements previously approved with Bent Grass Residential Filing No. 2 FDR, the Meridian Road/Bent Grass Meadows FDR, and the proposed development known as Bent Grass West. A Vicinity Map is included in Appendix A.

The existing soil type within the proposed site as determined by the NRCS Web Soil Survey for El Paso County Area consists of Columbine gravelly sandy loam which is defined as having a hydrologic soil group 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 and adjacent sites.

1. *Falcon Drainage Basin Planning Study*, by Matrix Design Group, September 2015.
2. *Master Development Drainage Plan and Preliminary Drainage Plan – Bent Grass Subdivision*, by Kiowa Engineering Corporation, December 2006.
3. *Final Drainage and Erosion Control for The Meadows Filing 3 Subdivision*, by LADD Engineering, July 2000.
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. *Final Drainage Report for Bent Grass Residential Filing No. 2*, by Galloway & Company, April 2020.
7. *Meridian Road & Bent Grass Meadows Drive*, by Galloway & Company, September 2020.
8. *Preliminary Drainage Report Falcon Meadows at Bent Grass*, by Galloway & Company, December 2020.

## IV. Drainage Criteria

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.

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 and the 5-year event was used as the minor event.

For the analysis of the existing channel adjacent to Meridian Road and the preliminary design of the proposed channel, Bentley Flowmaster was utilized. Flowmaster was used to evaluate velocity, Froude number, and channel depth. A Manning's n value of 0.035 was utilized for the channel which is appropriate for the existing native grass that comprises the channel section. The proposed channel was designed to have a maximum depth of 5' per the criteria manual and have a maximum velocity of 5 ft/s with a maximum Froude number of 0.6.

The West Tributary channel will be designed to meet the following criteria, maximum depth of 5' per the criteria manual and have a maximum velocity of 5 ft/s with a maximum Froude number of 0.9. The West Tributary channel is comprised of channel reaches RWT202, RWT204 and RWT210 in the HEC-HMS models. A preliminary HEC-RAS analysis has been done for the channel. Per the DBPS, reaches RWT202 and RWT204 will require small drop structures, while Reach RWT210 is a natural channel design. If RWT210 cannot meet the design requirements, small grade control structures may be used to reach those requirements.

## V. Current Drainage Conditions

A historic/existing conditions drainage map has been prepared for this area to analyze the area prior to any of the new Bent Grass residential development. This scenario resembles the existing conditions shown in the previous FDR for Bent Grass Residential Filing No. 2. Hydrology calculations for this scenario have been provided in Appendix B.

A Current Conditions drainage basin map has also been provided. This scenario includes the development of Bent Grass residential Filing No. 2. Hydrology Calculations for this scenario have been provided in Appendix B. This was also provided as the existing conditions map and calculations in the Bent Grass West PDR.

Individual basin descriptions have not been included here, as they have been addressed in previously stated reports. General overall descriptions of the drainage patterns have been provided.

The Bent Grass development will impact the West Tributary and the Middle Tributary of the Falcon Basin. All development from the west side of Bent Grass Residential Filing No. 1 and west will be contained within the West Tributary. Everything east of that property line, including the Bent Grass Meadows/Meridian Road intersection, will impact the Middle Tributary.

## MIDDLE TRIBUTARY

The Middle Tributary drainage begins at Design Point 30.

**Design Point 30** (225.0 AC,  $Q_5 = 2.1$  cfs,  $Q_{100} = 63.5$  cfs): is the release rate of the existing Meadows Pond #3, located in Meadows Filing No. 3, just north of Woodmen Hills Drive. The flows are based on the revised HEC-HMS (Current and Future Models), which is located in Appendix B. Flows will cross under Woodmen Hills Drive via an existing culvert, then sheet flow to the southeast, passing through Basin OS-25 to DP 31. The DBPS by Matrix had 160 cfs at this location under the "Do Nothing Analysis" and 99 cfs under the "Regional" and "Sub-Regional" design alternatives. Minor flows were not provided in the report. The flows are lower in the current HEC-HMS report, as more accurate design data and as-built information for the existing Meadows Pond 2 was utilized in the pond stage/storage and storage/discharge tables.

Design Point 30 will combine with offsite basins OS-25 & OS-26, until they reach an existing sedimentation pond at DP-32, located north of Bent Grass Meadows Drive, on what's referred to as the "school" site. The current configuration of the pond has release rates of 2.1 and 63.5 cfs for the 5 and 100-year storm events, under the Current HEC HMS model. These flows will continue south to Bent Grass Meadows Drive. Curb and gutter in the roadway is able to handle 7.4 and 33.2 cfs in the minor and major storms. It is assumed that the max gutter flow will continue to the east and any remaining flow, of 30.3 cfs, will be directed to the south through the Bent Grass Filing No. 1 development. Flow will travel through curb and gutter and existing storm systems within Bent Grass Filing No. 1, ultimately out falling to Bent Grass Pond 1. Based on the local street section and slopes, flows were routed through the development based on overtopping and flows splitting at intersections. The routing of the storm flow can be found in Appendix B, under Surface Routing.

The existing detention pond, Pond 1 Bent Grass Filing No. 1, was analyzed with the additional flow and contributing area. From the FDR for Bent Grass Residential, Pond 1 had a 5-year release rate of 0.4 cfs and a 100-year release rate of 6.8 cfs. The 100-year water surface elevation was 6937.61. With the additional flow being re-routed to Pond 1, the current release rates for Pond 1 are 0.5 cfs for the 5-year event and 22.0 cfs for the 100-year event. The pond will have a 100-year water surface elevation of 6938.08. The spillway elevation for the pond is 6939.61.

Flows in Bent Grass Meadows will continue east, on the north side of the roadway, where they will combine with offsite flows from BG 50 (5-year flow is 280 cfs, 100-year flow=850 cfs), which is the flow obtained from the Falcon DBPS. There are 3 existing 45" x 29" elliptical rcp's. For the current condition, the approved FDR for Meridian Road is allowing 2 additional elliptical rcp's, which will handle the flow

from Bent Grass Meadows at Design Point 15n (5-year flow = 13.4 cfs, 100-year flow=62.2 cfs). Design Point 20 (5-year flow=304.8, 100-year flow=961.8 cfs) combines the roadside flow from offsite with the flow from Bent Grass Meadows Drive. Flows will then continue south in a roadside ditch along Meridian Road, on the west side. The Meridian Road ditch also captures flows from the Bent Grass East Commercial developments. Existing water quality facilities intercept the runoff and treat it, prior to being released into the ditch. Flows will eventually be intercepted by a set of existing twin 36" c/p's at Owl Place, at Design Point BG 25 (Q100=837.4, Q5=256.3 cfs). From the Meridian Road/Bent Grass Meadows FDR, it is shown that the existing culverts at Bent Grass Meadows Drive and Owl Place and the channel connecting the culverts are undersized and will need to be improved in the future to properly convey the flows outlined in the DBPS. Flow will continue through an existing channel and release into Pond SR-4.

Basin MT060, which is the remaining area of the DBPS Basin MT060 minus the "School Site" which has been re-routed along Bent Grass Meadows Drive. The "school site" and areas north of it (Rational Basins OS-25 & OS-26), are now referred to as Basin MS060a in the HEC HMS model. Basin MT060 refers to the original MT060 minus, minus MT060a. MT060 has now reduced to 101.1 acres and flows through an existing channel to the south. MT060 generates 60.1 cfs for the 5-year storm and 196.8 cfs for the 100-year storm. These flows are released directly into Pond SR-4.

## WEST TRIBUTARY

For the West Tributary of Falcon Basin, the hydrology analysis has the Bent Grass Residential Filing No. 2 as being constructed, as it is currently underway. The basins for this development are part of the hydrology calculations which are provided in Appendix B, but a complete description of each of these basins has not been provided, as they can be referenced in the approved FDR for Bent Grass Residential Filing No. 2. With this development, there were 2 water quality ponds built, which release into the West Tributary channel. The offsite basins have also been discussed in the Bent Grass Filing No. 2 FDR.

The currently undeveloped portion of the Bent Grass site, referred to as Bent Grass West, is comprised of 8 undeveloped basins. Below is a brief description of them.

**Basin EX-1** (1.19 AC,  $Q_5 = 0.4$  cfs,  $Q_{100} = 2.5$  cfs): is associated with the northeastern portion of the Bent Grass West site east of the existing channel. The basin is currently undeveloped. Runoff from the basin generally flows to the southwest, into Basin EX-2 at **DP 10**.

**Basin EX-2** (1.56 AC,  $Q_5 = 0.5$  cfs,  $Q_{100} = 3.7$  cfs): is along the eastern boundary portion of the proposed site and is south of Basin EX-1, east of the existing channel. 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 14** combined with flows from **DP 11 & 12**.

**Basin EX-3** (0.62 AC,  $Q_5 = 0.2$  cfs,  $Q_{100} = 1.5$  cfs): is along the eastern boundary of the proposed site south of Basin EX-2 and east of the existing channel. The basin currently contains an existing WQCV pond created as part of Bent Grass Residential Filing No. 2. This basin receives flows from **DP 14** and **DP 8**.

**Basin EX-4** (12.49 AC,  $Q_5 = 3.7$  cfs,  $Q_{100} = 25.1$  cfs): is located along the northern boundary, just south of the swale built with Bent Grass Meadows Drive and west of the existing channel. The basin is currently undeveloped. Runoff from the basin generally flows to the south onto Bent Grass Meadows Drive at **DP 6**. From there, it flows via curb & gutter to the east into an existing sump inlet, ultimately discharging into the existing WQCV pond located in Basin EX-3.

**Basin EX-5** (5.15 AC,  $Q_5 = 1.6$  cfs,  $Q_{100} = 10.6$  cfs): is west of Basin EX-4 and north of Bent Grass Meadows Drive. The basin is currently undeveloped. Runoff from the basin generally flows to the south onto Bent Grass Meadows Drive at **DP 7**. From there, it flows via curb & gutter to the east into an existing sump inlet, ultimately discharging into the existing WQCV pond located in Basin EX-3.

**Basin EX-6** (9.53 AC,  $Q_5 = 2.7$  cfs,  $Q_{100} = 17.8$  cfs): is along the west boundary of the site. The basin is currently undeveloped and receives off-site flows from Basins OS-2 & OS-3. Runoff from the basin generally flows to the south into the existing drainage ditch entering an existing inlet at **DP 22** and flowing under Bent Grass Meadows Drive and discharging into an existing drainage swale in Basin EX-8.

**Basin EX-7** (9.16 AC,  $Q_5 = 2.8$  cfs,  $Q_{100} = 18.9$  cfs): is north & west of Bent Grass Meadows Drive, between Basins EX-5 & EX-6. The basin is currently undeveloped. Runoff from the basin generally flows to the southeast into Bent Grass Meadows Drive at **DP 21**. From there, it flows via curb & gutter to the south into an existing sump inlet, ultimately discharging into the existing sediment pond located in Basin EX-8.

**Basin EX-8** (21.3 AC,  $Q_5 = 6.6$  cfs,  $Q_{100} = 43.9$  cfs): is a portion of the site south and east of Bent Grass Meadows Drive, north of the south property line and west of Bent Grass Filing No. 2. The basin is currently undeveloped and contains two drainage ditches, a sediment pond, and a portion of the creek associated with Basin WT200 from the Falcon DBPS. Runoff from the basin generally flows to the southeast into the existing channel.

Overall flows exiting the Bent Grass Site at **DP CC** are 278.3 cfs for the minor storm and 1224.7 cfs for the major storm. This flow is determined by using the DBPS flows entering the site from basin WT200 and channel reaches RWT202 & RWT204 and combining them with flows from the Falcon Meadows site.

Flows exiting the site are a mix of DBPS and rational flows. The flow will continue south through an existing leg of the West Tributary channel of the Falcon Basin.

South of the Bent Grass development, there are two basins (WT210 and WT220, as shown in the DBPS) which still contribute flows to the channel reach RWT210 prior to Woodmen Road. Basin WT210 is on the west side of the channel and is 172.8 acres. Future flows from this basin are 60 and 188 cfs for minor and major storm events. Basin WT220 is on the east side of the channel and is 121.6 acres. Future flows from this basin are 85 cfs for the 5-year storm and 250 cfs for the 100-year storm. Flows from both basins are from the HEC-HMS model in the appendix. Refer to Figures 3-12 (Existing Hydrology) and 3-13 (Future Hydrology) in Appendix A.

## VI. Four Step Process

The Four Step Process is used to minimize the adverse impacts of urbanization of developing a balanced, sustainable project. Below identifies the approach to

### 1. Employ Runoff Reduction Practices

The proposed development uses Low Impact Development (LID) practices to reduce runoff at the source. Generally, rather than creating point discharges that are directly connected to impervious areas, runoff is routed through pervious areas to promote infiltration. In general, single family developments are good at promoting LID practices. The project site has incorporated open and vegetated areas throughout the area to help disconnect pervious areas. Grass buffers and swales are used where practical, specifically around the property boundary. These items will help in reducing runoff volumes.

remaining portions of **ADDED**

**NEW EXHIBIT  
ADDED**

redlines

This paragraph still needs more detail, and needs to correspond to a plan showing current conditions.

**PARAGRAPH EXPANDED AND  
ADDITIONAL INFORMATION  
ADDED**

Revise this section per the "Four-Step Process" for selecting structural BMPs (ECM Section I.7.2 BMP Selection). ie: switch #2 and #3, and revise #4 to match what is in EPC criteria.

**ORDER CHANGED  
AND #4 UPDATED**



## 2. Implement BMPs That Provide a Water Quality Capture Volume with Slow Release

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. WQCV facilities will be designed as Extended Detention Basins.

and 2

Added

The Falcon Meadows at Bent Grass development, west of Bent Grass Residential, Filing No. 1, will include several water quality ponds throughout the site to ensure flows will be treated prior to being released into the West Tributary Channel, running through the site. Only a small area, less than 1.0 acres will not be treated prior to releasing into the channel.

Is the last sentence correct?

Meridian Road

Currently, the existing roadside ditch, ultimately receives runoff to the existing quality pond MN, as shown and discussed in the Falcon DBPS. The Falcon future detention and water quality pond SR-4 that is to receive flows from basin MT060 and discharge into basin MT070, ultimately routing to existing Pond MN. Flows from Bent Grass Meadows Drive are listed in basin MT060 but are being routed to the existing roadside ditch along Meridian Road, which is in basin MT070. The flows from the "School Site" and upstream basins will release into the east side of Pond SR-4 (west of Falcon Market Place). Pond SR-4 is currently under construction. The proposed improvements impact on the existing drainage basin and both Pond MN and Pond SR-4 are discussed later in the report.

Added

With regards to Falcon Meadows, this is a true statement

## 3. Stabilize Drainageways

This step implements stabilization to the channel 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 stability analysis on the existing roadside ditch along Meridian Road was conducted with results shown in Appendix C. From the analysis, it was determined that the existing ditch is not in stable condition with existing DBPS flows. Improvements are anticipated to be made in the future, per recommendations from the Falcon DBPS, when additional land is obtained to expand the ROW along the southbound portion of Meridian Road.

In the interim condition, it has been proposed to add a temporary lining to the existing channel to handle the excess velocities and depth associated with the DBPS flows and Bent Grass development re-routed flows. This analysis has been included in the Appendix.

as proposed in the DBPS

The West Tributary Channel will be natural, vegetated facility, helping to ensure that the overall velocities will be reduced, flow depth will not exceed 5' and minimize any potential for scour. If needed, grade control structures may be designed to ensure these criteria are met.

Added

## 4. Implement Site Specific and Other Source Control BMPs

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 City of

Colorado Springs website and discuss topics such as: pet waste, car washing, lawn care, fall leaves, and snow melt and deicer.

Bent Grass East Commercial Filing No. 1 contains commercial development. This area will need to consider the need for Industrial & Commercial BMPs. No industrial uses or outside storage is proposed for this area. Drainage will be routed through water quality ponds prior to leaving the site to minimize contaminants into the public system.

## **VII. Future Drainage Conditions**

### **MIDDLE TRIBUTARY**

Design Point 30 and Basins OS-25 and OS-26 are as described under Existing Drainage Conditions. However, Basins OS-25 and OS-26 now route through proposed “future” detention pond, on what’s been previously referred to as the “School Site”, north of Bent Grass Meadows Drive and just west of Bent Grass Filing No. 2. This “future” pond will replace the current sedimentation pond on the “School Site”. Upon any additional development within the Middle Tributary area of the Bent Grass Development and north of Bent Grass Meadows Drive, this pond will need to be constructed to accommodate the re-routed flows from the Meadows Pond #2 at DP 30.

This future facility will need to provide 2.76 ac-ft of water quality, 6.26 ac-ft for EURV and 11.98 ac-ft for 100-year storage volume. Preliminary release rates for the 5 and 100-year storms are 3.8 cfs and 32.2 cfs. These flows were then routed to Bent Grass Meadows to the south. With the decrease in flows, flows will not overtop Bent Grass Meadows Drive and continue east to the future box culvert under Bent Grass Meadows Drive at DP BG20 (5-year flow=291.7 cfs, 100-year flow=914.3 cfs). Flows were still checked against street capacity on the north and south side of Bent Grass Meadows Drive, as it continues to the east. With the construction of the future pond, Bent Grass Meadows Drive will be able to adequately handle the flows and no additional storm infrastructure would need to be built to carry these future developed flows. Any area north of Bent Grass Meadows Drive that will develop in the future will need to provide its own on-site detention. Should future development not be able to release flows into Bent Grass Meadows Drive, a 42” RCP would be able to convey the flows of DP 15n (Q100=40.9 cfs, Q5=8.0 cfs) to the northwest corner of the Bent Grass Meadows Drive and Meridian Road intersection. Analysis for this culvert sizing has been included in the appendix.

At the Bent Grass Meadows Drive/Meridian Road intersection, the elliptical rcp’s will need to be replaced with a double 16’ x 4’ rcbc. The future roadside ditch will have a 15’ wide bottom channel with 4:1 side slope, 6.5’ deep and a longitudinal slope of 0.30%. This will result in a flow depth of 5.15’ and velocity of 5.04 fps. This channel will direct flows to Owl Place where the existing twin cmp’s will be replaced with a 20’ x 4’ rcbc or equivalent. This structure will need to be built when any development west of Meridian Road at the intersection of Owl Place happens. With future development, it is anticipated that the existing channel conveying flows to the south will be removed to accommodate the new development. The new channel will need to be a 35’ wide bottom channel with 4:1 sides, 5’ deep and a longitudinal slope of 0.30%. This will produce a flow depth of 3.7’ and a velocity of 4.6 fps. If the channel option is not viable, twin 78” rcp’s at a minimum 0.50% slope would be able to handle this future flow. Analysis for this design option has been included in the appendix.

Calculations are provided in Appendix C for the future culverts and roadside channel.



## WEST TRIBUTARY

Offsite flows entering the west tributary location of Bent Grass have not changed from what was discussed under Current Conditions. Reach RWT202 at the northwest corner of the development has a 100-year flow of 1000 cfs and Reach RWT204 has a flow of 43 cfs. These were obtained from the DBPS by Matrix. The Flood Insurance Study (FIS) by FEMA does not have flows evaluated this far north. The have a flow of 1482 cfs beginning at RWT210. The 8 undeveloped on-site basins for Bent Grass West have been replaced with 17 developed basins. These basins are found in the Falcon Meadows for Bent Grass PDR. A summary of these basins is provided below and are part of the hydrology analysis provided in Appendix B.

**Basin AA-1** (2.57 AC, Q5 = 4.2 cfs, Q100 = 9.9 cfs): a basin that includes residential lots & east half of Lemon Grass Road. It encompasses single-family residential lots. Runoff will flow from each lot onto the proposed public R.O.W. where proposed mountable curb and gutter will convey flows to **DP 4**. Flows will then enter a proposed CDOT Type 'R' inlet and will be piped into the existing Bent Grass Filing No. 2 WQCV pond located in Basin A-2 at **DP 6**.

**Basin AA-2** (2.28 AC, Q5 = 4.2 cfs, Q100 = 9.3 cfs): a basin that includes the west half of Lemon Grass Road and encompasses single-family residential lots. Runoff will flow from each lot onto the proposed public R.O.W. where proposed mountable curb and gutter will convey flows to **DP 5**. Flows will then enter a proposed CDOT Type 'R' inlet where it will be piped into the existing Bent Grass Filing No. 2 WQCV pond located in the south end of the basin.

From the existing WQCV in Bent Grass Filing No. 2, flows will be released into the West Tributary Channel, combining with the channel flows at **DP AA**. This design point corresponds to the upstream side of a twin set of box culverts crossing beneath Bent Grass Meadows Drive. Combined flows at this location are 270.3 cfs and 1188.7 cfs for the minor and major storm events. Design of these structures was part of the FDR for Bent Grass Residential Filing No. 1.

**Basin B-1** (5.25 AC, Q5 = 2.3 cfs, Q100 = 10.7 cfs): a basin that is in the center of the site and encompasses the existing rerouted channel RWT202 and existing improved channel RWT204, as well as a portion of rear lots. Flows will sheet flow into the existing channel where they will then be conveyed to **DP AA**.

**Basin CC-1** (9.07 AC, Q5 = 16.9 cfs, Q100 = 36.0 cfs): a basin that includes Sophia Lane, the west half of Sarin Trail, north portion of Kittrick Place, and encompasses single-family residential lots. Runoff will flow from each lot onto the proposed public R.O.W. where proposed mountable curb and gutter will convey flows to **DP 15**. Flows will then enter a proposed CDOT Type 'R' inlet where it will be piped to the proposed north WQCV pond at **DP 13**.

changed to DP 10

still not per plan

DP 15 & 12  
added to  
plan sheet

**Basin CC-2** (1.53 AC, Q5 = 4.6 cfs, Q100 = 9.8 cfs): It encompasses single-family residential lots including the east half of Sarin Trail. Runoff will flow from each lot onto the proposed public R.O.W. where proposed mountable curb and gutter will convey flows to **DP 12**. Flows will then enter a proposed CDOT Type 'R' inlet where it will be piped to the proposed north WQCV pond at **DP 13**.

changed to DP 10

**Basin CC-3** (1.88 AC, Q5 = 6.4 cfs, Q100 = 12.1 cfs): It encompasses Kittrick Place between Sarin Trail & Daelyn Drive, as well as single-family residential lots. Runoff will flow from each lot onto the proposed public R.O.W. where proposed mountable curb and gutter will convey flows to the intersection of Sarin Trail & Bent Grass Meadows Drive, releasing flows ultimately to the existing inlet at **DP 8**. Flows will then

enter an existing CDOT Type 'R' inlet on the north side of Bent Grass Meadows Drive, where it will then be released into the existing Filing No. 2 North WQCV Pond.

### 3.65 Updated area and flows

**Basin CC-4** (4.24 AC, Q5 = 6.5 cfs, Q100 = 17.8 cfs): It encompasses residential lots and open space between Sarin Trail & Bent Grass Meadows Drive. Runoff will flow from each lot onto the proposed open space, eventually releasing into the public R.O.W. of Bent Grass Meadows Drive, where existing curb and gutter will convey flows to **DP 8**. Flows will then enter an existing CDOT Type 'R' inlet where it will then be released into the existing Filing No. 2 North WQCV Pond.

**Basin CC-5** (0.45 AC, Q5 = 0.2 cfs, Q100 = 1.4 cfs): It encompasses the proposed north WQCV pond area. The stormwater within the proposed north WQCV pond will be released at a controlled rate, via an outlet structure with orifice holes, into the existing channel RWT204.

**Basin D-1** (9.07 AC, Q5 = 11.2 cfs, Q100 = 26.6 cfs): a basin along the west property line of the site. It encompasses single-family residential lots, Isabel Place, & west half of Daelyn Drive. Runoff will flow from each lot onto the proposed public R.O.W. where proposed mountable curb and gutter will convey flows to **DP 21**. Flows will then enter a proposed CDOT Type 'R' inlet where it will then be piped and ultimately outfall in the proposed south WQCV pond at **DP 31**.

22? changed to DP 22

changed to DP 45

**Basin D-2** (7.42 AC, Q5 = 15.5 cfs, Q100 = 32.2 cfs): a basin east of Basin D-1. It encompasses single-family residential lots, Isabel Place, Raylan Loop, Jolie Court, as well as the east half of Daelyn Drive. Runoff will flow from each lot onto the proposed public R.O.W. where proposed mountable curb and gutter will convey flows to **DP 14**. Flows will then enter a proposed CDOT Type 'R' inlet where it will then be piped and ultimately outfall in the proposed south WQCV pond at **DP 31**.

21? changed to DP 21

45? changed to DP 45

**Basin D-3** (2.03 AC, Q5 = 0.8 cfs, Q100 = 2.3 cfs): a basin that is in the southwest corner of the site, south of Basin D-1. It encompasses the backs of several proposed residential lots as well as proposed Swale D, along the west property line and Swale E (existing) along the south property line. Runoff will flow from basin OS-2 and OS-3 into Swale D and convey flows to the existing drainage swale (Swale E) which will convey flows to an existing area inlet at **DP 23**. This inlet will connect to a propose storm system which will route flows through the development and ultimately outfall at the south WQCV pond at **DP 31**.

changed to DP 45

**Basin D-4** (4.38 AC, Q5 = 7.8 cfs, Q100 = 16.6 cfs): a basin that is east of Bent Grass Meadows Drive. It encompasses single-family residential lots, Rowena Way, & portions of Linley Way, Jayla Trail, and 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 **DP 17**. Flows will then enter a proposed CDOT Type 'R' inlet where it will then be piped and ultimately outfall in the proposed south WQCV pond at **DP 31**.

42?

changed to DP 45

**Basin D-5** (1.08 AC, Q5 = 2.2 cfs, Q100 = 4.6 cfs): a basin at the southwest corner of Bent Grass Meadows Drive and Henzlee Place. It includes residential lots, as well as a portion of the north half of Nico Way and west half of Henzlee Place. Flows will be directed towards the public R.O.W. where proposed curb and gutter will convey flows to the south along Henzlee Place to **DP 18**. Flows will then enter a proposed CDOT Type 'R' inlet where it will then be piped and ultimately outfall in the proposed south WQCV pond at **DP 31**.

changed to DP 42

changed to DP 45

43?

changed to DP 43

**Basin D-6** (4.01 AC, Q5 = 8.2 cfs, Q100 = 17.2 cfs): a basin south of Basin D-5 & east of Basin D-4. It encompasses single-family residential lots & half of Linley Way, Jayla Trail, Henzlee Place, & Nico Way. Runoff will flow from each lot onto the proposed public R.O.W. where proposed mountable curb and

changed to DP 43

gutter will convey flows to **DP 18**. Flows will then enter a proposed CDOT Type 'R' inlet where it will then be piped and ultimately outfall in the proposed south WQCV pond at **DP 31**.

changed to DP 45

**Basin D-7** (6.39 AC, Q5 = 3.2 cfs, Q100 = 14.8 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 proposed south WQCV pond, an existing sediment basin, and an existing drainage ditch. Runoff will flow, via sheet flow, until it enters the existing drainage ditch, Swale F, and is conveyed to the proposed south WQCV pond or will directly flow into the proposed south WQCV pond.

**Basin D-8** (1.69 AC, Q5 = 1.3 cfs, Q100 = 4.5 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 a proposed drainage ditch. The drainage ditch (Swale C) will then convey flows, ultimately discharging into the proposed south WQCV pond at **DP 32**.

changed to DP 44

**Basin B-2** (4.16 AC, Q5 = 1.4 cfs, Q100 = 9.1 cfs): a basin that is in the south area of the site and encompasses the existing channel RWT210. Flows will sheet flow into the existing channel where they will then be conveyed to **DP CC** exiting the site.

Basins E-1 thru E-5 are the same as discussed under the Existing Conditions Section, as these basins represent the already built Bent Grass Meadows Drive through the proposed site.

The Bent Grass West development accounts for 2 additional water quality facilities to be built. These items were preliminarily designed in the Falcon Meadows for Bent Grass PDR and will be final designed with the FDR for Bent Grass Meadows Filing No. 3.

1 and 3?

Revised to Falcon Meadows @BG No. 1 & No. 2

still does not make sense

Final flows exiting the site from the West Tributary at **DP CC** for the future design analysis are 200.2 cfs for the 5-year storm and 1183.4 cfs for the 100-year storm. This does take into account flows from RWT202, RWT 204 and Basin WT200. These flows are less than the current conditions (Q100=1224.7 cfs, Q5=278.3 cfs) at this location, due to the additional WQ ponds being built and storm infrastructure with this "future" development. This allows for additional flow to be "held back" and longer routing of flows through the site. Flows will continue offsite through the West Tributary, eventually reaching the existing Pond WU. Flows exiting the project site correspond to channel reach RWT210 in the HEC HMS models.

261?

1169?

South of the Bent Grass development, conditions are the same as discussed under the Current Conditions Section, specifically in regard to DBPS Basins WT210 and WT220.

compare to existing (pre-Bent Grass Res. 2)

A future conditions drainage map has been prepared for this area. The proposed map is included in Appendix D.

## VIII. Proposed Channel

### MIDDLE TRIBUTARY

Have updated flows and made clear what flows are from which models and try to compare only rational to rational and HMS to HMS flows.

1040 per previous model - how did this increase? DBPS only has 950 at Woodmen Road

Although the existing channel and culverts are undersized and improvements will need to be made in the future, minimal channel improvements are being proposed at this time, along with the construction of the right turn lane on Bent Grass Meadows Drive, the three RCP pipes will be extended approximately 15' to span the extended width of the roadway. Additionally, two RCP pipes will be installed under Bent Grass Meadows Drive to convey the flow from the existing channel.

Added how flows would increase due to development of Falcon Meadows, additional area from Mid Trib, etc

channel will need to be lined with a temporary turf reinforcement mat (TRM) due to the excessive velocities (9.91 fps), high shear stress (5.11 lbs/ft<sup>2</sup>) & high Froude Number (1.12). With the TRM added to the channel sides, the allowable velocity is 25 fps and permissible shear stress is 12 lbs/ft<sup>2</sup>. An analysis of the channel with the TRM is provided in the Appendix.

In the future, El Paso County will need to improve the existing culverts and channel to adequately convey the flow outlined in the DBPS. These necessary improvements and associated calculations are described further below. A preliminary grading exhibit has been prepared showing these improvements and included in Appendix C.

Similar to the existing channel, Bentley Flowmaster was also used to design the future proposed channel section. The future channel was designed to have a maximum depth of 5' per the criteria manual and have a maximum velocity of 5 ft/s with a maximum Froude number of 0.6. The flow rate used for the design, 925 cfs, was taken from the Falcon DBPS flow combined with the additional off-site drainage coming from the "School Site" and

The future channel section was designed as a trapezoidal shape with a 15' bottom width, 4:1 side slope, and 0.3% longitudinal slope. The total depth of the channel will be 6', providing 1' of freeboard for the 5' of water depth. The velocity of the proposed channel is 4.93 ft/s.

The Federal Highway Administration's HY-8 program was also utilized to design the future culverts that will run beneath Bent Grass Meadows Drive. The calculations included in Appendix C show that in order to adequately convey the 915 cfs in the future conditions, two 16'x4' concrete box culverts will need to replace the existing elliptical RCP's. In order to construct the box culverts, the channel will need to be flattened from downstream to create roughly 5' of additional clearance below the road.

#### WEST TRIBUTARY

state what the combined rerouted flows are to DP AA (Q5=270, Q100=1,180, FEMA Q100=1,400).

The Falcon Area DBPS made rerouting of RWT202 was rerouted on the north side of the channel. The channel was designed as part of the Bent Grass Meadows Drive project. Improvements were made to the channel through the project site.

Added in flows from future rational calculations as well as FEMA flow rate for channel section RWT204

The RWT204 is grossly oversized for the actual flows expected through it, with a 100 year flow for 43 cfs from the DBPS study. Improvements to this section of the channel will adhere and be equivalent to the recommendations in the Falcon Basin DBPS.

RWT204 will generally stay in a location similar to where it is in existing conditions but will have new designed channel sections. The channels will have longitudinal slopes flattened to below 1% in order to reduce the scour potential of the channel. Grouted Sloping Boulder Drops may be utilized within the channel as grade controls (maximum height of 4' with 4:1 slope). It is anticipated that 7 grade control structures will be utilized within the channel. This may change when final design of the channel is completed.

RWT210 is the section of the channel south of Bent Grass Meadows Drive and continues south to Woodmen Road. The channel location will shift slightly to the east and "straighten" out the overall flow path. It will be located within a drainage easement. The channel will have a design with a longitudinal slope less than 1.5%, bottom width of 38', and 4:1 side slopes. The Falcon DBPS recommendations for the channel are to remain as a natural drainage channel. Grade control structures may be utilized within the channel to meet design requirements.

mention the proposed type and approximate number of grade control structures

Improvements to the existing channel are outlined in the DBPS. At this time, it is assumed that the recommended channel improvements will be sufficient to handle the final developed channel flow. At the time of final design of the channel, if it is determined that additional improvements are necessary, they will be designed at that time and will be incorporated into the corresponding Final Drainage Report for the channel improvements.

Information added

The West Trib Channel (RWT202, RWT204 & RWT210) will be maintained by the Bent Grass Metropolitan District. For channel improvements offsite of the Falcon Meadows at Bent Grass Filing No. 1 and Bent Grass Residential Filing 2 property, specifically south of the development, it is agreed that the developer will be responsible for future channel improvements, south of the development, to the existing improvements north of Woodmen Road if the current property owners have not initiated the future improvements themselves. Or the developer will work with the current property owners to reach an agreement on design/construction, costs, and timing of the channel improvements. A schedule will be in place prior to approval of Falcon Meadows at Bent Grass Filing No. 1. And improvements shall be complete within three years of the recordation of Falcon Meadows at Bent Grass Filing No. 4.

Exhibit showing filing boundaries has been added at beginning of Appendix D

provide a plan showing the areas of the proposed filings

## IX. Proposed & Future Hydrology Modeling (HEC-HMS)

The updated Falcon Basin DBPS by Matrix looked at several design alternatives for the area to help with undersized ponds throughout the area. The preferred method for dealing with this deficiency was the design and construction of sub-regional ponds throughout the area. The Bent Grass development site impacts one of these ponds, SR4.

The HEC-HMS model, which was used in the Falcon DBPS, was updated. Updates to the model included:

- Meadows Pond #2 stage/storage & stage/elevation data based on stage/storage data in DBPS
- Adding in existing sedimentation pond at "school site" location
- Breaking up Basin MT060 into 2 basins (MT060a & MT060) to account "school site" pond
- Updated Pond SR4 based on approved construction drawing information
- Basin MT070 updated to show future improvements within the basin

As previously mentioned, the DBPS identified a pond named SR3 at the junction of RWT202 and RWT204 near the south end of the Bent Grass Residential Subdivision. Per the approved FDR for Bent Grass Filing No. 2 and the PDR for Falcon Meadows at Bent Grass, 4 separate water quality ponds will be situated through the Bent Grass site to in lieu of the SR3 pond. The 4 ponds were small enough in volume that they were not incorporated into the HMS model, but are accounted for in the rational modeling within the site.

These on-site water quality ponds will treat runoff prior to releasing it into the channel. The two water quality ponds associated with the Bent Grass Filing No. 2 have a volume of approximately 1 acre-foot just for water quality and therefore eliminating the SR3 pond, which never provided detention. The existing channel will remain in place.

## X. Proposed Water Quality

The Middle Tributary site does not include the addition of any proposed water quality or detention ponds, under the current scenario. Under future conditions, additional water quality facilities will be necessary for any new development and detention will be required for new development north of Bent Grass Meadows



Drive. Also, in the future conditions scenario, Pond SR-4 and existing Pond MN from the Falcon DBPS will receive flows from the improved school site. The HEC-HMS has been updated and is included in Appendix B. As discussed previously, the "School Site" have been added as an additional Basin MT060a, which is routed to the regional detention facility SR-4.

Basin MT070, described in the Falcon DBPS, was analyzed to include the improvements made to the site within Basin MT070 and the effects it has on existing Pond MN.

From the analysis, Pond SR-4's 100-yr. receiving flows decreased from 1,000 cfs to 952.1 cfs. Based on the increase in impervious area, Basin MT070's Curve Number increased from 67 to 68. Subsequently, the 100-yr. receiving flows entering existing Pond MN decreased to 720.0 cfs from 850 cfs.

Release rates for SR-4 are 11.2 cfs for the 2-year storm and 607.7 cfs for the 100-year storm. Falcon DBPS has 2-year storm listed as 27 cfs and 100-year storm as 730 cfs. This gives a decrease of 15.8 cfs and 122.3 cfs for the 2 and 100-year events respectively.

Pond MN release rates 30.9 for the 2-year storm and 686.6 cfs for the 100-year storm. The DBPS has release rates listed as 32 cfs for the 2-year storm and 820 cfs for the 100-year storm. This gives a decrease of 1.1 cfs and 133.4 cfs for the 2 and 100-year events respectively.

The West Tributary site does include the addition of proposed water quality ponds with the Bent Grass development, under the current scenario. Under future conditions, additional water quality facilities will be necessary for any other new developments. Existing Pond WU, further south **only** the West Tributary, near Highway 24, is regional detention facility for areas just upstream of the pond, as well as providing water quality for **the same** Falcon Highlands area. **Added** **the west side of?** **Added** **provide contributing acreage**

Pond WU release rates 45.0 for the 2-year storm and 925.0 cfs for the 100-year storm. The DBPS has release rates listed as 55 cfs for the 2-year storm and 1000 cfs for the 100-year storm. This gives a decrease of 10.0 cfs and 75 cfs for the 2 and 100-year events respectively.

## XI. Maintenance

The proposed channels are to be private facilities. They will be maintained by the Bent Grass Metropolitan district. When completion of future DBPS construction improvements and upon the Board of County Commissioners acceptance the channels, Reaches RWT 204 & RWT210, will then be owned and maintained by El Paso County along with all drainage facilities within the public Right-of-Way.

## XII. Wetlands Mitigation

No wetlands are located on site.

## XIII. Floodplain Statement

According to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map number 08041C0553G, effective December 7, 2018, there is a floodplain in a portion of the project area. A copy of the FIRM Panel is included in Appendix A.

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. Since there is a discrepancy between the DPBS and FEMA maps, the RWT202

channel has been rerouted to follow the north Bent Grass property line and connect to the RWT204 channel. No-rise certifications are complete, and permit issued. No LOMR is anticipated or proposed at this time.

## XIV. Fee Development

At this time, it is being requested to add the improvement of the culverts at the Bent Grass Meadows Drive/Meridian Road intersection to the reimbursable list of storm facilities presented in the Falcon DBPS. Based on the estimate shown below, the box culvert would add \$429,749.00 to the overall bridge construction costs.

Item	Quantity	Unit	Unit Cost	Cost
Culvert (Concrete Box Culvert) (Public)				
4' x 16' Concrete Box Culvert (Double)	190	LF	\$ 1,600.00	\$ 304,000.00
30" Grouted Boulders	164	SY	\$ 190.00	\$ 31,160.00
Soil Rip Rap - Type M	52.44	CY	\$ 100.00	\$ 5,244.00
Headwalls - Concrete	35	CY	\$ 850.00	\$ 29,750.00
Wingwalls - Concrete	60	CY	\$ 850.00	\$ 51,000.00
Headwalls - Steel Reinforcement	1300	LBS	\$ 1.50	\$ 1,950.00
Wingwalls - Steel Reinforcement	4430	LBS	\$ 1.50	\$ 6,645.00
<b>Total</b>				<b>\$ 429,749.00</b>

In Section 7.0 Fee Development of the Falcon Basin DBPS, it was shown that the Development Cost for Bridge Improvements was \$2,058,474. With the addition of the box culvert at Bent Grass Meadows Drive/Meridian Road, this estimate would raise to \$2,488,223. The Drainage Improvement costs shown in the DBPS for Development were \$14,988,251. The DBPS fees were based on (Refer to DBPS for detailed information on area breakdown).

Added in crossing at BGMD

see comment letter

The Bridge Fee per Impervious acre was \$3,189 and Drainage Fee was \$23,217. There are no improvements to facilities falling under the Drainage Fee criteria. The Bridge fee will increase. Based on the new overall bridge development fee of \$2,488,223, the fee per impervious acre will be \$3,793, an increase of \$604 per impervious acre.

(needs to be verified based on platted areas)

It is requested that the Drainage Board verify the Falcon Basin Bridge Fees.

Added statement that this will need to be verified

## XV. Conclusion

This report has been prepared using the criteria and methods as described in the El Paso County Drainage Criteria Manual. For the Middle Tributary portion of the site, it has been shown that under current conditions, existing facilities will function. Recommendations for future facilities have been provided for an EURV pond on the "school site", Bent Grass Meadows Drive/Meridian Road intersection and the Owl Place crossing. Also, it has been noted that any new development in this area will need to provide their own on-site water quality and detention. Under the current conditions, there are no adverse impacts to the sub-regional SR4 pond or the Regional Pond MN, further downstream.

For the West Tributary areas, several water quality facilities are being proposed/constructed. These items will treat developed flows prior to being released into the channel for the West Tributary. The West

Tributary Channel will meet the design requirements of the Falcon DBPS. Bent Grass Metropolitan District will maintain the channel. If after a pre-determined amount of the time, current property owners have not initiated any of channel improvements themselves, the developer will build the remaining channel improvements to Woodmen Road. Or the developer may work with the current property owners to reach a pre-approved agreement on design/construction, costs and timing of these channel improvements, which would need to be “in-place” prior to the approval for the first plat of the Falcon Meadows at Bent Grass development. An agreement and schedule will be in place prior to approval of Falcon Meadows at Bent Grass Filing No. 1.

Upon entering the channel, flows will leave the Bent Grass property and continue south, eventually reaching the Regional Pond WU. There are no adverse impacts to this facility.

## **XVI. 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 – Bent Grass Residential Subdivision*, by Galloway & Company, May 2019.
9. *Final Drainage and Erosion Control for The Meadows Filing 3 Subdivision*, by LADD Engineering, July 2000.
10. *Final Drainage Report for Bent Grass Residential Filing No. 2*, by Galloway & Company, April 2020.
11. *Meridian Road & Bent Grass Meadows Drive*, by Galloway & Company, September 2020.
12. *Preliminary Drainage Report Falcon Meadows at Bent Grass*, by Galloway & Company, December 2020.
13. *Preliminary Drainage Report for Bent Grass East Commercial-Phase 1 (Preliminary Plan) -Final Drainage Report for Bent Grass East Commercial Filing No. 1-Lot 1 (Final Plat) & Addendum No. 1 (7-11 Development)*, by Classic Consulting Engineers & Surveyors, LLC, April 2013.
14. *Final Drainage Report for Bent Grass East Commercial Filing No. 2*, by Classic Consulting Engineers & Surveyors, July 2014.
15. *Drainage Letter Report for Falcon Dental Lot 2A, Bent Grass East Commercial Filing No. 2A*, by JPS Engineering, April 2016.



**APPENDIX A**  
**Exhibits and Figures**



## FALCON MEADOWS AT BENT GRASS

BENT GRASS MEADOWS DRIVE

SCALE: 1"=2,000'

### VICINITY MAP

Project No: CLH000017.20

Drawn By: TJE

Checked By: CMD

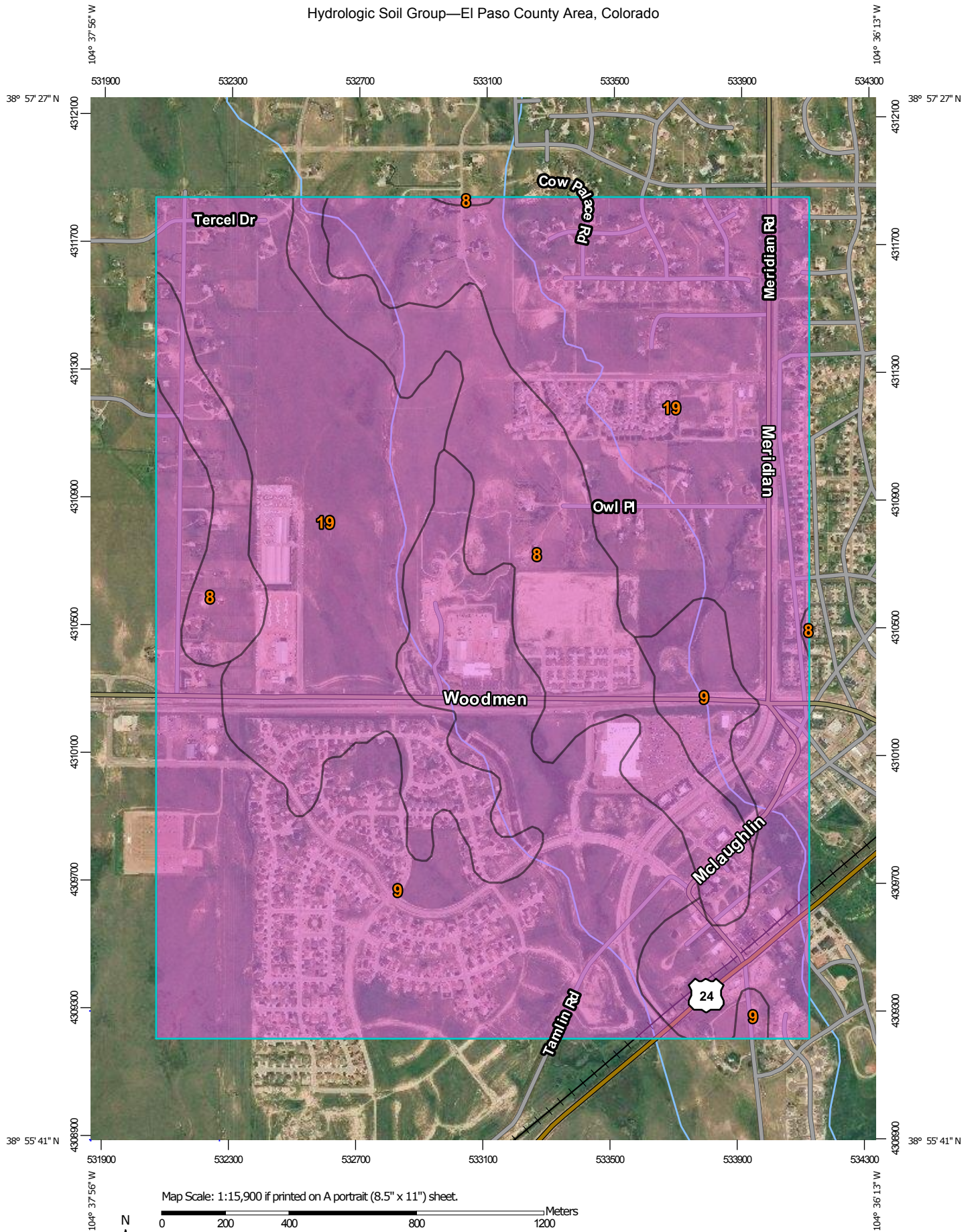
Date: 06/19/2020

# Galloway

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Colorado Springs, CO 80920  
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# Hydrologic Soil Group—El Paso County Area, Colorado



**Natural Resources  
Conservation Service**

Web Soil Survey  
National Cooperative Soil Survey

4/2/2019  
Page 1 of 4

## 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%
<b>Totals for Area of Interest</b>			<b>1,342.6</b>	<b>100.0%</b>

## 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



## 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 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, NIMS12  
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.

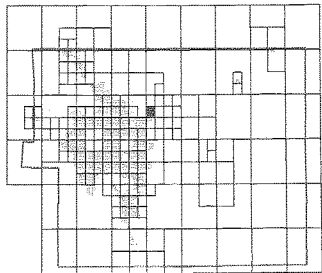
Contact **FEMA Map Service Center (MSC)** via the FEMA Map Information eXchange (FMIX) 1-877-336-2627 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. The MSC may also be reached by Fax at 1-800-358-9820 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/nfp>.

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**

- 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.

Base Flood Elevation line and value; elevation in feet\*

Base Flood Elevation value where uniform within zone; elevation in feet\*

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

Cross section line

Transect line

Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)

1000-meter Universal Transverse Mercator grid ticks, zone 13

5000-foot grid ticks: Colorado State Plane coordinate system, central zone (FIPS ZONE 0502), Lambert Conformal Conic Projection

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

6000000 FT

DX5510

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.

# FALCON DRAINAGE BASIN PLANNING STUDY

## SELECTED PLAN REPORT

### FINAL - SEPTEMBER 2015

Prepared for:



El Paso County Public Services Department  
3275 Akers Drive  
Colorado Springs, CO 80922

Prepared By:

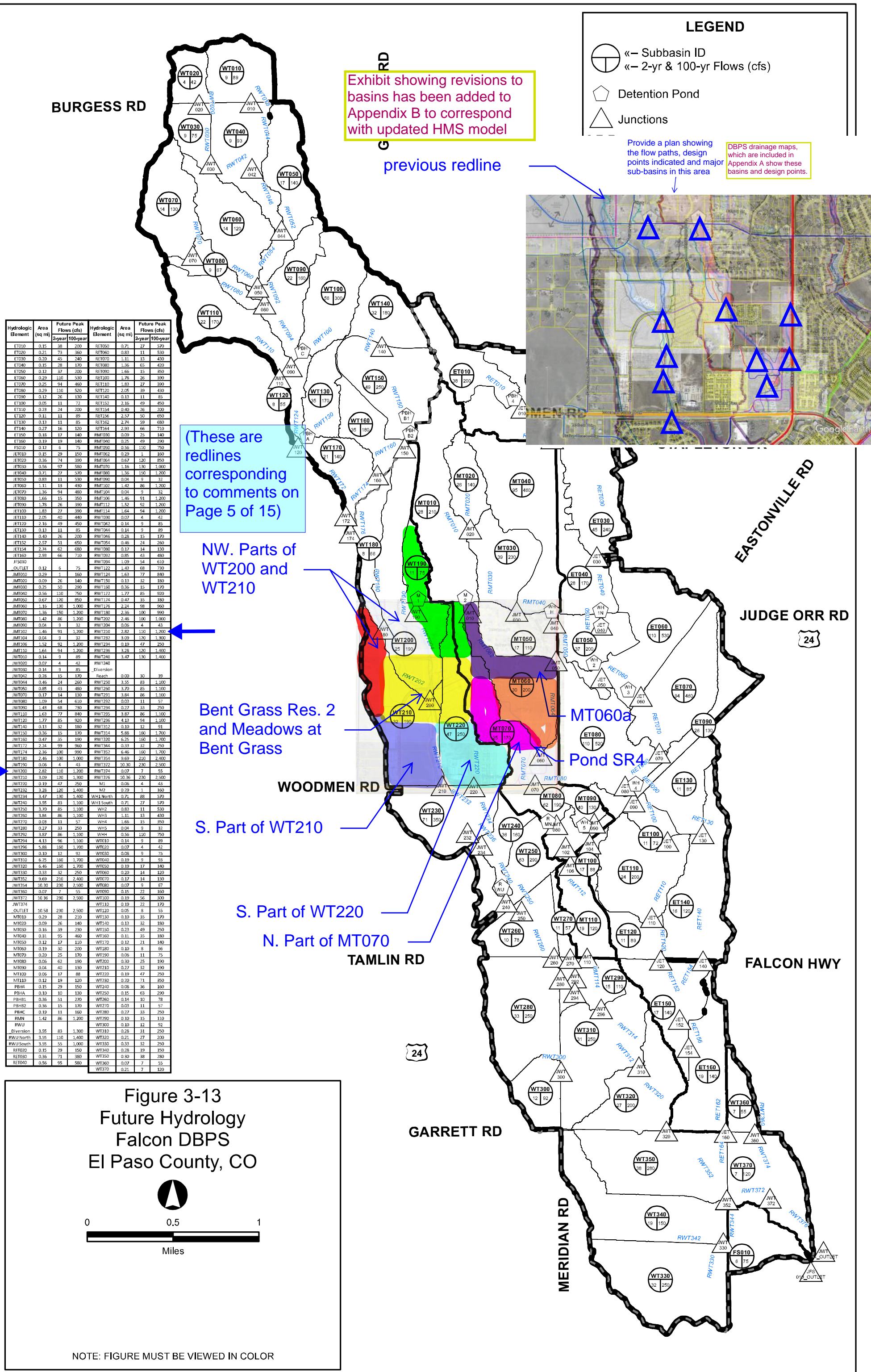


Matrix Design Group  
2435 Research Parkway, Suite 300  
Colorado Springs, CO 80920

Matrix Project No. 10.122.003









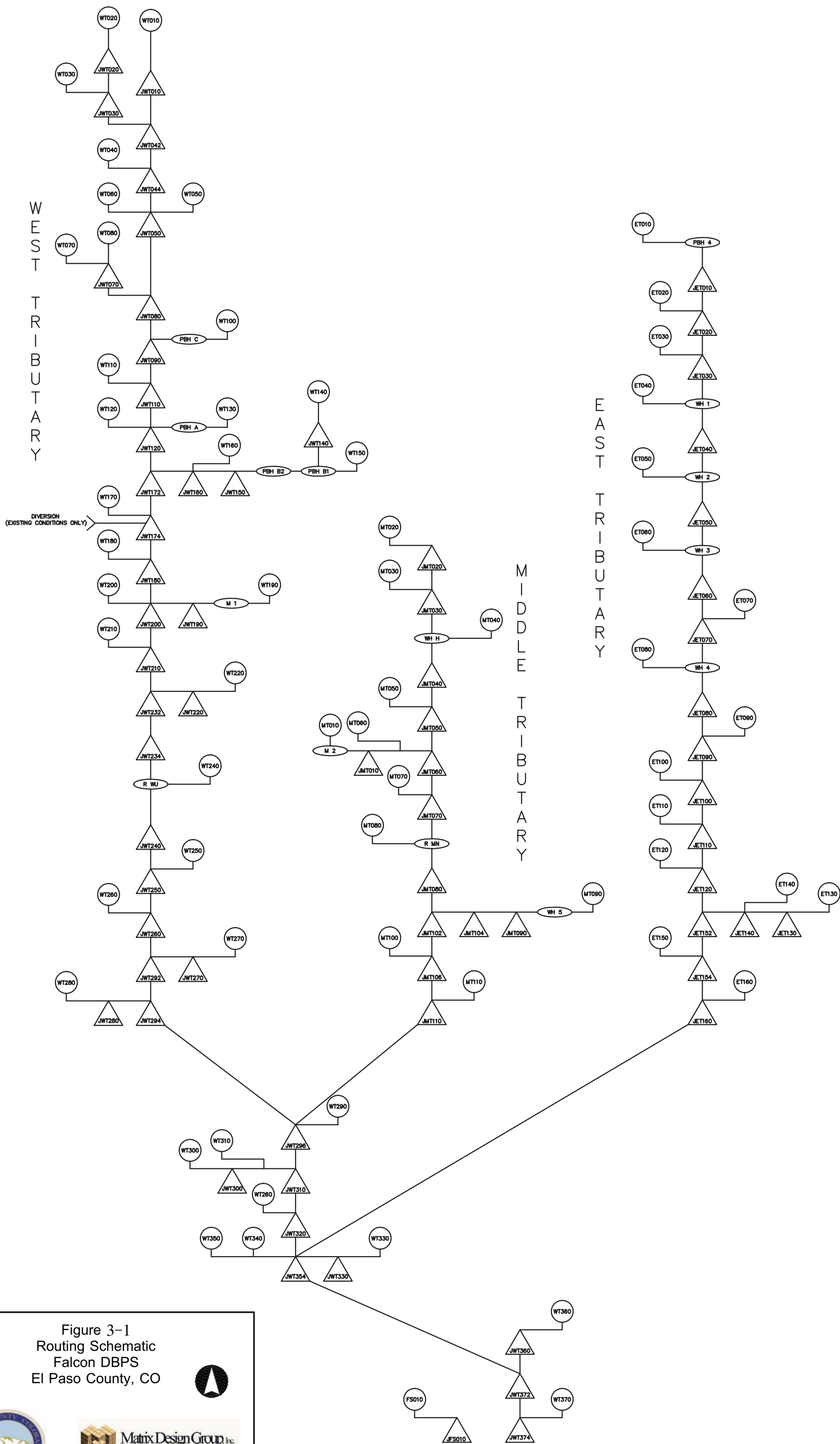


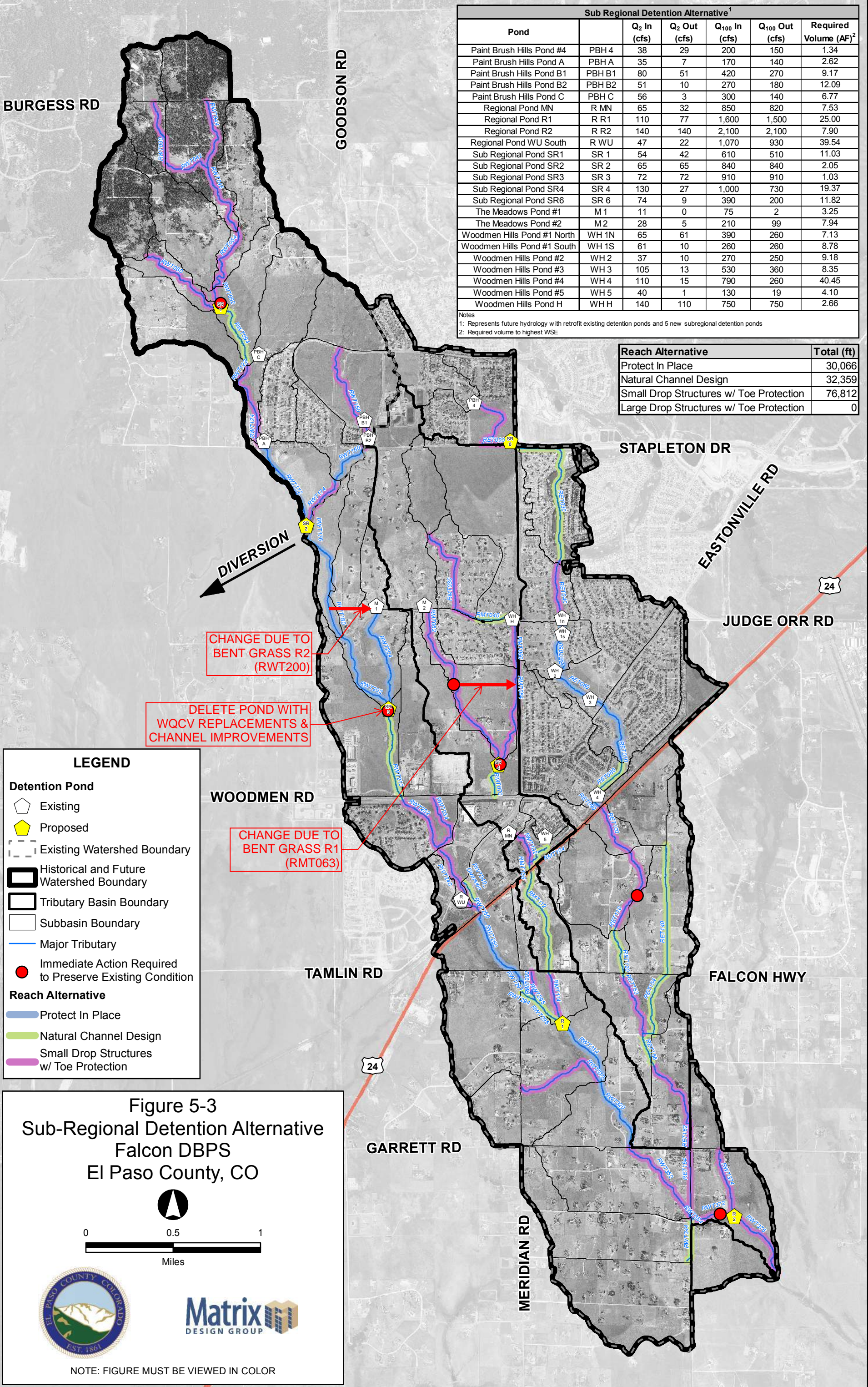
Figure 3-1  
Routing Schematic  
Falcon DBPS  
El Paso County, CO



DRAWING NOT TO SCALE



FILE: G:\gis\_projects\Falcon\_Creek\_DBPS\active\subregional\_detention\_alt.mxd, 12/19/2011, ron\_ramold





Falcon DBPS  
Peak Flow Results

Hydrologic Element	Area (sq mi)	Future Peak Flows (cfs)					
		2-year	5-year	10-year	25-year	50-year	100-year
ET010	0.15	38	67	90	140	170	200
ET020	0.21	73	130	170	260	310	360
ET030	0.20	45	81	110	170	210	240
ET040	0.15	28	53	72	120	140	170
ET050	0.12	37	67	89	140	170	200
ET060	0.29	110	190	250	380	450	530
ET070	0.25	94	160	220	330	400	460
ET080	0.29	110	190	250	380	450	520
ET090	0.12	26	46	61	95	110	130
ET100	0.05	11	22	31	50	61	72
ET110	0.23	24	53	76	130	160	200
ET120	0.11	11	24	34	59	74	89
ET130	0.13	11	23	33	57	71	85
ET140	0.27	16	33	48	82	100	120
ET150	0.18	17	37	53	91	110	140
ET160	0.19	19	39	55	92	110	140
FS010	0.12	6	17	26	48	61	75
JET010	0.15	29	49	64	110	130	150
JET020	0.36	74	130	170	270	330	390
JET030	0.56	97	180	250	410	500	580
JET040	0.71	27	85	140	380	500	570
JET050	0.83	11	38	88	210	380	530
JET060	1.11	13	32	68	210	300	430
JET070	1.36	94	170	220	350	420	480
JET080	1.66	15	38	61	200	270	350
JET090	1.78	26	47	81	200	290	390
JET100	1.83	27	49	83	200	290	390
JET110	2.05	40	85	120	210	320	440
JET120	2.16	49	110	160	270	340	450
JET130	0.13	11	23	33	57	71	85
JET140	0.40	26	55	80	140	170	200
JET152	2.57	51	120	180	350	500	650
JET154	2.74	62	140	200	370	530	680
JET160	2.93	66	150	230	410	550	710
JFS010_OUTLET	0.12	6	17	26	48	61	75
JMT010	0.29	1	11	25	62	120	160
JMT020	0.09	26	47	64	100	120	140
JMT030	0.25	50	94	130	200	250	290
JMT040	0.56	110	240	330	520	620	750
JMT050	0.67	120	280	380	590	710	850
JMT060	1.16	130	310	430	700	850	1,000
JMT070	1.36	150	350	490	800	980	1,200
JMT080	1.42	86	330	490	810	980	1,200
JMT090	0.04	9	15	18	25	29	32
JMT102	1.46	91	330	500	820	1,000	1,200
JMT104	0.04	9	15	18	25	29	32
JMT106	1.52	92	320	490	820	1,000	1,200
JMT110	1.64	94	320	500	830	1,000	1,200
JWT010	0.14	9	21	32	58	73	89
JWT020	0.07	4	10	15	27	34	42
JWT030	0.14	9	20	30	55	69	85
JWT042	0.28	15	37	57	110	140	170
JWT044	0.46	24	59	89	170	210	260
JWT050	0.85	43	110	170	310	390	480
JWT070	0.17	14	33	49	87	110	130
JWT080	1.09	54	140	210	400	500	610
JWT090	1.43	68	160	250	480	610	730
JWT110	1.63	77	170	280	530	690	840
JWT120	1.77	85	190	300	570	730	920
JWT140	0.13	32	59	80	130	150	180
JWT150	0.36	15	19	39	97	140	170
JWT160	0.47	35	64	85	130	160	190
JWT172	2.24	99	210	320	600	760	960
JWT174	2.36	100	210	330	610	780	990

Hydrologic Element	Area (sq mi)	Future Peak Flows (cfs) - Regional Detention					
		2-year	5-year	10-year	25-year	50-year	100-year
ET010	0.15	38	0	0	0	0	200
ET020	0.21	73	0	0	0	0	360
ET030	0.20	45	0	0	0	0	240
ET040	0.15	28	0	0	0	0	170
ET050	0.12	37	0	0	0	0	200
ET060	0.29	110	0	0	0	0	530
ET070	0.25	94	0	0	0	0	460
ET080	0.29	110	0	0	0	0	520
ET090	0.12	26	0	0	0	0	130
ET100	0.05	11	0	0	0	0	72
ET110	0.23	24	0	0	0	0	200
ET120	0.11	11	0	0	0	0	89
ET130	0.13	11	0	0	0	0	85
ET140	0.27	16	0	0	0	0	120
ET150	0.18	17	0	0	0	0	140
ET160	0.19	19	0	0	0	0	140
FS010	0.12	6	0	0	0	0	75
JET010	0.15	29	0	0	0	0	150
JET020	0.36	74	0	0	0	0	390
JET030	0.56	97	0	0	0	0	580
JET040	0.71	14	0	0	0	0	620
JET050	0.83	10	0	0	0	0	540
JET060	1.11	14	0	0	0	0	510
JET070	1.36	94	0	0	0	0	660
JET080	1.66	14	0	0	0	0	400
JET090	1.78	30	0	0	0	0	410
JET100	1.83	32	0	0	0	0	410
JET110	2.05	42	0	0	0	0	440
JET120	2.16	50	0	0	0	0	470
JET130	0.13	11	0	0	0	0	85
JET140	0.40	26	0	0	0	0	200
JET152	2.57	55	0	0	0	0	660
JET154	2.74	62	0	0	0	0	690
JET160	2.93	67	0	0	0	0	720
JFS010_OUTLET	0.12	6	0	0	0	0	75
JMT010	0.29	5	0	0	0	0	99
JMT020	0.09	26	0	0	0	0	140
JMT030	0.25	50	0	0	0	0	290
JMT040	0.56	110	0	0	0	0	750
JMT050	0.67	120	0	0	0	0	850
JMT060	1.16	130	0	0	0	0	1,000
JMT070	1.36	150	0	0	0	0	1,200
JMT080	1.42	140	0	0	0	0	1,100
JMT090	0.04	1	0	0	0	0	19
JMT102	1.46	140	0	0	0	0	1,100
JMT104	0.04	1	0	0	0	0	19
JMT106	1.52	140	0	0	0	0	1,100
JMT110	1.64	140	0	0	0	0	1,100
JWT010	0.14	9	0	0	0	0	89
JWT020	0.07	4	0	0	0	0	42
JWT030	0.14	9	0	0	0	0	85
JWT042	0.28	15	0	0	0	0	170
JWT044	0.46	24	0	0	0	0	260
JWT050	0.85	43	0	0	0	0	480
JWT070	0.17	14	0	0	0	0	130
JWT080	1.09	54	0	0	0	0	610
JWT090	1.43	60	0	0	0	0	770
JWT110	1.63	69	0	0	0	0	880
JWT120	1.77	73	0	0	0	0	950
JWT140	0.13	32	0	0	0	0	180
JWT150	0.36	10	0	0	0	0	180
JWT160	0.47	35	0	0	0	0	190
JWT172	2.24	79	0	0	0	0	980
JWT174	2.36	81	0	0	0	0	1,000

Hydrologic Element	Area (sq mi)	Future Peak Flows (cfs) - Sub Regional Detention					
		2-year	5-year	10-year	25-year	50-year	100-year
ET010	0.15	38	0	0	0	0	200
ET020	0.21	73	0	0	0	0	360
ET030	0.20	45	0	0	0	0	240
ET040	0.15	28	0	0	0	0	170
ET050	0.12	37	0	0	0	0	200
ET060	0.29	110	0	0	0	0	530
ET070	0.25	94	0	0	0	0	460
ET080	0.29	110	0	0	0	0	520
ET090	0.12	26	0	0	0	0	130
ET100	0.05	11	0	0	0	0	72
ET110	0.23	24	0	0	0	0	200
ET120	0.11	11	0	0	0	0	89
ET130	0.13	11	0	0	0	0	85
ET140	0.27	16	0	0	0	0	120
ET150	0.18	17	0	0	0	0	140
ET160	0.19	19	0	0	0	0	140
FS010	0.12	6	0	0	0	0	75
JET010	0.15	29	0	0	0	0	150
JET020	0.36	9	0	0	0	0	200
JET030	0.56	45	0	0	0	0	270
JET040	0.71	10	0	0	0	0	260
JET050	0.83	10	0	0	0	0	250
JET060	1.11	13	0	0	0	0	360
JET070	1.36	94	0	0	0	0	640
JET080	1.66	15	0	0	0	0	260
JET090	1.78	30	0	0	0	0	300
JET100	1.83	32	0	0	0	0	300
JET110	2.05	42	0	0	0	0	360
JET120	2.16	50	0	0	0	0	400
JET130	0.13	11	0	0	0	0	85
JET140	0.40	26	0	0	0	0	200
JET152	2.57	55	0	0	0	0	560
JET154	2.74	62	0	0	0	0	590
JET160	2.93	67	0	0	0	0	640
JFS010_OUTLET	0.12	6	0	0	0	0	75
JMT010	0.29	5	0	0	0	0	99
JMT020	0.09	26	0	0	0	0	140
JMT030	0.25	50	0	0	0	0	290
JMT040	0.56	110	0	0	0	0	750
JMT050	0.67	120	0	0	0	0	850
JMT060	1.16	27	0	0	0	0	730
JMT070	1.36	31	0	0	0	0	840
JMT080	1.42	32	0	0	0	0	820
JMT090	0.04	1	0	0	0	0	19
JMT102	1.46	33	0	0	0	0	840
JMT104	0.04	1	0	0	0	0	19
JMT106	1.52	33	0	0	0	0	840
JMT110	1.64	34	0	0	0	0	860
JWT010	0.14	9	0	0	0	0	89
JWT020	0.07	4	0	0	0	0	42
JWT030	0.14	9	0	0	0	0	85
JWT042	0.28	15	0	0	0	0	170
JWT044	0.46	24	0	0	0	0	260
JWT050	0.85	43	0	0	0	0	480
JWT070	0.17	14	0	0	0	0	130
JWT080	1.09	42	0	0	0	0	510
JWT090	1.43	47	0	0	0	0	620
JWT110	1.63	51	0	0	0	0	680
JWT120	1.77	55	0	0	0	0	710
JWT140	0.13	32	0	0	0	0	180
JWT150	0.36	10	0	0	0	0	180
JWT160	0.47	35	0	0	0	0	190
JWT172	2.24	63	0	0	0	0	830
JWT174	2.36	65	0	0	0	0	840

Falcon DBPS  
Peak Flow Results

Hydrologic Element	Area (sq mi)	Future Peak Flows (cfs)					
		2-year	5-year	10-year	25-year	50-year	100-year
JWT180	2.46	100	220	330	620	800	1,000
JWT190	0.06	4	7	12	26	35	43
JWT200	2.82	110	230	360	690	890	1,200
JWT210	3.09	120	250	400	760	990	1,300
JWT220	0.19	47	85	110	180	210	250
JWT232	3.28	120	260	410	790	1,000	1,400
JWT234	3.47	130	270	420	810	1,000	1,400
JWT240	3.55	83	200	380	770	940	1,100
JWT250	3.70	85	210	390	780	950	1,100
JWT260	3.84	86	210	390	790	970	1,100
JWT270	0.03	11	20	27	41	49	57
JWT280	0.27	33	70	100	170	210	250
JWT292	3.87	86	210	390	790	970	1,100
JWT294	4.13	96	210	400	800	990	1,100
JWT296	5.88	160	410	620	1,100	1,400	1,700
JWT300	0.10	12	26	36	62	76	92
JWT310	6.25	160	420	640	1,100	1,400	1,700
JWT320	6.46	160	410	630	1,100	1,400	1,700
JWT330	0.33	32	68	98	170	210	250
JWT352	9.69	210	530	820	1,400	2,000	2,400
JWT354	10.30	230	560	870	1,500	2,000	2,500
JWT360	0.07	7	15	21	37	46	55
JWT372	10.36	230	560	860	1,500	2,000	2,500
JWT374_OUTLET	10.58	230	560	860	1,500	2,000	2,500
MT010	0.29	28	58	82	140	170	210
MT020	0.09	26	47	64	100	120	140
MT030	0.16	39	73	100	160	190	230
MT040	0.31	95	160	220	330	390	460
MT050	0.12	17	33	46	76	92	110
MT060	0.19	30	59	83	140	170	200
MT070	0.20	25	50	69	110	140	170
MT080	0.06	62	92	110	150	170	190
MT090	0.04	40	59	73	100	110	130
MT100	0.06	17	30	40	63	75	88
MT110	0.12	19	36	50	81	99	120
Paint Brush Hills Pond #4	0.15	29	49	64	110	130	150
Paint Brush Hills Pond A	0.10	10	18	24	64	97	130
Paint Brush Hills Pond B1	0.36	51	100	140	190	210	270
Paint Brush Hills Pond B2	0.36	15	19	39	97	140	170
Paint Brush Hills Pond C	0.19	11	14	23	56	74	160
Regional Pond MN	1.42	86	330	490	810	980	1,200
Regional Pond WU Diversion	3.55	83	230	380	770	1,000	1,300
Regional Pond WU North	3.55	110	270	420	810	1,100	1,400
Regional Pond WU South	3.55	55	170	340	730	900	1,000
RET020	0.15	29	49	64	100	130	150
RET030	0.36	71	130	170	270	320	380
RET040	0.56	95	180	250	400	490	580
RET050	0.71	27	85	140	370	490	570
RET060	0.83	11	38	88	210	370	530
RET070	1.11	13	32	68	210	300	430
RET080	1.36	65	120	170	270	340	420
RET090	1.66	15	38	61	200	270	350
RET100	1.78	26	47	81	200	290	390
RET110	1.83	27	49	83	200	290	390
RET120	2.05	39	84	120	210	320	430
RET140	0.13	11	23	33	57	70	85
RET152	2.16	49	110	150	270	340	450
RET154	0.40	26	55	80	140	170	200
RET156	2.57	50	120	180	350	500	650
RET162	2.74	59	130	200	360	530	680
RET164	2.93	66	150	230	410	550	710
RMT030	0.09	25	47	63	100	120	140
RMT040	0.25	49	93	130	200	250	290
RMT050	0.56	110	240	330	520	620	750

Hydrologic Element	Area (sq mi)	Future Peak Flows (cfs) - Regional Detention					
		2-year	5-year	10-year	25-year	50-year	100-year
JWT180	2.46	83	0	0	0	0	1,000
JWT190	0.06	0	0	0	0	0	2
JWT200	2.82	89	0	0	0	0	1,200
JWT210	3.09	97	0	0	0	0	1,300
JWT220	0.19	47	0	0	0	0	250
JWT232	3.28	100	0	0	0	0	1,400
JWT234	3.47	100	0	0	0	0	1,400
JWT240	3.55	50	0	0	0	0	1,200
JWT250	3.70	65	0	0	0	0	1,200
JWT260	3.84	70	0	0	0	0	1,200
JWT270	0.03	11	0	0	0	0	57
JWT280	0.27	33	0	0	0	0	250
JWT292	3.87	73	0	0	0	0	1,200
JWT294	4.13	95	0	0	0	0	1,300
JWT296	5.88	79	0	0	0	0	1,700
JWT300	0.10	12	0	0	0	0	92
JWT310	6.25	81	0	0	0	0	1,700
JWT320	6.46	82	0	0	0	0	1,700
JWT330	0.33	32	0	0	0	0	250
JWT352	9.69	110	0	0	0	0	2,300
JWT354	10.30	140	0	0	0	0	2,400
JWT360	0.07	7	0	0	0	0	55
JWT372	10.36	140	0	0	0	0	2,400
JWT374_OUTLET	10.58	140	0	0	0	0	2,400
MT010	0.29	28	0	0	0	0	210
MT020	0.09	26	0	0	0	0	140
MT030	0.16	39	0	0	0	0	230
MT040	0.31	95	0	0	0	0	460
MT050	0.12	17	0	0	0	0	110
MT060	0.19	30	0	0	0	0	200
MT070	0.20	25	0	0	0	0	170
MT080	0.06	62	0	0	0	0	190
MT090	0.04	40	0	0	0	0	130
MT100	0.06	17	0	0	0	0	88
MT110	0.12	19	0	0	0	0	120
Paint Brush Hills Pond #4	0.15	29	0	0	0	0	150
Paint Brush Hills Pond A	0.10	7	0	0	0	0	140
Paint Brush Hills Pond B1	0.36	51	0	0	0	0	270
Paint Brush Hills Pond B2	0.36	10	0	0	0	0	180
Paint Brush Hills Pond C	0.19	3	0	0	0	0	140
Regional Pond MN	1.42	140	0	0	0	0	1,100
Regional Pond R1	5.88	79	0	0	0	0	1,700
Regional Pond R2	10.36	140	0	0	0	0	2,400
Regional Pond WU Diversion	3.55	68	0	0	0	0	1,300
Regional Pond WU North	3.55	97	0	0	0	0	1,400
Regional Pond WU South	3.55	27	0	0	0	0	1,200
RET020	0.15	29	0	0	0	0	150
RET030	0.36	71	0	0	0	0	380
RET040	0.56	95	0	0	0	0	580
RET050	0.71	14	0	0	0	0	620
RET060	0.83	10	0	0	0	0	540
RET070	1.11	14	0	0	0	0	510
RET080	1.36	65	0	0	0	0	560
RET090	1.66	14	0	0	0	0	400
RET100	1.78	30	0	0	0	0	410
RET110	1.83	32	0	0	0	0	410
RET120	2.05	42	0	0	0	0	440
RET140	0.13	11	0	0	0	0	85
RET152	2.16	49	0	0	0	0	470
RET154	0.40	26	0	0	0	0	200
RET156	2.57	55	0	0	0	0	660
RET162	2.74	59	0	0	0	0	690
RET164	2.93	66	0	0	0	0	720
RMT030	0.09	25	0	0	0	0	140

Hydrologic Element	Area (sq mi)	Future Peak Flows (cfs) - Sub Regional Detention					
		2-year	5-year	10-year	25-year	50-year	100-year
JWT180	2.46	66	0	0	0	0	850
JWT190	0.06	0	0	0	0	0	2
JWT200	2.82	72	0	0	0	0	910
JWT210	3.09	81	0	0	0	0	1,000
JWT220	0.19	47	0	0	0	0	250
JWT232	3.28	85	0	0	0	0	1,100
JWT234	3.47	89	0	0	0	0	1,100
JWT240	3.55	42	0	0	0	0	970
JWT250	3.70	64	0	0	0	0	980
JWT260	3.84	70	0	0	0	0	1,000
JWT270	0.03	11	0	0	0	0	57
JWT280	0.27	33	0	0	0	0	250
JWT292	3.87	73	0	0	0	0	1,000
JWT294	4.13	95	0	0	0	0	1,000
JWT296	5.88	77	0	0	0	0	1,500
JWT300	0.10	12	0	0	0	0	92
JWT310	6.25	79	0	0	0	0	1,500
JWT320	6.46	80	0	0	0	0	1,500
JWT330	0.33	32	0	0	0	0	250
JWT352	9.69	130	0	0	0	0	2,100
JWT354	10.30	140	0	0	0	0	2,100
JWT360	0.07	7	0	0	0	0	55
JWT372	10.36	140	0	0	0	0	2,100
JWT374_OUTLET	10.58	140	0	0	0	0	2,100
MT010	0.29	28	0	0	0	0	210
MT020	0.09	26	0	0	0	0	140
MT030	0.16	39	0	0	0	0	230
MT040	0.31	95	0	0	0	0	460
MT050	0.12	17	0	0	0	0	110
MT060	0.19	30	0	0	0	0	200
MT070	0.20	25	0	0	0	0	170
MT080	0.06	62	0	0	0	0	190
MT090	0.04	40	0	0	0	0	130
MT100	0.06	17	0	0	0	0	88
MT110	0.12	19	0	0	0	0	120
Paint Brush Hills Pond #4	0.15	29	0	0	0	0	150
Paint Brush Hills Pond A	0.10	7	0	0	0	0	140
Paint Brush Hills Pond B1	0.36	51	0	0	0	0	270
Paint Brush Hills Pond B2	0.36	10	0	0	0	0	180
Paint Brush Hills Pond C	0.19	3	0	0	0	0	140
Regional Pond MN	1.42	32	0	0	0	0	820
Regional Pond R1	5.88	77	0	0	0	0	1,500
Regional Pond R2	10.36	140	0	0	0	0	2,100
Regional Pond WU Diversion	3.55	47	0	0	0	0	1,100
Regional Pond WU North	3.55	71	0	0	0	0	1,100
Regional Pond WU South	3.55	22	0	0	0	0	930
RET020	0.15	29	0	0	0	0	150
RET030	0.36	9	0	0	0	0	190
RET040	0.56	45	0	0	0	0	270
RET050	0.71	10	0	0	0	0	260
RET060	0.83	10	0	0	0	0	250
RET070	1.11	13	0	0	0	0	360
RET080	1.36	65	0	0	0	0	520
RET090	1.66	15	0	0	0	0	2

Falcon DBPS  
Peak Flow Results

Hydrologic Element	Area (sq mi)	Future Peak Flows (cfs)					
		2-year	5-year	10-year	25-year	50-year	100-year
RMT062	0.29	1	11	25	62	110	160
RMT064	0.67	120	270	370	590	710	850
RMT070	1.16	130	310	430	690	840	1,000
RMT080	1.36	150	350	490	800	980	1,200
RMT090	0.04	9	15	18	25	29	32
RMT102	1.42	86	320	490	800	980	1,200
RMT104	0.04	9	15	18	25	29	32
RMT106	1.46	91	320	490	810	990	1,200
RMT112	1.52	92	310	490	810	990	1,200
RMT114	1.64	94	320	500	830	1,000	1,200
RWT030	0.07	4	10	15	27	34	42
RWT042	0.14	9	20	30	54	69	85
RWT044	0.14	9	21	32	57	73	89
RWT046	0.28	15	37	57	110	140	170
RWT054	0.46	24	59	89	170	210	260
RWT080	0.17	14	33	48	87	110	130
RWT092	0.85	43	110	170	310	390	480
RWT094	1.09	54	140	210	400	500	610
RWT122	1.43	68	160	250	480	610	730
RWT124	1.63	77	170	280	530	690	840
RWT150	0.13	32	59	79	130	150	180
RWT160	0.36	15	19	39	97	140	170
RWT172	1.77	85	190	300	570	730	920
RWT174	0.47	35	63	84	130	160	180
RWT176	2.24	98	210	320	600	760	960
RWT180	2.36	100	210	330	610	780	990
RWT202	2.46	100	220	330	620	800	1,000
RWT204	0.06	4	7	12	26	34	43
RWT210	2.82	110	230	360	690	890	1,200
RWT232	3.09	120	250	400	760	990	1,300
RWT234	0.19	47	84	110	180	210	250
RWT236	3.28	120	260	410	790	1,000	1,400
RWT240	3.47	130	270	420	810	1,000	1,400
RWT240_Diversion Reach	0.00	30	37	38	38	39	39
RWT250	3.55	83	200	380	770	940	1,100
RWT260	3.70	85	210	380	780	950	1,100
RWT291	3.84	86	210	390	790	970	1,100
RWT292	0.03	11	20	26	41	49	57
RWT294	0.27	33	70	100	170	210	250
RWT295	3.87	86	210	390	790	970	1,100
RWT296	4.13	94	210	400	800	990	1,100
RWT312	0.10	12	25	36	61	76	91
RWT314	5.88	160	400	620	1,100	1,400	1,700
RWT320	6.25	160	400	620	1,100	1,400	1,700
RWT344	0.33	32	68	97	170	210	250
RWT352	6.46	160	400	620	1,100	1,400	1,700
RWT354	9.69	210	530	820	1,400	2,000	2,400
RWT372	10.30	230	560	860	1,500	2,000	2,500
RWT374	0.07	7	15	21	36	45	55
RWT376	10.36	230	550	850	1,500	2,000	2,500
The Meadows Pond #1	0.06	4	7	12	26	35	43
The Meadows Pond #2	0.29	1	11	25	62	120	160
Woodmen Hills Pond #1 North	0.71	88	180	260	420	500	570
Woodmen Hills Pond #1 South	0.71	27	85	140	380	500	570
Woodmen Hills Pond #2	0.83	11	38	88	210	380	530
Woodmen Hills Pond #3	1.11	13	32	68	210	300	430
Woodmen Hills Pond #4	1.66	15	38	61	200	270	350
Woodmen Hills Pond #5	0.04	9	15	18	25	29	32
Woodmen Hills Pond H	0.56	110	240	330	520	620	750
WT010	0.14	9	21	32	58	73	89
WT020	0.07	4	10	15	27	34	42
WT030	0.08	9	20	29	50	62	75
WT040	0.19	9	22	33	60	76	93
WT050	0.19	17	37	54	93	120	140

Hydrologic Element	Area (sq mi)	Future Peak Flows (cfs) - Regional Detention					
		2-year	5-year	10-year	25-year	50-year	100-year
RMT040	0.25	49	0	0	0	0	290
RMT050	0.56	110	0	0	0	0	750
RMT062	0.29	5	0	0	0	0	99
RMT064	0.67	120	0	0	0	0	850
RMT070	1.16	130	0	0	0	0	1,000
RMT080	1.36	150	0	0	0	0	1,200
RMT090	0.04	1	0	0	0	0	19
RMT102	1.42	140	0	0	0	0	1,100
RMT104	0.04	1	0	0	0	0	19
RMT106	1.46	140	0	0	0	0	1,100
RMT112	1.52	140	0	0	0	0	1,100
RMT114	1.64	140	0	0	0	0	1,100
RWT030	0.07	4	0	0	0	0	42
RWT042	0.14	9	0	0	0	0	85
RWT044	0.14	9	0	0	0	0	89
RWT046	0.28	15	0	0	0	0	170
RWT054	0.46	24	0	0	0	0	260
RWT080	0.17	14	0	0	0	0	130
RWT092	0.85	43	0	0	0	0	480
RWT094	1.09	54	0	0	0	0	610
RWT122	1.43	60	0	0	0	0	770
RWT124	1.63	68	0	0	0	0	880
RWT150	0.13	32	0	0	0	0	180
RWT160	0.36	10	0	0	0	0	180
RWT172	1.77	73	0	0	0	0	950
RWT174	0.47	35	0	0	0	0	190
RWT176	2.24	79	0	0	0	0	980
RWT180	2.36	81	0	0	0	0	1,000
RWT202	2.46	83	0	0	0	0	1,000
RWT204	0.06	0	0	0	0	0	2
RWT210	2.82	89	0	0	0	0	1,200
RWT232	3.09	97	0	0	0	0	1,300
RWT234	0.19	47	0	0	0	0	250
RWT236	3.28	100	0	0	0	0	1,400
RWT240	3.47	100	0	0	0	0	1,400
RWT240_Diversion Reach	0.00	28	0	0	0	0	39
RWT250	3.55	50	0	0	0	0	1,200
RWT260	3.70	62	0	0	0	0	1,200
RWT291	3.84	70	0	0	0	0	1,200
RWT292	0.03	11	0	0	0	0	57
RWT294	0.27	33	0	0	0	0	250
RWT295	3.87	73	0	0	0	0	1,200
RWT296	4.13	93	0	0	0	0	1,300
RWT312	0.10	12	0	0	0	0	91
RWT314	5.88	79	0	0	0	0	1,700
RWT320	6.25	81	0	0	0	0	1,700
RWT344	0.33	32	0	0	0	0	250
RWT352	6.46	82	0	0	0	0	1,700
RWT354	9.69	110	0	0	0	0	2,300
RWT372	10.30	140	0	0	0	0	2,400
RWT374	0.07	7	0	0	0	0	55
RWT376	10.36	140	0	0	0	0	2,400
The Meadows Pond #1	0.06	0	0	0	0	0	2
The Meadows Pond #2	0.29	5	0	0	0	0	99
Woodmen Hills Pond #1 North	0.71	65	0	0	0	0	670
Woodmen Hills Pond #1 South	0.71	14	0	0	0	0	620
Woodmen Hills Pond #2	0.83	10	0	0	0	0	540
Woodmen Hills Pond #3	1.11	14	0	0	0	0	510
Woodmen Hills Pond #4	1.66	14	0	0	0	0	400
Woodmen Hills Pond #5	0.04	1	0	0	0	0	19
Woodmen Hills Pond H	0.56	110	0	0	0	0	750
WT010	0.14	9	0	0	0	0	89
WT020	0.07	4	0	0	0	0	42
WT030	0.08	9	0	0	0	0	75

Hydrologic Element	Area (sq mi)	Future Peak Flows (cfs) - Sub Regional Detention					
		2-year	5-year	10-year	25-year	50-year	100-year
RMT040	0.25	49	0	0	0	0	290
RMT050	0.56	110	0	0	0	0	750
RMT062	0.29	5	0	0	0	0	99
RMT064	0.67	120	0	0	0	0	850
RMT070	1.16	27	0	0	0	0	730
RMT080	1.36	31	0	0	0	0	840
RMT090	0.04	1	0	0	0	0	19
RMT102	1.42	32	0	0	0	0	820
RMT104	0.04	1	0	0	0	0	19
RMT106	1.46	33	0	0	0	0	830
RMT112	1.52	33	0	0	0	0	840
RMT114	1.64	34	0	0	0	0	860
RWT030	0.07	4	0	0	0	0	42
RWT042	0.14	9	0	0	0	0	85
RWT044	0.14	9	0	0	0	0	89
RWT046	0.28	15	0	0	0	0	170
RWT054	0.46	24	0	0	0	0	260
RWT080	0.17	14	0	0	0	0	130
RWT092	0.85	43	0	0	0	0	480
RWT094	1.09	42	0	0	0	0	510
RWT122	1.43	47	0	0	0	0	620
RWT124	1.63	51	0	0	0	0	680
RWT150	0.13	32	0	0	0	0	180
RWT160	0.36	10	0	0	0	0	180
RWT172	1.77	54	0	0	0	0	710
RWT174	0.47	35	0	0	0	0	190
RWT176	2.24	63	0	0	0	0	830
RWT180	2.36	65	0	0	0	0	840
RWT202	2.46	66	0	0	0	0	850
RWT204	0.06	0	0	0	0	0	2
RWT210	2.82	71	0	0	0	0	910
RWT232	3.09	81	0	0	0	0	1,000
RWT234	0.19	47	0	0	0	0	250
RWT236	3.28	85	0	0	0	0	1,100
RWT240	3.47	86	0	0	0	0	1,100
RWT240_Diversion Reach	0.00	24	0	0	0	0	39
RWT250	3.55	42	0	0	0	0	970
RWT260	3.70	62	0	0	0	0	980
RWT291	3.84	70	0	0	0	0	1,000
RWT292	0.03	11	0	0	0	0	57
RWT294	0.27	33	0	0	0	0	250
RWT295	3.87	73	0	0	0	0	1,000
RWT296	4.13	93	0	0	0	0	1,000
RWT312	0.10	12	0	0	0	0	91
RWT314	5.88	77	0	0	0	0	1,500
RWT320	6.25	79	0	0	0	0	1,500
RWT344	0.33	32	0	0	0	0	250
RWT352	6.46	80	0	0	0	0	1,500
RWT354	9.69	130	0	0	0	0	2,100
RWT372	10.30	140	0	0	0	0	2,100
RWT374	0.07	7	0	0	0	0	55
RWT376	10.36	140	0	0	0	0	2,100
Sub Regional Pond SR1	1.09	42	0	0	0	0	510
Sub Regional Pond SR2	2.36	65	0	0	0	0	840
Sub Regional Pond SR3	2.82	72	0	0	0	0	910
Sub Regional Pond SR4	1.16	27	0	0	0	0	730
Sub Regional Pond SR6	0.36	9	0	0	0	0	200
The Meadows Pond #1	0.06	0	0	0	0	0	2
The Meadows Pond #2	0.29	5	0	0	0	0	99
Woodmen Hills Pond #1 North	0.71	61	0	0	0	0	260
Woodmen Hills Pond #1 South	0.71	10	0	0	0	0	260
Woodmen Hills Pond #2	0.83	10	0	0	0	0	250
Woodmen Hills Pond #3	1.11	13	0	0	0	0	360
Woodmen Hills Pond #4	1.66	15	0	0	0	0	260

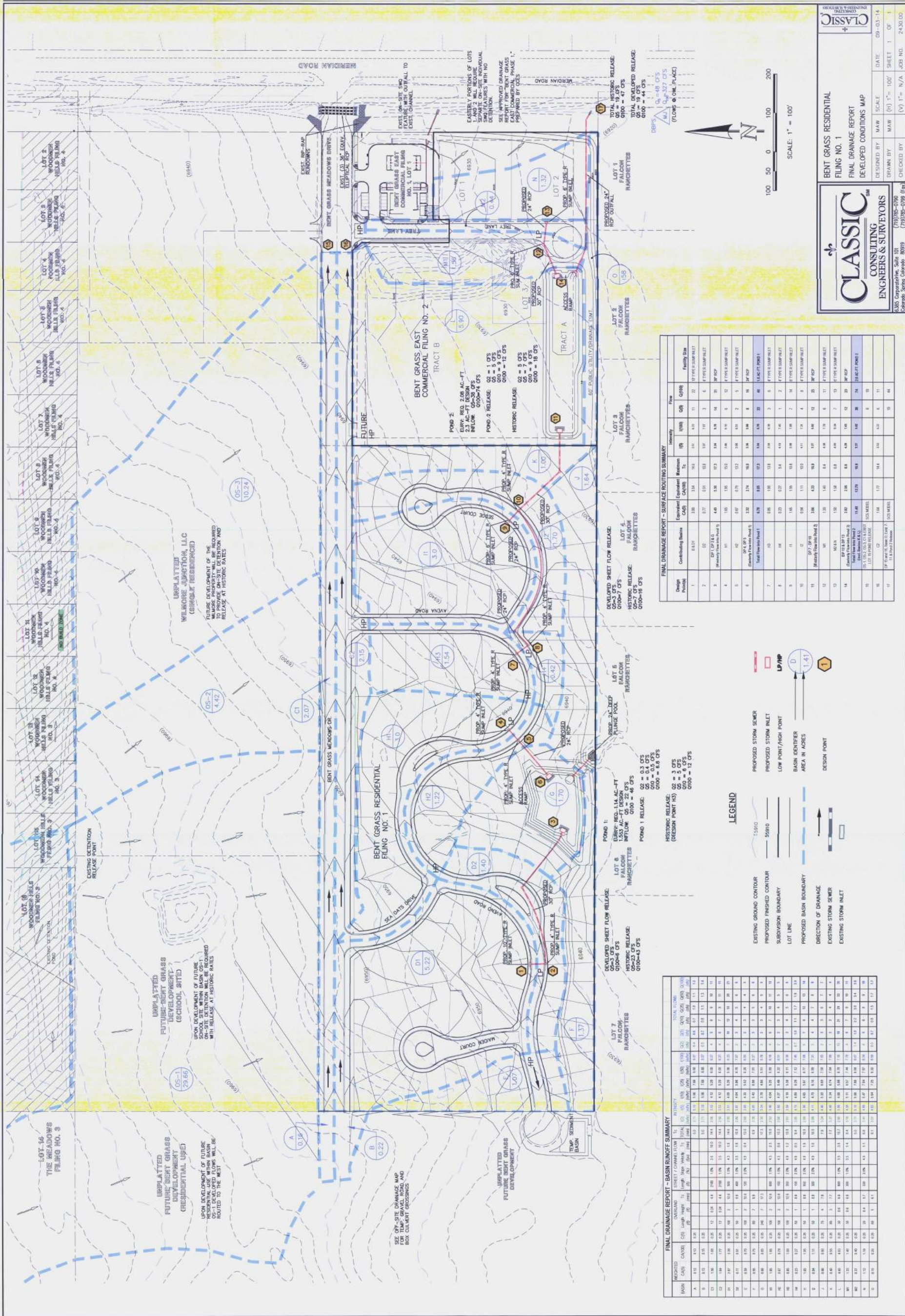
Falcon DBPS  
Peak Flow Results

Hydrologic Element	Area (sq mi)	Future Peak Flows (cfs)					
		2-year	5-year	10-year	25-year	50-year	100-year
WT060	0.20	14	30	44	77	96	120
WT070	0.17	14	33	49	87	110	130
WT080	0.07	9	19	27	45	56	67
WT090	0.15	22	46	65	110	140	160
WT100	0.19	56	100	140	210	260	300
WT110	0.19	22	47	67	110	140	170
WT120	0.05	8	16	22	37	46	55
WT130	0.10	35	61	81	120	150	170
WT140	0.13	32	59	80	130	150	180
WT150	0.23	49	86	110	180	210	250
WT160	0.11	35	64	85	130	160	180
WT170	0.12	21	43	60	99	120	140
WT180	0.10	8	17	25	43	54	66
WT190	0.06	11	23	31	51	63	75
WT200	0.30	25	52	74	130	160	190
WT210	0.27	32	60	81	130	160	190
WT220	0.19	47	85	110	180	210	250
WT230	0.20	71	120	160	250	300	350
WT240	0.08	36	61	79	120	140	160
WT250	0.15	63	110	140	210	250	290
WT260	0.14	10	21	30	52	64	78
WT270	0.03	11	20	27	41	49	57
WT280	0.27	33	70	100	170	210	250
WT290	0.10	15	31	44	75	92	110
WT300	0.10	12	26	36	62	76	92
WT310	0.28	31	67	96	170	210	250
WT320	0.21	27	56	80	140	170	200
WT330	0.33	32	68	98	170	210	250
WT340	0.28	19	40	57	98	120	150
WT350	0.30	38	79	110	190	230	280
WT360	0.07	7	15	21	37	46	55
WT370	0.21	7	23	38	76	99	120

Hydrologic Element	Area (sq mi)	Future Peak Flows (cfs) - Regional Detention					
		2-year	5-year	10-year	25-year	50-year	100-year
WT040	0.19	9	0	0	0	0	93
WT050	0.19	17	0	0	0	0	140
WT060	0.20	14	0	0	0	0	120
WT070	0.17	14	0	0	0	0	130
WT080	0.07	9	0	0	0	0	67
WT090	0.15	22	0	0	0	0	160
WT100	0.19	56	0	0	0	0	300
WT110	0.19	22	0	0	0	0	170
WT120	0.05	8	0	0	0	0	55
WT130	0.10	35	0	0	0	0	170
WT140	0.13	32	0	0	0	0	180
WT150	0.23	49	0	0	0	0	250
WT160	0.11	35	0	0	0	0	180
WT170	0.12	21	0	0	0	0	140
WT180	0.10	8	0	0	0	0	66
WT190	0.06	11	0	0	0	0	75
WT200	0.30	25	0	0	0	0	190
WT210	0.27	32	0	0	0	0	190
WT220	0.19	47	0	0	0	0	250
WT230	0.20	71	0	0	0	0	350
WT240	0.08	36	0	0	0	0	160
WT250	0.15	63	0	0	0	0	290
WT260	0.14	10	0	0	0	0	78
WT270	0.03	11	0	0	0	0	57
WT280	0.27	33	0	0	0	0	250
WT290	0.10	15	0	0	0	0	110
WT300	0.10	12	0	0	0	0	92
WT310	0.28	31	0	0	0	0	250
WT320	0.21	27	0	0	0	0	200
WT330	0.33	32	0	0	0	0	250
WT340	0.28	19	0	0	0	0	150
WT350	0.30	38	0	0	0	0	280
WT360	0.07	7	0	0	0	0	55
WT370	0.21	7	0	0	0	0	120

Hydrologic Element	Area (sq mi)	Future Peak Flows (cfs) - Sub Regional Detention					
		2-year	5-year	10-year	25-year	50-year	100-year
Woodmen Hills Pond #5	0.04	1	0	0	0	0	19
Woodmen Hills Pond H	0.56	110	0	0	0	0	750
WT010	0.14	9	0	0	0	0	89
WT020	0.07	4	0	0	0	0	42
WT030	0.08	9	0	0	0	0	75
WT040	0.19	9	0	0	0	0	93
WT050	0.19	17	0	0	0	0	140
WT060	0.20	14	0	0	0	0	120
WT070	0.17	14	0	0	0	0	130
WT080	0.07	9	0	0	0	0	67
WT090	0.15	22	0	0	0	0	160
WT100	0.19	56	0	0	0	0	300
WT110	0.19	22	0	0	0	0	170
WT120	0.05	8	0	0	0	0	55
WT130	0.10	35	0	0	0	0	170
WT140	0.13	32	0	0	0	0	180
WT150	0.23	49	0	0	0	0	250
WT160	0.11	35	0	0	0	0	180
WT170	0.12	21	0	0	0	0	140
WT180	0.10	8	0	0	0	0	66
WT190	0.06	11	0	0	0	0	75
WT200	0.30	25	0	0	0	0	190
WT210	0.27	32	0	0	0	0	190
WT220	0.19	47	0	0	0	0	250
WT230	0.20	71	0	0	0	0	350
WT240	0.08	36	0	0	0	0	160
WT250	0.15	63	0	0	0	0	290
WT260	0.14	10	0	0	0	0	78
WT270	0.03	11	0	0	0	0	57
WT280	0.27	33	0	0	0	0	250
WT290	0.10	15	0	0	0	0	110
WT300	0.10	12	0	0	0	0	92
WT310	0.28	31	0	0	0	0	250
WT320	0.21	27	0	0	0	0	200
WT330	0.33	32	0	0	0	0	250
WT340	0.28	19	0	0	0	0	150
WT350	0.30	38	0	0	0	0	280
WT360	0.07	7	0	0	0	0	55
WT370	0.21	7	0	0	0	0	120







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**Project Summary**

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Title	BENT GRASS RESIDENTIAL FILING NO.1
Engineer	MAW
Company	CLASSIC CONSULTING
Date	7/10/2014

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Notes	POND 1 2 YEAR
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Subsection: Master Network Summary

**Catchments Summary**

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft <sup>3</sup> /s)
Basins	Post-Development 2 Year	2	0.411	0.300	14.96

**Node Summary**

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft <sup>3</sup> /s)
O-1	Post-Development 2 Year	2	0.335	0.650	0.32

**Pond Summary**

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft <sup>3</sup> /s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
Pond 1 (IN)	Post-Development 2 Year	2	0.411	0.300	14.96	(N/A)	(N/A)
Pond 1 (OUT)	Post-Development 2 Year	2	0.335	0.650	0.32	6,934.59	0.402

Subsection: I-D-F Table  
Label: CO SPRINGS

Return Event: 2 years  
Storm Event: CO SPRINGS - 2 Year

**I-D-F Curve**

Time (hours)	Intensity (in/h)
0.083	3.710
0.167	2.980
0.250	2.520
0.333	2.190
0.417	1.950
0.500	1.760
0.583	1.610
0.667	1.490
0.750	1.380
0.833	1.290
0.917	1.220
1.000	1.150

Subsection: Elevation-Area Volume Curve

Label: Pond 1

Return Event: 2 years

Storm Event: CO SPRINGS - 2 Year

Elevation (ft)	Planimeter (ft <sup>2</sup> )	Area (acres)	A1+A2+sq (A1*A2) (acres)	Volume (ac-ft)	Volume (Total) (ac-ft)
6,932.00	0.0	0.005	0.000	0.000	0.000
6,934.00	0.0	0.292	0.335	0.223	0.223
6,936.00	0.0	0.367	0.986	0.658	0.881
6,938.00	0.0	0.451	1.225	0.817	1.698
6,940.00	0.0	0.545	1.492	0.995	2.692



Subsection: Outlet Input Data  
 Label: Composite Outlet Structure - 1

Return Event: 2 years  
 Storm Event: CO SPRINGS - 2 Year

**Requested Pond Water Surface Elevations**

Minimum (Headwater)	6,932.00 ft
Increment (Headwater)	0.50 ft
Maximum (Headwater)	6,940.00 ft

**Outlet Connectivity**

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Inlet Box	Riser - 1	Forward	Culvert - 1	6,937.00	6,940.00
Orifice-Area	Orifice - 1	Forward	Culvert - 1	6,933.00	6,940.00
Culvert-Circular	Culvert - 1	Forward	TW	6,932.00	6,940.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

Subsection: Outlet Input Data

Label: Composite Outlet Structure - 1

Return Event: 2 years

Storm Event: CO SPRINGS - 2 Year

Structure ID: Riser - 1	
Structure Type: Inlet Box	
Number of Openings	1
Elevation	6,937.00 ft
Orifice Area	10.2 ft <sup>2</sup>
Orifice Coefficient	0.600
Weir Length	4.00 ft
Weir Coefficient	3.00 (ft <sup>0.5</sup> )/s
K Reverse	1.000
Manning's n	0.000
Kev, Charged Riser	0.000
Weir Submergence	False
Orifice H to crest	False

Subsection: Outlet Input Data  
 Label: Composite Outlet Structure - 1

Return Event: 2 years  
 Storm Event: CO SPRINGS - 2 Year

Structure ID: Culvert - 1	
Structure Type: Culvert-Circular	
Number of Barrels	1
Diameter	24.0 in
Length	60.00 ft
Length (Computed Barrel)	60.03 ft
Slope (Computed)	0.033 ft/ft
Outlet Control Data	
Manning's n	0.013
Ke	0.200
Kb	0.012
Kr	0.000
Convergence Tolerance	0.00 ft
Inlet Control Data	
Equation Form	Form 1
K	0.0045
M	2.0000
C	0.0317
Y	0.6900
T1 ratio (HW/D)	0.000
T2 ratio (HW/D)	1.181
Slope Correction Factor	-0.500

Use unsubmerged inlet control 0 equation below T1 elevation.

Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,  
 interpolate between flows at T1 & T2...

T1 Elevation	6,932.00 ft	T1 Flow	15.55 ft <sup>3</sup> /s
T2 Elevation	6,934.36 ft	T2 Flow	17.77 ft <sup>3</sup> /s

Subsection: Outlet Input Data  
Label: Composite Outlet Structure - 1

Return Event: 2 years  
Storm Event: CO SPRINGS - 2 Year

Structure ID: Orifice - 1	
Structure Type: Orifice-Area	
Number of Openings	12
Elevation	6,933.00 ft
Orifice Area	0.0 ft <sup>2</sup>
Top Elevation	6,937.00 ft
Datum Elevation	6,933.00 ft
Orifice Coefficient	0.600
Structure ID: TW	
Structure Type: TW Setup, DS Channel	
Tailwater Type	Free Outfall
Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.01 ft
Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.01 ft
Headwater Tolerance (Maximum)	0.50 ft
Flow Tolerance (Minimum)	0.001 ft <sup>3</sup> /s
Flow Tolerance (Maximum)	10.000 ft <sup>3</sup> /s

Subsection: Individual Outlet Curves  
 Label: Composite Outlet Structure - 1

Return Event: 2 years  
 Storm Event: CO SPRINGS - 2 Year

RATING TABLE FOR ONE OUTLET TYPE  
 Structure ID = Riser - 1 (Inlet Box)

Upstream ID = (Pond Water Surface)  
 Downstream ID = Culvert - 1 (Culvert-Circular)

Water Surface Elevation (ft)	Device Flow (ft <sup>3</sup> /s)	(into) Headwater Hydraulic Grade Line (ft)	Converge Downstream Hydraulic Grade Line (ft)	Next Downstream Hydraulic Grade Line (ft)	Downstream Hydraulic Grade Line Error (ft)	Convergence Error (ft <sup>3</sup> /s)	Downstream Channel Tailwater (ft)	Tailwater Error (ft)
6,932.00	0.00	0.00	0.00	0.00	0.00	0.00	(N/A)	0.00
6,932.50	0.00	0.00	0.00	0.00	0.00	0.00	(N/A)	0.00
6,933.00	0.00	0.00	0.00	0.00	0.00	0.00	(N/A)	0.00
6,933.50	0.00	0.00	0.00	6,932.15	0.00	0.00	(N/A)	0.00
6,934.00	0.00	0.00	0.00	6,932.21	0.00	0.00	(N/A)	0.00
6,934.50	0.00	0.00	0.00	6,932.26	0.00	0.00	(N/A)	0.00
6,935.00	0.00	0.00	0.00	6,932.30	0.00	0.00	(N/A)	0.00
6,935.50	0.00	0.00	0.00	6,932.34	0.00	0.00	(N/A)	0.00
6,936.00	0.00	0.00	0.00	6,932.38	0.00	0.00	(N/A)	0.00
6,936.50	0.00	0.00	0.00	6,932.40	0.00	0.00	(N/A)	0.00
6,937.00	0.00	0.00	0.00	6,932.43	0.00	0.00	(N/A)	0.00
6,937.50	4.24	6,937.50	Free Outfall	6,933.15	0.00	0.00	(N/A)	0.00
6,938.00	12.00	6,938.00	Free Outfall	6,933.96	0.00	0.00	(N/A)	0.00
6,938.50	22.05	6,938.50	Free Outfall	6,935.01	0.00	0.00	(N/A)	0.00
6,939.00	33.94	6,939.00	6,937.16	6,937.16	0.00	0.00	(N/A)	0.00
6,939.50	47.43	6,939.50	6,939.50	6,939.50	0.00	0.00	(N/A)	0.00
6,940.00	62.35	6,940.00	6,940.00	6,940.00	0.00	0.00	(N/A)	0.00

Message

WS below an invert; no flow.  
 WS below an invert; no flow.  
 WS below an invert; no flow.  
 WS below an invert; no flow.  
 WS below an invert; no flow.  
 WS below an invert; no flow.  
 WS below an invert; no flow.  
 WS below an invert; no flow.  
 WS below an invert; no flow.  
 WS below an invert; no flow.  
 WS below an invert; no flow.  
 Weir: H =0.5ft  
 Weir: H =1ft  
 Weir: H =1.5ft  
 FULLY CHARGED RISER: ADJUSTED TO  
 WEIR: H =2ft  
 FULLY CHARGED RISER: ADJUSTED TO  
 WEIR: H =2.5ft

Subsection: Individual Outlet Curves  
Label: Composite Outlet Structure - 1

Return Event: 2 years  
Storm Event: CO SPRINGS - 2 Year

RATING TABLE FOR ONE OUTLET TYPE  
Structure ID = Riser - 1 (Inlet Box)

Upstream ID = (Pond Water Surface)  
Downstream ID = Culvert - 1 (Culvert-Circular)

Message

FULLY CHARGED RISER: ADJUSTED TO  
WEIR: H =3ft



Subsection: Individual Outlet Curves  
 Label: Composite Outlet Structure - 1

Return Event: 2 years  
 Storm Event: CO SPRINGS - 2 Year

**RATING TABLE FOR ONE OUTLET TYPE**  
 Structure ID = Culvert - 1 (Culvert-Circular)

Mannings open channel maximum capacity: 44.43 ft<sup>3</sup>/s  
 Upstream ID = Riser - 1, Orifice - 1  
 Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Device Flow (ft <sup>3</sup> /s)	(into) Headwater Hydraulic Grade Line (ft)	Converge Downstream Hydraulic Grade Line (ft)	Next Downstream Hydraulic Grade Line (ft)	Downstream Hydraulic Grade Line Error (ft)	Convergence Error (ft <sup>3</sup> /s)	Downstream Channel Tailwater (ft)	Tailwater Error (ft)
6,932.00	0.00	0.00	0.00	Free Outfall	0.00	0.00	(N/A)	0.00
6,932.50	0.00	0.00	0.00	Free Outfall	0.00	0.00	(N/A)	0.00
6,933.00	0.00	0.00	0.00	Free Outfall	0.00	0.00	(N/A)	0.00
6,933.50	0.10	6,932.15	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
6,934.00	0.20	6,932.21	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
6,934.50	0.30	6,932.26	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
6,935.00	0.40	6,932.30	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
6,935.50	0.50	6,932.34	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
6,936.00	0.61	6,932.38	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
6,936.50	0.69	6,932.40	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
6,937.00	0.79	6,932.43	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
6,937.50	5.07	6,933.15	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
6,938.00	12.79	6,933.96	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
6,938.50	22.77	6,935.01	Free Outfall	Free Outfall	0.00	0.02	(N/A)	0.00
6,939.00	34.46	6,937.16	Free Outfall	Free Outfall	0.00	0.02	(N/A)	0.00
6,939.50	43.77	6,939.50	Free Outfall	Free Outfall	0.00	3.67	(N/A)	0.00
6,940.00	45.51	6,940.00	Free Outfall	Free Outfall	0.00	16.84	(N/A)	0.00

**Message**

WS below an invert; no flow.  
 WS below an invert; no flow.  
 WS below an invert; no flow.  
 CRIT.DEPTH CONTROL Vh= .036ft  
 Dcr= .107ft CRIT.DEPTH Hev= .00ft  
 FLOW PRECEDENCE SET TO  
 UPSTREAM CONTROLLING  
 STRUCTURE  
 FLOW PRECEDENCE SET TO  
 UPSTREAM CONTROLLING  
 STRUCTURE  
 FLOW PRECEDENCE SET TO  
 UPSTREAM CONTROLLING  
 STRUCTURE  
 CRIT.DEPTH CONTROL Vh= .083ft  
 Dcr= .242ft CRIT.DEPTH Hev= .00ft  
 FLOW PRECEDENCE SET TO  
 UPSTREAM CONTROLLING  
 STRUCTURE

Subsection: Individual Outlet Curves  
Label: Composite Outlet Structure - 1

Return Event: 2 years  
Storm Event: CO SPRINGS - 2 Year

RATING TABLE FOR ONE OUTLET TYPE  
Structure ID = Culvert - 1 (Culvert-Circular)

Mannings open channel maximum capacity: 44.43 ft<sup>3</sup>/s  
Upstream ID = Riser - 1, Orifice - 1  
Downstream ID = Tailwater (Pond Outfall)

Message

CRIT.DEPTH CONTROL Vh= .099ft Dcr= .286ft CRIT.DEPTH Hev= .00ft CRIT.DEPTH CONTROL Vh= .106ft Dcr= .306ft CRIT.DEPTH Hev= .00ft FLOW PRECEDENCE SET TO UPSTREAM CONTROLLING STRUCTURE CRIT.DEPTH CONTROL Vh= .557ft Dcr= 1.287ft CRIT.DEPTH Hev= .00ft INLET CONTROL... Submerged: HW =3.01 INLET CONTROL... Submerged: HW =5.16 INLET CONTROL... Submerged: HW =7.50 INLET CONTROL... Submerged: HW =8.00
--

Subsection: Individual Outlet Curves  
Label: Composite Outlet Structure - 1

Return Event: 2 years  
Storm Event: CO SPRINGS - 2 Year

RATING TABLE FOR ONE OUTLET TYPE  
Structure ID = Orifice - 1 (Orifice-Area)

Upstream ID = (Pond Water Surface)  
Downstream ID = Culvert - 1 (Culvert-Circular)

Water Surface Elevation (ft)	Device Flow (ft <sup>3</sup> /s)	(Into) Headwater Hydraulic Grade Line (ft)	Converge Downstream Hydraulic Grade Line (ft)	Next Downstream Hydraulic Grade Line (ft)	Downstream Hydraulic Grade Line Error (ft)	Convergence Error (ft <sup>3</sup> /s)	Downstream Channel Tailwater (ft)	Tailwater Error (ft)
6,932.00	0.00	0.00	0.00	0.00	0.00	0.00	(N/A)	0.00
6,932.50	0.00	0.00	0.00	0.00	0.00	0.00	(N/A)	0.00
6,933.00	0.00	0.00	0.00	0.00	0.00	0.00	(N/A)	0.00
6,933.50	0.10	6,933.50	Free Outfall	6,932.15	0.00	0.00	(N/A)	0.00
6,934.00	0.20	6,934.00	Free Outfall	6,932.21	0.00	0.00	(N/A)	0.00
6,934.50	0.30	6,934.50	Free Outfall	6,932.26	0.00	0.00	(N/A)	0.00
6,935.00	0.40	6,935.00	Free Outfall	6,932.30	0.00	0.00	(N/A)	0.00
6,935.50	0.50	6,935.50	Free Outfall	6,932.34	0.00	0.00	(N/A)	0.00
6,936.00	0.60	6,936.00	Free Outfall	6,932.38	0.00	0.00	(N/A)	0.00
6,936.50	0.69	6,936.50	Free Outfall	6,932.40	0.00	0.00	(N/A)	0.00
6,937.00	0.79	6,937.00	Free Outfall	6,932.43	0.00	0.00	(N/A)	0.00
6,937.50	0.83	6,937.50	6,933.15	6,933.15	0.00	0.00	(N/A)	0.00
6,938.00	0.80	6,938.00	6,933.96	6,933.96	0.00	0.00	(N/A)	0.00
6,938.50	0.74	6,938.50	6,935.01	6,935.01	0.00	0.00	(N/A)	0.00
6,939.00	0.54	6,939.00	6,937.16	6,937.16	0.00	0.00	(N/A)	0.00
6,939.50	0.00	6,939.50	6,939.50	6,939.50	0.00	0.00	(N/A)	0.00
6,940.00	0.00	6,940.00	6,940.00	6,940.00	0.00	0.00	(N/A)	0.00

Message

WS below an Invert; no flow.  
WS below an Invert; no flow.  
WS below an Invert; no flow.  
Hi=.50; Ht=4.00; Qt=.07  
Hi=1.00; Ht=4.00; Qt=.07  
Hi=1.50; Ht=4.00; Qt=.07  
Hi=2.00; Ht=4.00; Qt=.07  
Hi=2.50; Ht=4.00; Qt=.07  
Hi=3.00; Ht=4.00; Qt=.07  
Hi=3.50; Ht=4.00; Qt=.07  
H =4.00  
H =4.35  
H =4.04  
H =3.49  
H =1.84  
FLOW PRECEDENCE SET TO  
DOWNSTREAM CONTROLLING  
STRUCTURE

Subsection: Individual Outlet Curves  
Label: Composite Outlet Structure - 1

Return Event: 2 years  
Storm Event: CO SPRINGS - 2 Year

**RATING TABLE FOR ONE OUTLET TYPE**

Structure ID = Orifice - 1 (Orifice-Area)

Upstream ID = (Pond Water Surface)

Downstream ID = Culvert - 1 (Culvert-Circular)

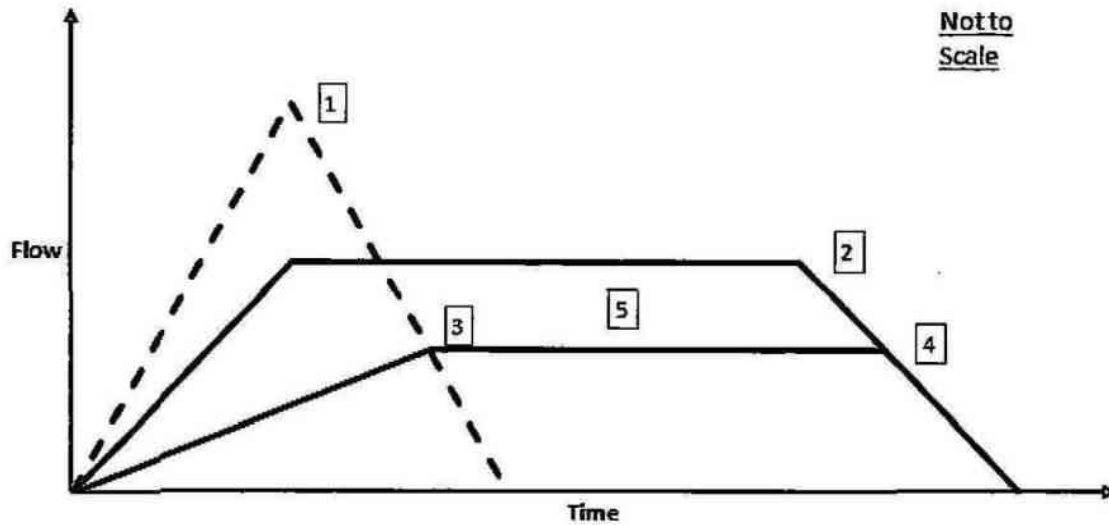
**Message**

FLOW PRECEDENCE SET TO  
DOWNSTREAM CONTROLLING  
STRUCTURE

Subsection: Modified Rational Graph  
Label: Basins

Return Event: 2 years  
Storm Event: CO SPRINGS - 2 Year

Method Type	Method T
Time of Duration (Modified Rational, Critical)	0.333 hours



[1]			[2]		
Time of Concentration (Modified Rational, Composite)	0.288	hours	Time of Duration (Modified Rational, Critical)	0.333	hours
Intensity (Modified Rational, Peak)	2.368	in/h	Intensity (Modified Rational, Critical)	2.190	in/h
Flow (Modified Rational, Peak)	16.18	ft <sup>3</sup> /s	Flow (Modified Rational, Critical)	14.96	ft <sup>3</sup> /s
[3]			[5]		
First Outflow Breakpoint (Modified Rational, Method T)		0.390 hours	Storage (Modified Rational, Estimated)	0.090	ac-ft
Flow (Modified Rational, Allowable)		12.00 ft <sup>3</sup> /s			
[4]			[5]		
Second Outflow Breakpoint (Modified Rational)	0.363	hours	Storage (Modified Rational, Estimated)	0.090	ac-ft
Flow (Modified Rational, Allowable)	12.00	ft <sup>3</sup> /s			



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**Project Summary**

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Title	BENT GRASS RESIDENTIAL FILING NO.1
Engineer	MAW
Company	CLASSIC CONSULTING
Date	7/10/2014

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Notes	POND 1 5 YEAR
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	Pond Routed Hydrograph (total out), 5 years	15
Pond 1 (IN)		
	Pond Inflow Summary, 5 years	18
Basins	Modified Rational Graph, 5 years	19

Subsection: Master Network Summary

**Catchments Summary**

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft <sup>3</sup> /s)
Basins	Post-Development 5 Year	5	0.582	0.300	20.11

**Node Summary**

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft <sup>3</sup> /s)
O-1	Post-Development 5 Year	5	0.470	0.650	0.42

**Pond Summary**

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft <sup>3</sup> /s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
Pond 1 (IN)	Post-Development 5 Year	5	0.582	0.300	20.11	(N/A)	(N/A)
Pond 1 (OUT)	Post-Development 5 Year	5	0.470	0.650	0.42	6,935.11	0.569

Subsection: I-D-F Table  
Label: CO SPRINGS

Return Event: 5 years  
Storm Event: CO SPRINGS - 5 Year

**I-D-F Curve**

Time (hours)	Intensity (In/h)
0.083	5.100
0.167	4.100
0.250	3.460
0.333	3.010
0.417	2.680
0.500	2.420
0.583	2.210
0.667	2.040
0.750	1.900
0.833	1.780
0.917	1.670
1.000	1.580



Subsection: Elevation-Area Volume Curve

Label: Pond 1

Return Event: 5 years

Storm Event: CO SPRINGS - 5 Year

Elevation (ft)	Planimeter (ft <sup>2</sup> )	Area (acres)	A1+A2+sqr (A1*A2) (acres)	Volume (ac-ft)	Volume (Total) (ac-ft)
6,932.00	0.0	0.005	0.000	0.000	0.000
6,934.00	0.0	0.292	0.335	0.223	0.223
6,936.00	0.0	0.367	0.986	0.658	0.881
6,938.00	0.0	0.451	1.225	0.817	1.698
6,940.00	0.0	0.545	1.492	0.995	2.692

Subsection: Outlet Input Data  
 Label: Composite Outlet Structure - 1

Return Event: 5 years  
 Storm Event: CO SPRINGS - 5 Year

---

**Requested Pond Water Surface Elevations**

---

Minimum (Headwater)	6,932.00 ft
Increment (Headwater)	0.50 ft
Maximum (Headwater)	6,940.00 ft

---

**Outlet Connectivity**

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Inlet Box	Riser - 1	Forward	Culvert - 1	6,937.00	6,940.00
Orifice-Area	Orifice - 1	Forward	Culvert - 1	6,933.00	6,940.00
Culvert-Circular	Culvert - 1	Forward	TW	6,932.00	6,940.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

Subsection: Outlet Input Data  
Label: Composite Outlet Structure - 1

Return Event: 5 years  
Storm Event: CO SPRINGS - 5 Year

Structure ID: Riser - 1	
Structure Type: Inlet Box	
Number of Openings	1
Elevation	6,937.00 ft
Orifice Area	10.2 ft <sup>2</sup>
Orifice Coefficient	0.600
Weir Length	4.00 ft
Weir Coefficient	3.00 (ft <sup>0.5</sup> )/s
K Reverse	1.000
Manning's n	0.000
Kev, Charged Riser	0.000
Weir Submergence	False
Orifice H to crest	False

Subsection: Outlet Input Data  
 Label: Composite Outlet Structure - 1

Return Event: 5 years  
 Storm Event: CO SPRINGS - 5 Year

Structure ID: Culvert - 1	
Structure Type: Culvert-Circular	
Number of Barrels	1
Diameter	24.0 in
Length	60.00 ft
Length (Computed Barrel)	60.03 ft
Slope (Computed)	0.033 ft/ft
Outlet Control Data	
Manning's n	0.013
Ke	0.200
Kb	0.012
Kr	0.000
Convergence Tolerance	0.00 ft
Inlet Control Data	
Equation Form	Form 1
K	0.0045
M	2.0000
C	0.0317
Y	0.6900
T1 ratio (HW/D)	1.079
T2 ratio (HW/D)	1.181
Slope Correction Factor	-0.500

Use unsubmerged inlet control 0 equation below T1 elevation.

Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control, interpolate between flows at T1 & T2...

T1 Elevation	6,934.16 ft	T1 Flow	15.55 ft <sup>3</sup> /s
T2 Elevation	6,934.36 ft	T2 Flow	17.77 ft <sup>3</sup> /s

Subsection: Outlet Input Data  
Label: Composite Outlet Structure - 1

Return Event: 5 years  
Storm Event: CO SPRINGS - 5 Year

Structure ID: Orifice - 1	
Structure Type: Orifice-Area	
Number of Openings	12
Elevation	6,933.00 ft
Orifice Area	0.0 ft <sup>2</sup>
Top Elevation	6,937.00 ft
Datum Elevation	6,933.00 ft
Orifice Coefficient	0.600
Structure ID: TW	
Structure Type: TW Setup, DS Channel	
Tailwater Type	Free Outfall
Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.01 ft
Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.01 ft
Headwater Tolerance (Maximum)	0.50 ft
Flow Tolerance (Minimum)	0.001 ft <sup>3</sup> /s
Flow Tolerance (Maximum)	10.000 ft <sup>3</sup> /s



Subsection: Individual Outlet Curves  
 Label: Composite Outlet Structure - 1

Return Event: 5 years  
 Storm Event: CO SPRINGS - 5 Year

**RATING TABLE FOR ONE OUTLET TYPE**  
 Structure ID = Riser - 1 (Inlet Box)

Upstream ID = (Pond Water Surface)  
 Downstream ID = Culvert - 1 (Culvert-Circular)

Water Surface Elevation (ft)	Device Flow (ft <sup>3</sup> /s)	(Into) Headwater Hydraulic Grade Line (ft)	Converge Downstream Hydraulic Grade Line (ft)	Next Downstream Hydraulic Grade Line (ft)	Downstream Hydraulic Grade Line Error (ft)	Convergence Error (ft <sup>3</sup> /s)	Downstream Channel Tailwater (ft)	Tailwater Error (ft)
6,932.00	0.00	0.00	0.00	0.00	0.00	0.00	(N/A)	0.00
6,932.50	0.00	0.00	0.00	0.00	0.00	0.00	(N/A)	0.00
6,933.00	0.00	0.00	0.00	0.00	0.00	0.00	(N/A)	0.00
6,933.50	0.00	0.00	0.00	6,932.15	0.00	0.00	(N/A)	0.00
6,934.00	0.00	0.00	0.00	6,932.21	0.00	0.00	(N/A)	0.00
6,934.50	0.00	0.00	0.00	6,932.26	0.00	0.00	(N/A)	0.00
6,935.00	0.00	0.00	0.00	6,932.30	0.00	0.00	(N/A)	0.00
6,935.50	0.00	0.00	0.00	6,932.34	0.00	0.00	(N/A)	0.00
6,936.00	0.00	0.00	0.00	6,932.38	0.00	0.00	(N/A)	0.00
6,936.50	0.00	0.00	0.00	6,932.40	0.00	0.00	(N/A)	0.00
6,937.00	0.00	0.00	0.00	6,932.43	0.00	0.00	(N/A)	0.00
6,937.50	4.24	6,937.50	Free Outfall	6,933.15	0.00	0.00	(N/A)	0.00
6,938.00	12.00	6,938.00	Free Outfall	6,933.96	0.00	0.00	(N/A)	0.00
6,938.50	22.05	6,938.50	Free Outfall	6,935.01	0.00	0.00	(N/A)	0.00
6,939.00	33.94	6,939.00	6,937.16	6,937.16	0.00	0.00	(N/A)	0.00
6,939.50	47.43	6,939.50	6,939.50	6,939.50	0.00	0.00	(N/A)	0.00
6,940.00	62.35	6,940.00	6,940.00	6,940.00	0.00	0.00	(N/A)	0.00

**Message**

WS below an invert; no flow.  
 WS below an invert; no flow.  
 WS below an invert; no flow.  
 WS below an invert; no flow.  
 WS below an invert; no flow.  
 WS below an invert; no flow.  
 WS below an invert; no flow.  
 WS below an invert; no flow.  
 WS below an invert; no flow.  
 WS below an invert; no flow.  
 WS below an invert; no flow.  
 Weir: H =0.5ft  
 Weir: H =1ft  
 Weir: H =1.5ft  
 FULLY CHARGED RISER: ADJUSTED TO  
 WEIR: H =2ft  
 FULLY CHARGED RISER: ADJUSTED TO  
 WEIR: H =2.5ft

Subsection: Individual Outlet Curves  
Label: Composite Outlet Structure - 1

Return Event: 5 years  
Storm Event: CO SPRINGS - 5 Year

RATING TABLE FOR ONE OUTLET TYPE  
Structure ID = Riser - 1 (Inlet Box)

Upstream ID = (Pond Water Surface)  
Downstream ID = Culvert - 1 (Culvert-Circular)

Message

FULLY CHARGED RISER: ADJUSTED TO  
WEIR: H = 3ft

Subsection: Individual Outlet Curves  
 Label: Composite Outlet Structure - 1

Return Event: 5 years  
 Storm Event: CO SPRINGS - 5 Year

RATING TABLE FOR ONE OUTLET TYPE  
 Structure ID = Culvert - 1 (Culvert-Circular)

Mannings open channel maximum capacity: 44.43 ft<sup>3</sup>/s  
 Upstream ID = Riser - 1, Orifice - 1  
 Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Device Flow (ft <sup>3</sup> /s)	(into) Headwater Hydraulic Grade Line (ft)	Converge Downstream Hydraulic Grade Line (ft)	Next Downstream Hydraulic Grade Line (ft)	Downstream Hydraulic Grade Line Error (ft)	Convergence Error (ft <sup>3</sup> /s)	Downstream Channel Tailwater (ft)	Tailwater Error (ft)
6,932.00	0.00	0.00	0.00	Free Outfall	0.00	0.00	(N/A)	0.00
6,932.50	0.00	0.00	0.00	Free Outfall	0.00	0.00	(N/A)	0.00
6,933.00	0.00	0.00	0.00	Free Outfall	0.00	0.00	(N/A)	0.00
6,933.50	0.10	6,932.15	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
6,934.00	0.20	6,932.21	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
6,934.50	0.30	6,932.26	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
6,935.00	0.40	6,932.30	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
6,935.50	0.50	6,932.34	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
6,936.00	0.61	6,932.38	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
6,936.50	0.69	6,932.40	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
6,937.00	0.79	6,932.43	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
6,937.50	5.07	6,933.15	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
6,938.00	12.79	6,933.96	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
6,938.50	22.77	6,935.01	Free Outfall	Free Outfall	0.00	0.02	(N/A)	0.00
6,939.00	34.46	6,937.16	Free Outfall	Free Outfall	0.00	0.02	(N/A)	0.00
6,939.50	43.77	6,939.50	Free Outfall	Free Outfall	0.00	3.67	(N/A)	0.00
6,940.00	45.51	6,940.00	Free Outfall	Free Outfall	0.00	16.84	(N/A)	0.00

Message

WS below an invert; no flow.  
 WS below an invert; no flow.  
 WS below an invert; no flow.  
 CRIT.DEPTH CONTROL Vh= .036ft  
 Dcr= .107ft CRIT.DEPTH Hev= .00ft  
 FLOW PRECEDENCE SET TO  
 UPSTREAM CONTROLLING  
 STRUCTURE  
 FLOW PRECEDENCE SET TO  
 UPSTREAM CONTROLLING  
 STRUCTURE  
 FLOW PRECEDENCE SET TO  
 UPSTREAM CONTROLLING  
 STRUCTURE  
 CRIT.DEPTH CONTROL Vh= .083ft  
 Dcr= .242ft CRIT.DEPTH Hev= .00ft  
 FLOW PRECEDENCE SET TO  
 UPSTREAM CONTROLLING  
 STRUCTURE

Subsection: Individual Outlet Curves  
Label: Composite Outlet Structure - 1

Return Event: 5 years  
Storm Event: CO SPRINGS - 5 Year

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = Culvert - 1 (Culvert-Circular)

Mannings open channel maximum capacity: 44.43 ft<sup>3</sup>/s

Upstream ID = Riser - 1, Orifice - 1

Downstream ID = Tailwater (Pond Outfall)

Message

CRIT.DEPTH CONTROL Vh= .099ft  
Dcr= .286ft CRIT.DEPTH Hev= .00ft  
CRIT.DEPTH CONTROL Vh= .106ft  
Dcr= .306ft CRIT.DEPTH Hev= .00ft  
FLOW PRECEDENCE SET TO  
UPSTREAM CONTROLLING  
STRUCTURE  
CRIT.DEPTH CONTROL Vh= .557ft  
Dcr= 1.287ft CRIT.DEPTH Hev= .00ft  
INLET CONTROL... Submerged: HW  
=3.01  
INLET CONTROL... Submerged: HW  
=5.16  
INLET CONTROL... Submerged: HW  
=7.50  
INLET CONTROL... Submerged: HW  
=8.00

Subsection: Individual Outlet Curves  
Label: Composite Outlet Structure - 1

Return Event: 5 years  
Storm Event: CO SPRINGS - 5 Year

RATING TABLE FOR ONE OUTLET TYPE  
Structure ID = Orifice - 1 (Orifice-Area)

Upstream ID = (Pond Water Surface)  
Downstream ID = Culvert - 1 (Culvert-Circular)

Water Surface Elevation (ft)	Device Flow (ft <sup>3</sup> /s)	(Into) Headwater Hydraulic Grade Line (ft)	Converge Downstream Hydraulic Grade Line (ft)	Next Downstream Hydraulic Grade Line (ft)	Downstream Hydraulic Grade Line Error (ft)	Convergence Error (ft <sup>3</sup> /s)	Downstream Channel Tailwater (ft)	Tailwater Error (ft)
6,932.00	0.00	0.00	0.00	0.00	0.00	0.00	(N/A)	0.00
6,932.50	0.00	0.00	0.00	0.00	0.00	0.00	(N/A)	0.00
6,933.00	0.00	0.00	0.00	0.00	0.00	0.00	(N/A)	0.00
6,933.50	0.10	6,933.50	Free Outfall	6,932.15	0.00	0.00	(N/A)	0.00
6,934.00	0.20	6,934.00	Free Outfall	6,932.21	0.00	0.00	(N/A)	0.00
6,934.50	0.30	6,934.50	Free Outfall	6,932.26	0.00	0.00	(N/A)	0.00
6,935.00	0.40	6,935.00	Free Outfall	6,932.30	0.00	0.00	(N/A)	0.00
6,935.50	0.50	6,935.50	Free Outfall	6,932.34	0.00	0.00	(N/A)	0.00
6,936.00	0.60	6,936.00	Free Outfall	6,932.38	0.00	0.00	(N/A)	0.00
6,936.50	0.69	6,936.50	Free Outfall	6,932.40	0.00	0.00	(N/A)	0.00
6,937.00	0.79	6,937.00	Free Outfall	6,932.43	0.00	0.00	(N/A)	0.00
6,937.50	0.83	6,937.50	6,933.15	6,933.15	0.00	0.00	(N/A)	0.00
6,938.00	0.80	6,938.00	6,933.96	6,933.96	0.00	0.00	(N/A)	0.00
6,938.50	0.74	6,938.50	6,935.01	6,935.01	0.00	0.00	(N/A)	0.00
6,939.00	0.54	6,939.00	6,937.16	6,937.16	0.00	0.00	(N/A)	0.00
6,939.50	0.00	6,939.50	6,939.50	6,939.50	0.00	0.00	(N/A)	0.00
6,940.00	0.00	6,940.00	6,940.00	6,940.00	0.00	0.00	(N/A)	0.00

Message

WS below an invert; no flow.  
WS below an invert; no flow.  
WS below an invert; no flow.  
Hi=.50; Ht=4.00; Qt=.07  
Hi=1.00; Ht=4.00; Qt=.07  
Hi=1.50; Ht=4.00; Qt=.07  
Hi=2.00; Ht=4.00; Qt=.07  
Hi=2.50; Ht=4.00; Qt=.07  
Hi=3.00; Ht=4.00; Qt=.07  
Hi=3.50; Ht=4.00; Qt=.07  
H =4.00  
H =4.35  
H =4.04  
H =3.49  
H =1.84  
FLOW PRECEDENCE SET TO  
DOWNSTREAM CONTROLLING  
STRUCTURE



Subsection: Individual Outlet Curves  
Label: Composite Outlet Structure - 1

Return Event: 5 years  
Storm Event: CO SPRINGS - 5 Year

RATING TABLE FOR ONE OUTLET TYPE  
Structure ID = Orifice - 1 (Orifice-Area)

Upstream ID = (Pond Water Surface)  
Downstream ID = Culvert - 1 (Culvert-Circular)

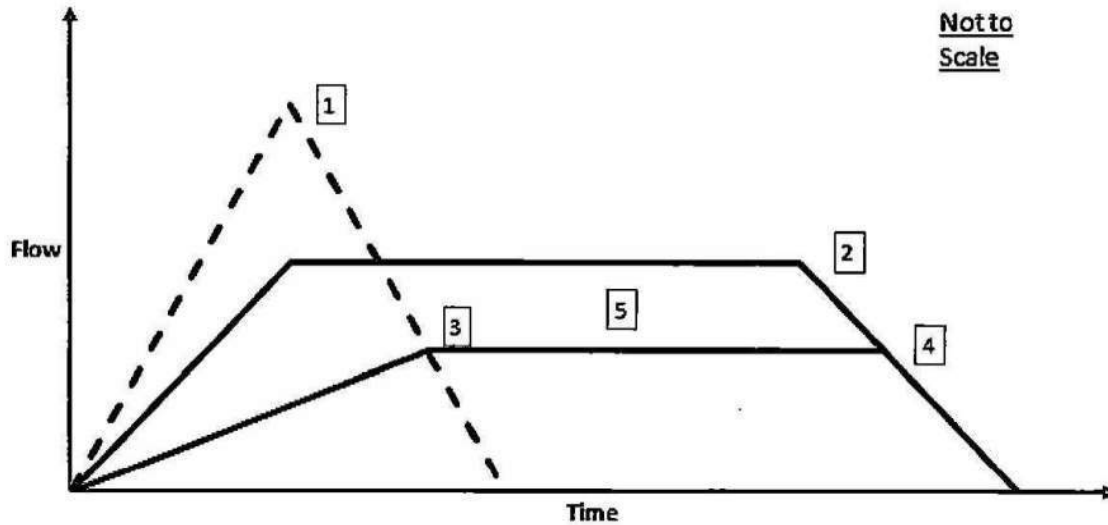
Message

FLOW PRECEDENCE SET TO  
DOWNSTREAM CONTROLLING  
STRUCTURE

Subsection: Modified Rational Graph  
 Label: Basins

Return Event: 5 years  
 Storm Event: CO SPRINGS - 5 Year

Method Type	Method T
Time of Duration (Modified Rational, Critical)	0.350 hours



[1]			[2]		
Time of Concentration (Modified Rational, Composite)	0.288	hours	Time of Duration (Modified Rational, Critical)	0.350	hours
Intensity (Modified Rational, Peak)	3.253	in/h	Intensity (Modified Rational, Critical)	2.944	in/h
Flow (Modified Rational, Peak)	22.22	ft <sup>3</sup> /s	Flow (Modified Rational, Critical)	20.11	ft <sup>3</sup> /s

[3]		
First Outflow Breakpoint (Modified Rational, Method T)		0.466 hours
Flow (Modified Rational, Allowable)		12.00 ft <sup>3</sup> /s

[4]			[5]		
Second Outflow Breakpoint (Modified Rational)	0.421	hours	Storage (Modified Rational, Estimated)	0.243	ac-ft
Flow (Modified Rational, Allowable)	12.00	ft <sup>3</sup> /s			

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Project Summary	
Title	BENT GRASS RESIDENTIAL FILING NO.1
Engineer	MAW
Company	CLASSIC CONSULTING
Date	7/10/2014
Notes	POND 1 10 YEAR

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	Pond Routed Hydrograph (total out), 10 years	15
Pond 1 (IN)		
	Pond Inflow Summary, 10 years	18
Basins	Modified Rational Graph, 10 years	19



Subsection: Master Network Summary

**Catchments Summary**

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft <sup>3</sup> /s)
Basins	Post-Development 10 Year	10	0.710	0.300	22.45

**Node Summary**

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft <sup>3</sup> /s)
O-1	Post-Development 10 Year	10	0.565	0.700	0.49

**Pond Summary**

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft <sup>3</sup> /s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
Pond 1 (IN)	Post-Development 10 Year	10	0.710	0.300	22.45	(N/A)	(N/A)
Pond 1 (OUT)	Post-Development 10 Year	10	0.565	0.700	0.49	6,935.48	0.694

Subsection: I-D-F Table  
Label: CO SPRINGS

Return Event: 10 years  
Storm Event: CO SPRINGS - 10 Year

**I-D-F Curve**

Time (hours)	Intensity (in/h)
0.083	5.960
0.167	4.790
0.250	4.040
0.333	3.520
0.417	3.130
0.500	2.830
0.583	2.580
0.667	2.390
0.750	2.220
0.833	2.080
0.917	1.950
1.000	1.850

Subsection: Elevation-Area Volume Curve

Label: Pond 1

Return Event: 10 years

Storm Event: CO SPRINGS - 10 Year

Elevation (ft)	Planimeter (ft <sup>2</sup> )	Area (acres)	A1+A2+sqr (A1*A2) (acres)	Volume (ac-ft)	Volume (Total) (ac-ft)
6,932.00	0.0	0.005	0.000	0.000	0.000
6,934.00	0.0	0.292	0.335	0.223	0.223
6,936.00	0.0	0.367	0.986	0.658	0.881
6,938.00	0.0	0.451	1.225	0.817	1.698
6,940.00	0.0	0.545	1.492	0.995	2.692

Subsection: Outlet Input Data  
 Label: Composite Outlet Structure - 1

Return Event: 10 years  
 Storm Event: CO SPRINGS - 10 Year

**Requested Pond Water Surface Elevations**

Minimum (Headwater)	6,932.00 ft
Increment (Headwater)	0.50 ft
Maximum (Headwater)	6,940.00 ft

**Outlet Connectivity**

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Inlet Box	Riser - 1	Forward	Culvert - 1	6,937.00	6,940.00
Orifice-Area	Orifice - 1	Forward	Culvert - 1	6,933.00	6,940.00
Culvert-Circular	Culvert - 1	Forward	TW	6,932.00	6,940.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

Subsection: Outlet Input Data  
Label: Composite Outlet Structure - 1

Return Event: 10 years  
Storm Event: CO SPRINGS - 10 Year

Structure ID: Riser - 1	
Structure Type: Inlet Box	
Number of Openings	1
Elevation	6,937.00 ft
Orifice Area	10.2 ft <sup>2</sup>
Orifice Coefficient	0.600
Weir Length	4.00 ft
Weir Coefficient	3.00 (ft <sup>0.5</sup> )/s
K Reverse	1.000
Manning's n	0.000
Kev, Charged Riser	0.000
Weir Submergence	False
Orifice H to crest	False



Subsection: Outlet Input Data  
 Label: Composite Outlet Structure - 1

Return Event: 10 years  
 Storm Event: CO SPRINGS - 10 Year

Structure ID: Culvert - 1	
Structure Type: Culvert-Circular	
Number of Barrels	1
Diameter	24.0 in
Length	60.00 ft
Length (Computed Barrel)	60.03 ft
Slope (Computed)	0.033 ft/ft
Outlet Control Data	
Manning's n	0.013
Ke	0.200
Kb	0.012
Kr	0.000
Convergence Tolerance	0.00 ft
Inlet Control Data	
Equation Form	Form 1
K	0.0045
M	2.0000
C	0.0317
Y	0.6900
T1 ratio (HW/D)	1.079
T2 ratio (HW/D)	1.181
Slope Correction Factor	-0.500

Use unsubmerged inlet control 0 equation below T1 elevation.

Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control, interpolate between flows at T1 & T2...

T1 Elevation	6,934.16 ft	T1 Flow	15.55 ft <sup>3</sup> /s
T2 Elevation	6,934.36 ft	T2 Flow	17.77 ft <sup>3</sup> /s

Subsection: Outlet Input Data  
 Label: Composite Outlet Structure - 1

Return Event: 10 years  
 Storm Event: CO SPRINGS - 10 Year

Structure ID: Orifice - 1	
Structure Type: Orifice-Area	
Number of Openings	12
Elevation	6,933.00 ft
Orifice Area	0.0 ft <sup>2</sup>
Top Elevation	6,937.00 ft
Datum Elevation	6,933.00 ft
Orifice Coefficient	0.600
Structure ID: TW	
Structure Type: TW Setup, DS Channel	
Tailwater Type	Free Outfall
Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.01 ft
Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.01 ft
Headwater Tolerance (Maximum)	0.50 ft
Flow Tolerance (Minimum)	0.001 ft <sup>3</sup> /s
Flow Tolerance (Maximum)	10.000 ft <sup>3</sup> /s

Subsection: Individual Outlet Curves  
 Label: Composite Outlet Structure - 1

Return Event: 10 years  
 Storm Event: CO SPRINGS - 10 Year

RATING TABLE FOR ONE OUTLET TYPE  
 Structure ID = Riser - 1 (Inlet Box)

Upstream ID = (Pond Water Surface)  
 Downstream ID = Culvert - 1 (Culvert-Circular)

Water Surface Elevation (ft)	Device Flow (ft <sup>3</sup> /s)	(Into) Headwater Hydraulic Grade Line (ft)	Converge Downstream Hydraulic Grade Line (ft)	Next Downstream Hydraulic Grade Line (ft)	Downstream Hydraulic Grade Line Error (ft)	Convergence Error (ft <sup>3</sup> /s)	Downstream Channel Tailwater (ft)	Tailwater Error (ft)
6,932.00	0.00	0.00	0.00	0.00	0.00	0.00	(N/A)	0.00
6,932.50	0.00	0.00	0.00	0.00	0.00	0.00	(N/A)	0.00
6,933.00	0.00	0.00	0.00	0.00	0.00	0.00	(N/A)	0.00
6,933.50	0.00	0.00	0.00	6,932.15	0.00	0.00	(N/A)	0.00
6,934.00	0.00	0.00	0.00	6,932.21	0.00	0.00	(N/A)	0.00
6,934.50	0.00	0.00	0.00	6,932.26	0.00	0.00	(N/A)	0.00
6,935.00	0.00	0.00	0.00	6,932.30	0.00	0.00	(N/A)	0.00
6,935.50	0.00	0.00	0.00	6,932.34	0.00	0.00	(N/A)	0.00
6,936.00	0.00	0.00	0.00	6,932.38	0.00	0.00	(N/A)	0.00
6,936.50	0.00	0.00	0.00	6,932.40	0.00	0.00	(N/A)	0.00
6,937.00	0.00	0.00	0.00	6,932.43	0.00	0.00	(N/A)	0.00
6,937.50	4.24	6,937.50	Free Outfall	6,933.15	0.00	0.00	(N/A)	0.00
6,938.00	12.00	6,938.00	Free Outfall	6,933.96	0.00	0.00	(N/A)	0.00
6,938.50	22.05	6,938.50	Free Outfall	6,935.01	0.00	0.00	(N/A)	0.00
6,939.00	33.94	6,939.00	6,937.16	6,937.16	0.00	0.00	(N/A)	0.00
6,939.50	47.43	6,939.50	6,939.50	6,939.50	0.00	0.00	(N/A)	0.00
6,940.00	62.35	6,940.00	6,940.00	6,940.00	0.00	0.00	(N/A)	0.00

Message

WS below an invert; no flow.  
 WS below an invert; no flow.  
 WS below an invert; no flow.  
 WS below an invert; no flow.  
 WS below an invert; no flow.  
 WS below an invert; no flow.  
 WS below an invert; no flow.  
 WS below an invert; no flow.  
 WS below an invert; no flow.  
 WS below an invert; no flow.  
 WS below an invert; no flow.  
 Weir: H =0.5ft  
 Weir: H =1ft  
 Weir: H =1.5ft  
 FULLY CHARGED RISER: ADJUSTED TO  
 WEIR: H =2ft  
 FULLY CHARGED RISER: ADJUSTED TO  
 WEIR: H =2.5ft

Subsection: Individual Outlet Curves  
Label: Composite Outlet Structure - 1

Return Event: 10 years  
Storm Event: CO SPRINGS - 10 Year

RATING TABLE FOR ONE OUTLET TYPE  
Structure ID = Riser - 1 (Inlet Box)

Upstream ID = (Pond Water Surface)  
Downstream ID = Culvert - 1 (Culvert-Circular)

Message

FULLY CHARGED RISER: ADJUSTED TO WEIR: H = 3ft
---

Subsection: Individual Outlet Curves  
 Label: Composite Outlet Structure - 1

Return Event: 10 years  
 Storm Event: CO SPRINGS - 10 Year

RATING TABLE FOR ONE OUTLET TYPE  
 Structure ID = Culvert - 1 (Culvert-Circular)

Mannings open channel maximum capacity: 44.43 ft<sup>3</sup>/s  
 Upstream ID = Riser - 1, Orifice - 1  
 Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Device Flow (ft <sup>3</sup> /s)	(into) Headwater Hydraulic Grade Line (ft)	Converge Downstream Hydraulic Grade Line (ft)	Next Downstream Hydraulic Grade Line (ft)	Downstream Hydraulic Grade Line Error (ft)	Convergence Error (ft <sup>3</sup> /s)	Downstream Channel Tailwater (ft)	Tailwater Error (ft)
6,932.00	0.00	0.00	0.00	Free Outfall	0.00	0.00	(N/A)	0.00
6,932.50	0.00	0.00	0.00	Free Outfall	0.00	0.00	(N/A)	0.00
6,933.00	0.00	0.00	0.00	Free Outfall	0.00	0.00	(N/A)	0.00
6,933.50	0.10	6,932.15	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
6,934.00	0.20	6,932.21	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
6,934.50	0.30	6,932.26	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
6,935.00	0.40	6,932.30	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
6,935.50	0.50	6,932.34	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
6,936.00	0.61	6,932.38	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
6,936.50	0.69	6,932.40	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
6,937.00	0.79	6,932.43	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
6,937.50	5.07	6,933.15	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
6,938.00	12.79	6,933.96	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
6,938.50	22.77	6,935.01	Free Outfall	Free Outfall	0.00	0.02	(N/A)	0.00
6,939.00	34.46	6,937.16	Free Outfall	Free Outfall	0.00	0.02	(N/A)	0.00
6,939.50	43.77	6,939.50	Free Outfall	Free Outfall	0.00	3.67	(N/A)	0.00
6,940.00	45.51	6,940.00	Free Outfall	Free Outfall	0.00	16.84	(N/A)	0.00

Message

WS below an invert; no flow.  
 WS below an invert; no flow.  
 WS below an invert; no flow.  
 CRIT.DEPTH CONTROL Vh= .036ft  
 Dcr= .107ft CRIT.DEPTH Hev= .00ft  
 FLOW PRECEDENCE SET TO  
 UPSTREAM CONTROLLING  
 STRUCTURE  
 FLOW PRECEDENCE SET TO  
 UPSTREAM CONTROLLING  
 STRUCTURE  
 FLOW PRECEDENCE SET TO  
 UPSTREAM CONTROLLING  
 STRUCTURE  
 CRIT.DEPTH CONTROL Vh= .083ft  
 Dcr= .242ft CRIT.DEPTH Hev= .00ft  
 FLOW PRECEDENCE SET TO  
 UPSTREAM CONTROLLING  
 STRUCTURE

Subsection: Individual Outlet Curves  
Label: Composite Outlet Structure - 1

Return Event: 10 years  
Storm Event: CO SPRINGS - 10 Year

#### RATING TABLE FOR ONE OUTLET TYPE

Structure ID = Culvert - 1 (Culvert-Circular)

Mannings open channel maximum capacity: 44.43 ft<sup>3</sup>/s

Upstream ID = Riser - 1, Orifice - 1

Downstream ID = Tailwater (Pond Outfall)

##### Message

CRIT.DEPTH CONTROL Vh= .099ft  
Dcr= .286ft CRIT.DEPTH Hev= .00ft  
CRIT.DEPTH CONTROL Vh= .106ft  
Dcr= .306ft CRIT.DEPTH Hev= .00ft  
FLOW PRECEDENCE SET TO  
UPSTREAM CONTROLLING  
STRUCTURE  
CRIT.DEPTH CONTROL Vh= .557ft  
Dcr= 1.287ft CRIT.DEPTH Hev= .00ft  
INLET CONTROL... Submerged: HW  
=3.01  
INLET CONTROL... Submerged: HW  
=5.16  
INLET CONTROL... Submerged: HW  
=7.50  
INLET CONTROL... Submerged: HW  
=8.00



Subsection: Individual Outlet Curves  
 Label: Composite Outlet Structure - 1

Return Event: 10 years  
 Storm Event: CO SPRINGS - 10 Year

RATING TABLE FOR ONE OUTLET TYPE  
 Structure ID = Orifice - 1 (Orifice-Area)

Upstream ID = (Pond Water Surface)  
 Downstream ID = Culvert - 1 (Culvert-Circular)

Water Surface Elevation (ft)	Device Flow (ft <sup>3</sup> /s)	(Into) Headwater Hydraulic Grade Line (ft)	Converge Downstream Hydraulic Grade Line (ft)	Next Downstream Hydraulic Grade Line (ft)	Downstream Hydraulic Grade Line Error (ft)	Convergence Error (ft <sup>3</sup> /s)	Downstream Channel Tailwater (ft)	Tailwater Error (ft)
6,932.00	0.00	0.00	0.00	0.00	0.00	0.00	(N/A)	0.00
6,932.50	0.00	0.00	0.00	0.00	0.00	0.00	(N/A)	0.00
6,933.00	0.00	0.00	0.00	0.00	0.00	0.00	(N/A)	0.00
6,933.50	0.10	6,933.50	Free Outfall	6,932.15	0.00	0.00	(N/A)	0.00
6,934.00	0.20	6,934.00	Free Outfall	6,932.21	0.00	0.00	(N/A)	0.00
6,934.50	0.30	6,934.50	Free Outfall	6,932.26	0.00	0.00	(N/A)	0.00
6,935.00	0.40	6,935.00	Free Outfall	6,932.30	0.00	0.00	(N/A)	0.00
6,935.50	0.50	6,935.50	Free Outfall	6,932.34	0.00	0.00	(N/A)	0.00
6,936.00	0.60	6,936.00	Free Outfall	6,932.38	0.00	0.00	(N/A)	0.00
6,936.50	0.69	6,936.50	Free Outfall	6,932.40	0.00	0.00	(N/A)	0.00
6,937.00	0.79	6,937.00	Free Outfall	6,932.43	0.00	0.00	(N/A)	0.00
6,937.50	0.83	6,937.50	6,933.15	6,933.15	0.00	0.00	(N/A)	0.00
6,938.00	0.80	6,938.00	6,933.96	6,933.96	0.00	0.00	(N/A)	0.00
6,938.50	0.74	6,938.50	6,935.01	6,935.01	0.00	0.00	(N/A)	0.00
6,939.00	0.54	6,939.00	6,937.16	6,937.16	0.00	0.00	(N/A)	0.00
6,939.50	0.00	6,939.50	6,939.50	6,939.50	0.00	0.00	(N/A)	0.00
6,940.00	0.00	6,940.00	6,940.00	6,940.00	0.00	0.00	(N/A)	0.00

Message

WS below an invert; no flow.  
 WS below an invert; no flow.  
 WS below an invert; no flow.  
 HI=.50; Ht=4.00; Qt=.07  
 HI=1.00; Ht=4.00; Qt=.07  
 HI=1.50; Ht=4.00; Qt=.07  
 HI=2.00; Ht=4.00; Qt=.07  
 HI=2.50; Ht=4.00; Qt=.07  
 HI=3.00; Ht=4.00; Qt=.07  
 HI=3.50; Ht=4.00; Qt=.07  
 H =4.00  
 H =4.35  
 H =4.04  
 H =3.49  
 H =1.84  
 FLOW PRECEDENCE SET TO  
 DOWNSTREAM CONTROLLING  
 STRUCTURE

Subsection: Individual Outlet Curves  
Label: Composite Outlet Structure - 1

Return Event: 10 years  
Storm Event: CO SPRINGS - 10 Year

**RATING TABLE FOR ONE OUTLET TYPE**

Structure ID = Orifice - 1 (Orifice-Area)

Upstream ID = (Pond Water Surface)

Downstream ID = Culvert - 1 (Culvert-Circular)

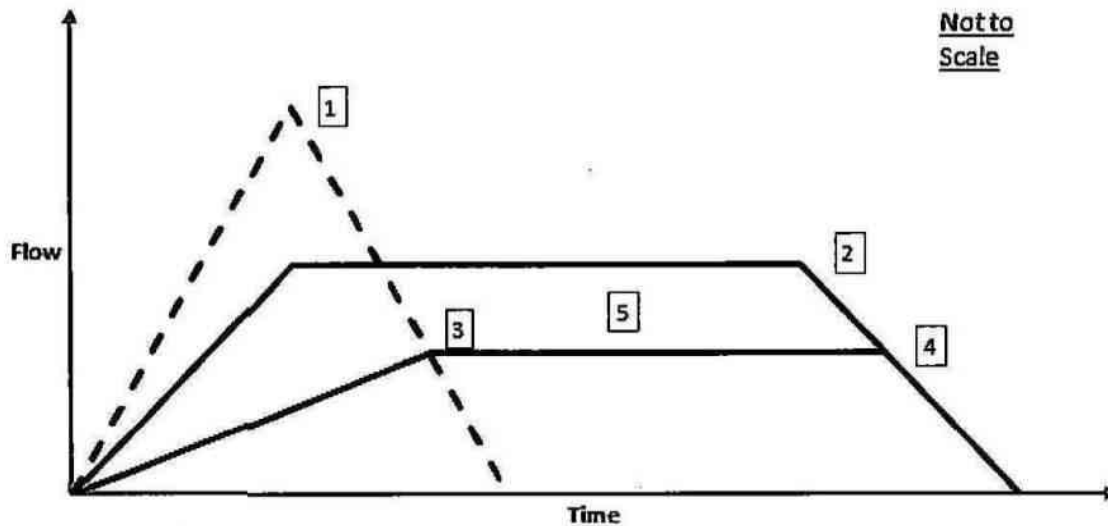
**Message**

FLOW PRECEDENCE SET TO  
DOWNSTREAM CONTROLLING  
STRUCTURE

Subsection: Modified Rational Graph  
 Label: Basins

Return Event: 10 years  
 Storm Event: CO SPRINGS - 10 Year

Method Type	Method T
Time of Duration (Modified Rational, Critical)	0.383 hours



[1]			[2]		
Time of Concentration (Modified Rational, Composite)	0.288	hours	Time of Duration (Modified Rational, Critical)	0.383	hours
Intensity (Modified Rational, Peak)	3.801	in/h	Intensity (Modified Rational, Critical)	3.286	in/h
Flow (Modified Rational, Peak)	25.96	ft <sup>3</sup> /s	Flow (Modified Rational, Critical)	22.45	ft <sup>3</sup> /s
[3]			[4]		
First Outflow Breakpoint (Modified Rational, Method T)		0.518 hours			
Flow (Modified Rational, Allowable)		12.00 ft <sup>3</sup> /s			
[5]			[4]		
Second Outflow Breakpoint (Modified Rational)	0.443	hours	Storage (Modified Rational, Estimated)	0.341	ac-ft
Flow (Modified Rational, Allowable)	12.00	ft <sup>3</sup> /s			

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**Project Summary**

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Title	BENT GRASS RESIDENTIAL FILING NO.1
Engineer	MAW
Company	CLASSIC CONSULTING
Date	7/10/2014

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Notes	POND 1 100 YEAR
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Subsection: Master Network Summary

**Catchments Summary**

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft <sup>3</sup> /s)
Basins	Post-Development 100 Year	100	1.657	0.300	28.64

**Node Summary**

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft <sup>3</sup> /s)
O-1	Post-Development 100 Year	100	1.305	0.900	6.77

**Pond Summary**

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft <sup>3</sup> /s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
Pond 1 (IN)	Post-Development 100 Year	100	1.657	0.300	28.64	(N/A)	(N/A)
Pond 1 (OUT)	Post-Development 100 Year	100	1.305	0.900	6.77	6,937.61	1.525

Subsection: I-D-F Table  
Label: CO SPRINGS

Return Event: 100 years  
Storm Event: CO SPRINGS - 100 Year

**I-D-F Curve**

Time (hours)	Intensity (in/h)
0.083	9.070
0.167	7.290
0.250	6.160
0.333	5.360
0.417	4.770
0.500	4.310
0.583	3.940
0.667	3.630
0.750	3.380
0.833	3.160
0.917	2.980
1.000	2.810

Subsection: Elevation-Area Volume Curve

Return Event: 100 years

Label: Pond 1

Storm Event: CO SPRINGS - 100 Year

Elevation (ft)	Planimeter (ft <sup>2</sup> )	Area (acres)	A1+A2+sqr (A1*A2) (acres)	Volume (ac-ft)	Volume (Total) (ac-ft)
6,932.00	0.0	0.005	0.000	0.000	0.000
6,934.00	0.0	0.292	0.335	0.223	0.223
6,936.00	0.0	0.367	0.986	0.658	0.881
6,938.00	0.0	0.451	1.225	0.817	1.698
6,940.00	0.0	0.545	1.492	0.995	2.692

Subsection: Outlet Input Data  
Label: Composite Outlet Structure - 1

Return Event: 100 years  
Storm Event: CO SPRINGS - 100 Year

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**Requested Pond Water Surface Elevations**

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Minimum (Headwater)	6,932.00 ft
Increment (Headwater)	0.50 ft
Maximum (Headwater)	6,940.00 ft

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**Outlet Connectivity**

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Inlet Box	Riser - 1	Forward	Culvert - 1	6,937.00	6,940.00
Orifice-Area	Orifice - 1	Forward	Culvert - 1	6,933.00	6,940.00
Culvert-Circular	Culvert - 1	Forward	TW	6,932.00	6,940.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

Subsection: Outlet Input Data  
Label: Composite Outlet Structure - 1

Return Event: 100 years  
Storm Event: CO SPRINGS - 100 Year

Structure ID: Riser - 1	
Structure Type: Inlet Box	
Number of Openings	1
Elevation	6,937.00 ft
Orifice Area	10.2 ft <sup>2</sup>
Orifice Coefficient	0.600
Weir Length	4.00 ft
Weir Coefficient	3.00 (ft <sup>0.5</sup> )/s
K Reverse	1.000
Manning's n	0.000
Kev, Charged Riser	0.000
Weir Submergence	False
Orifice H to crest	False

Subsection: Outlet Input Data  
 Label: Composite Outlet Structure - 1

Return Event: 100 years  
 Storm Event: CO SPRINGS - 100 Year

Structure ID: Culvert - 1	
Structure Type: Culvert-Circular	
Number of Barrels	1
Diameter	24.0 in
Length	60.00 ft
Length (Computed Barrel)	60.03 ft
Slope (Computed)	0.033 ft/ft
Outlet Control Data	
Manning's n	0.013
Ke	0.200
Kb	0.012
Kr	0.000
Convergence Tolerance	0.00 ft
Inlet Control Data	
Equation Form	Form 1
K	0.0045
M	2.0000
C	0.0317
Y	0.6900
T1 ratio (HW/D)	1.079
T2 ratio (HW/D)	1.181
Slope Correction Factor	-0.500

Use unsubmerged inlet control 0 equation below T1 elevation.

Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,  
 interpolate between flows at T1 & T2...

T1 Elevation	6,934.16 ft	T1 Flow	15.55 ft <sup>3</sup> /s
T2 Elevation	6,934.36 ft	T2 Flow	17.77 ft <sup>3</sup> /s

Subsection: Outlet Input Data  
Label: Composite Outlet Structure - 1

Return Event: 100 years  
Storm Event: CO SPRINGS - 100 Year

Structure ID: Orifice - 1	
Structure Type: Orifice-Area	
Number of Openings	12
Elevation	6,933.00 ft
Orifice Area	0.0 ft <sup>2</sup>
Top Elevation	6,937.00 ft
Datum Elevation	6,933.00 ft
Orifice Coefficient	0.600
Structure ID: TW	
Structure Type: TW Setup, DS Channel	
Tailwater Type	Free Outfall
Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.01 ft
Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.01 ft
Headwater Tolerance (Maximum)	0.50 ft
Flow Tolerance (Minimum)	0.001 ft <sup>3</sup> /s
Flow Tolerance (Maximum)	10.000 ft <sup>3</sup> /s



Subsection: Individual Outlet Curves  
Label: Composite Outlet Structure - 1

Return Event: 100 years  
Storm Event: CO SPRINGS - 100 Year

RATING TABLE FOR ONE OUTLET TYPE  
Structure ID = Riser - 1 (Inlet Box)

Upstream ID = (Pond Water Surface)  
Downstream ID = Culvert - 1 (Culvert-Circular)

Water Surface Elevation (ft)	Device Flow (ft <sup>3</sup> /s)	(into) Headwater Hydraulic Grade Line (ft)	Converge Downstream Hydraulic Grade Line (ft)	Next Downstream Hydraulic Grade Line (ft)	Downstream Hydraulic Grade Line Error (ft)	Convergence Error (ft <sup>3</sup> /s)	Downstream Channel Tailwater (ft)	Tailwater Error (ft)
6,932.00	0.00	0.00	0.00	0.00	0.00	0.00	(N/A)	0.00
6,932.50	0.00	0.00	0.00	0.00	0.00	0.00	(N/A)	0.00
6,933.00	0.00	0.00	0.00	0.00	0.00	0.00	(N/A)	0.00
6,933.50	0.00	0.00	0.00	6,932.15	0.00	0.00	(N/A)	0.00
6,934.00	0.00	0.00	0.00	6,932.21	0.00	0.00	(N/A)	0.00
6,934.50	0.00	0.00	0.00	6,932.26	0.00	0.00	(N/A)	0.00
6,935.00	0.00	0.00	0.00	6,932.30	0.00	0.00	(N/A)	0.00
6,935.50	0.00	0.00	0.00	6,932.34	0.00	0.00	(N/A)	0.00
6,936.00	0.00	0.00	0.00	6,932.38	0.00	0.00	(N/A)	0.00
6,936.50	0.00	0.00	0.00	6,932.40	0.00	0.00	(N/A)	0.00
6,937.00	0.00	0.00	0.00	6,932.43	0.00	0.00	(N/A)	0.00
6,937.50	4.24	6,937.50	Free Outfall	6,933.15	0.00	0.00	(N/A)	0.00
6,938.00	12.00	6,938.00	Free Outfall	6,933.96	0.00	0.00	(N/A)	0.00
6,938.50	22.05	6,938.50	Free Outfall	6,935.01	0.00	0.00	(N/A)	0.00
6,939.00	33.94	6,939.00	6,937.16	6,937.16	0.00	0.00	(N/A)	0.00
6,939.50	47.43	6,939.50	6,939.50	6,939.50	0.00	0.00	(N/A)	0.00
6,940.00	62.35	6,940.00	6,940.00	6,940.00	0.00	0.00	(N/A)	0.00

Message

WS below an invert; no flow.  
WS below an invert; no flow.  
WS below an invert; no flow.  
WS below an invert; no flow.  
WS below an invert; no flow.  
WS below an invert; no flow.  
WS below an invert; no flow.  
WS below an invert; no flow.  
WS below an invert; no flow.  
WS below an invert; no flow.  
WS below an invert; no flow.  
Weir: H =0.5ft  
Weir: H =1ft  
Weir: H =1.5ft  
FULLY CHARGED RISER: ADJUSTED TO  
WEIR: H =2ft  
FULLY CHARGED RISER: ADJUSTED TO  
WEIR: H =2.5ft

Subsection: Individual Outlet Curves  
Label: Composite Outlet Structure - 1

Return Event: 100 years  
Storm Event: CO SPRINGS - 100 Year

**RATING TABLE FOR ONE OUTLET TYPE**

Structure ID = Riser - 1 (Inlet Box)

Upstream ID = (Pond Water Surface)

Downstream ID = Culvert - 1 (Culvert-Circular)

**Message**

FULLY CHARGED RISER: ADJUSTED TO WEIR: H = 3ft
---

Subsection: Individual Outlet Curves  
 Label: Composite Outlet Structure - 1

Return Event: 100 years  
 Storm Event: CO SPRINGS - 100 Year

**RATING TABLE FOR ONE OUTLET TYPE**  
 Structure ID = Culvert - 1 (Culvert-Circular)

Mannings open channel maximum capacity: 44.43 ft<sup>3</sup>/s  
 Upstream ID = Riser - 1, Orifice - 1  
 Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Device Flow (ft <sup>3</sup> /s)	(Into) Headwater Hydraulic Grade Line (ft)	Converge Downstream Hydraulic Grade Line (ft)	Next Downstream Hydraulic Grade Line (ft)	Downstream Hydraulic Grade Line Error (ft)	Convergence Error (ft <sup>3</sup> /s)	Downstream Channel Tailwater (ft)	Tailwater Error (ft)
6,932.00	0.00	0.00	0.00	Free Outfall	0.00	0.00	(N/A)	0.00
6,932.50	0.00	0.00	0.00	Free Outfall	0.00	0.00	(N/A)	0.00
6,933.00	0.00	0.00	0.00	Free Outfall	0.00	0.00	(N/A)	0.00
6,933.50	0.10	6,932.15	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
6,934.00	0.20	6,932.21	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
6,934.50	0.30	6,932.26	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
6,935.00	0.40	6,932.30	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
6,935.50	0.50	6,932.34	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
6,936.00	0.61	6,932.38	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
6,936.50	0.69	6,932.40	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
6,937.00	0.79	6,932.43	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
6,937.50	5.07	6,933.15	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
6,938.00	12.79	6,933.96	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
6,938.50	22.77	6,935.01	Free Outfall	Free Outfall	0.00	0.02	(N/A)	0.00
6,939.00	34.46	6,937.16	Free Outfall	Free Outfall	0.00	0.02	(N/A)	0.00
6,939.50	43.77	6,939.50	Free Outfall	Free Outfall	0.00	3.67	(N/A)	0.00
6,940.00	45.51	6,940.00	Free Outfall	Free Outfall	0.00	16.84	(N/A)	0.00

**Message**

WS below an invert; no flow.  
 WS below an invert; no flow.  
 WS below an invert; no flow.  
 CRIT.DEPTH CONTROL Vh= .036ft  
 Dcr= .107ft CRIT.DEPTH Hev= .00ft  
 FLOW PRECEDENCE SET TO  
 UPSTREAM CONTROLLING  
 STRUCTURE  
 FLOW PRECEDENCE SET TO  
 UPSTREAM CONTROLLING  
 STRUCTURE  
 FLOW PRECEDENCE SET TO  
 UPSTREAM CONTROLLING  
 STRUCTURE  
 CRIT.DEPTH CONTROL Vh= .083ft  
 Dcr= .242ft CRIT.DEPTH Hev= .00ft  
 FLOW PRECEDENCE SET TO  
 UPSTREAM CONTROLLING  
 STRUCTURE

Subsection: Individual Outlet Curves  
Label: Composite Outlet Structure - 1

Return Event: 100 years  
Storm Event: CO SPRINGS - 100 Year

RATING TABLE FOR ONE OUTLET TYPE  
Structure ID = Culvert - 1 (Culvert-Circular)

Mannings open channel maximum capacity: 44.43 ft<sup>3</sup>/s  
Upstream ID = Riser - 1, Orifice - 1  
Downstream ID = Tailwater (Pond Outfall)

Message

CRIT.DEPTH CONTROL Vh= .099ft Dcr= .286ft CRIT.DEPTH Hev= .00ft CRIT.DEPTH CONTROL Vh= .106ft Dcr= .306ft CRIT.DEPTH Hev= .00ft FLOW PRECEDENCE SET TO UPSTREAM CONTROLLING STRUCTURE CRIT.DEPTH CONTROL Vh= .557ft Dcr= 1.287ft CRIT.DEPTH Hev= .00ft INLET CONTROL... Submerged: HW =3.01 INLET CONTROL... Submerged: HW =5.16 INLET CONTROL... Submerged: HW =7.50 INLET CONTROL... Submerged: HW =8.00
--

Subsection: Individual Outlet Curves  
 Label: Composite Outlet Structure - 1

Return Event: 100 years  
 Storm Event: CO SPRINGS - 100 Year

RATING TABLE FOR ONE OUTLET TYPE  
 Structure ID = Orifice - 1 (Orifice-Area)

Upstream ID = (Pond Water Surface)  
 Downstream ID = Culvert - 1 (Culvert-Circular)

Water Surface Elevation (ft)	Device Flow (ft <sup>3</sup> /s)	(Into) Headwater Hydraulic Grade Line (ft)	Converge Downstream Hydraulic Grade Line (ft)	Next Downstream Hydraulic Grade Line (ft)	Downstream Hydraulic Grade Line Error (ft)	Convergence Error (ft <sup>3</sup> /s)	Downstream Channel Tailwater (ft)	Tailwater Error (ft)
6,932.00	0.00	0.00	0.00	0.00	0.00	0.00	(N/A)	0.00
6,932.50	0.00	0.00	0.00	0.00	0.00	0.00	(N/A)	0.00
6,933.00	0.00	0.00	0.00	0.00	0.00	0.00	(N/A)	0.00
6,933.50	0.10	6,933.50	Free Outfall	6,932.15	0.00	0.00	(N/A)	0.00
6,934.00	0.20	6,934.00	Free Outfall	6,932.21	0.00	0.00	(N/A)	0.00
6,934.50	0.30	6,934.50	Free Outfall	6,932.26	0.00	0.00	(N/A)	0.00
6,935.00	0.40	6,935.00	Free Outfall	6,932.30	0.00	0.00	(N/A)	0.00
6,935.50	0.50	6,935.50	Free Outfall	6,932.34	0.00	0.00	(N/A)	0.00
6,936.00	0.60	6,936.00	Free Outfall	6,932.38	0.00	0.00	(N/A)	0.00
6,936.50	0.69	6,936.50	Free Outfall	6,932.40	0.00	0.00	(N/A)	0.00
6,937.00	0.79	6,937.00	Free Outfall	6,932.43	0.00	0.00	(N/A)	0.00
6,937.50	0.83	6,937.50	6,933.15	6,933.15	0.00	0.00	(N/A)	0.00
6,938.00	0.80	6,938.00	6,933.96	6,933.96	0.00	0.00	(N/A)	0.00
6,938.50	0.74	6,938.50	6,935.01	6,935.01	0.00	0.00	(N/A)	0.00
6,939.00	0.54	6,939.00	6,937.16	6,937.16	0.00	0.00	(N/A)	0.00
6,939.50	0.00	6,939.50	6,939.50	6,939.50	0.00	0.00	(N/A)	0.00
6,940.00	0.00	6,940.00	6,940.00	6,940.00	0.00	0.00	(N/A)	0.00

Message

WS below an invert; no flow.  
 WS below an invert; no flow.  
 WS below an invert; no flow.  
 Hi=.50; Ht=4.00; Qt=.07  
 Hi=1.00; Ht=4.00; Qt=.07  
 Hi=1.50; Ht=4.00; Qt=.07  
 Hi=2.00; Ht=4.00; Qt=.07  
 Hi=2.50; Ht=4.00; Qt=.07  
 Hi=3.00; Ht=4.00; Qt=.07  
 Hi=3.50; Ht=4.00; Qt=.07  
 H =4.00  
 H =4.35  
 H =4.04  
 H =3.49  
 H =1.84  
 FLOW PRECEDENCE SET TO  
 DOWNSTREAM CONTROLLING  
 STRUCTURE

Subsection: Individual Outlet Curves  
Label: Composite Outlet Structure - 1

Return Event: 100 years  
Storm Event: CO SPRINGS - 100 Year

RATING TABLE FOR ONE OUTLET TYPE  
Structure ID = Orifice - 1 (Orifice-Area)

Upstream ID = (Pond Water Surface)  
Downstream ID = Culvert - 1 (Culvert-Circular)

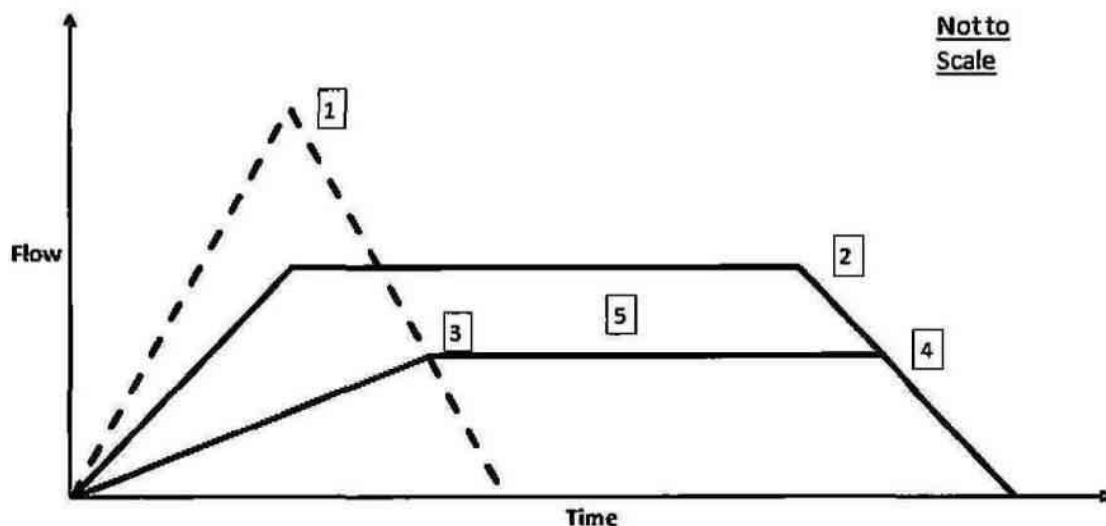
Message

FLOW PRECEDENCE SET TO  
DOWNSTREAM CONTROLLING  
STRUCTURE

Subsection: Modified Rational Graph  
 Label: Basins

Return Event: 100 years  
 Storm Event: CO SPRINGS - 100 Year

Method Type	Method T
Time of Duration (Modified Rational, Critical)	0.700 hours



[1]		[2]	
Time of Concentration (Modified Rational, Composite)	0.288 hours	Time of Duration (Modified Rational, Critical)	0.700 hours
Intensity (Modified Rational, Peak)	5.792 in/h	Intensity (Modified Rational, Critical)	3.530 in/h
Flow (Modified Rational, Peak)	46.99 ft <sup>3</sup> /s	Flow (Modified Rational, Critical)	28.64 ft <sup>3</sup> /s

[3]	
First Outflow Breakpoint (Modified Rational, Method T)	0.867 hours
Flow (Modified Rational, Allowable)	12.00 ft <sup>3</sup> /s

[4]		[5]	
Second Outflow Breakpoint (Modified Rational)	0.503 hours	Storage (Modified Rational, Estimated)	0.986 ac-ft
Flow (Modified Rational, Allowable)	12.00 ft <sup>3</sup> /s		



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Composite Outlet Structure - 1 (Outlet Input Data, 100 years)...5, 6, 7, 8

### M

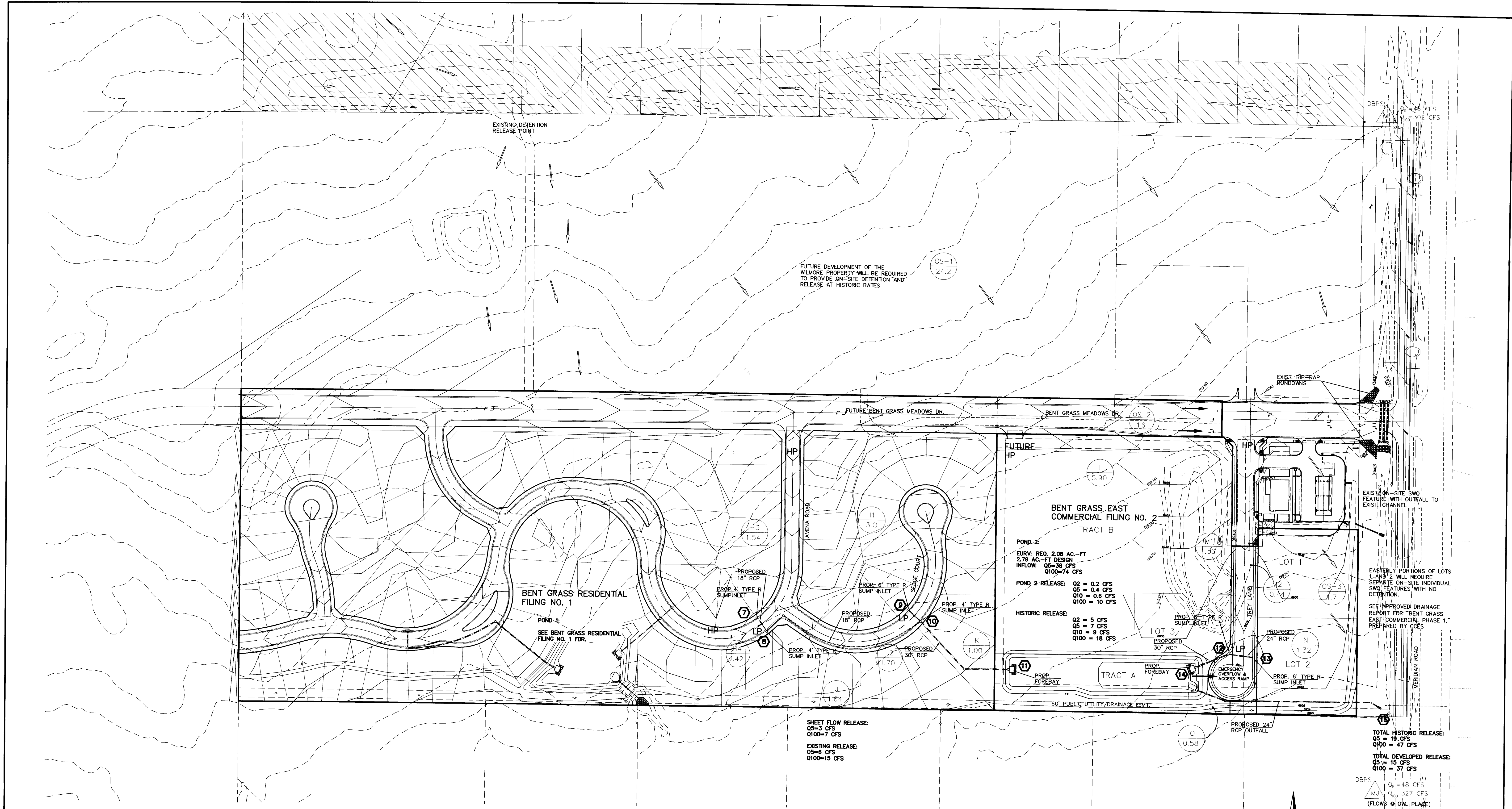
Master Network Summary...2

### P

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Pond 1 (IN) (Pond Inflow Summary, 100 years)...18

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LEGEND

- EXISTING GROUND CONTOUR

5910
- PROPOSED FINISHED CONTOUR

5910
- SUBDIVISION BOUNDARY
- LOT LINE
- PROPOSED BASIN BOUNDARY
- DIRECTION OF DRAINAGE
- EXISTING STORM SEWER
- EXISTING STORM INLET
- PROPOSED STORM SEWER
- PROPOSED STORM INLET
- LOW POINT/HIGH POINT

LP/HP
- BASIN IDENTIFIER

D
- AREA IN ACRES

1.41
- DESIGN POINT

1

FINAL DRAINAGE REPORT - BASIN RUNOFF SUMMARY																						
BASIN	WEIGHTED		OVERLAND				STREET / CHANNEL FLOW				INTENSITY				TOTAL FLOWS							
	CA(5)	CA(100)	C(5)	Length	Height	Tc	Length	Slope	Velocity	Tc	Tc	Q(2)	Q(5)	Q(10)	Q(25)	Q(50)	Q(100)	Q(5)	Q(10)	Q(25)	Q(50)	Q(100)
OS-1	6.05	8.47	0.25	950	22	37.1					37.1	1.55	2.14	2.49	3.21	3.63	3.90	5	13	15	21	32
OS-2	1.38	1.46	0.25								5.0	3.71	5.13	5.96	7.86	9.07	5.0	7	8	11	13	13
OS-3	1.34	1.44	0.25	30	0.6	6.9	200	15%	4.3	0.8	7.7	3.27	4.50	5.25	6.75	7.85	8.90	4	6	7	10	11
H3	8.85	1.00	0.25	100	2	12.6	350	2.0%	4.9	1.2	13.8	2.61	3.59	4.19	5.39	6.11	6.38	2	3	4	5	6
H4	0.23	0.27	0.25	50	1	8.9	150	2.0%	4.9	0.5	9.4	3.05	4.15	4.69	6.29	7.12	7.45	0.7	1.0	1.1	1.7	1.9
I1	1.65	1.95	0.25	50	1	8.9	550	2.0%	4.9	1.9	10.8	2.89	3.95	4.65	5.97	6.77	7.08	5	7	8	12	13
I2	0.94	1.11	0.25	50	1	8.9	300	2.0%	4.9	1.0	10.0	2.99	4.11	4.79	6.16	6.99	7.31	3	4	4	7	8
J	0.66	0.90	0.25	75	4	7.9				7.9	3.24	4.46	5.20	6.69	7.59	7.90	2	3	3	6	7	
K	0.40	0.55	0.25	65	3	7.7				7.7	3.27	4.40	5.24	6.74	7.64	7.99	1	2	2	4	4	
L	4.90	4.90	0.25	30	0.6	6.9	800	10%	3.5	3.8	10.7	2.90	3.95	4.65	5.99	6.78	7.10	13	18	21	29	33
M1	1.33	1.40	0.25	30	0.6	6.9	300	10%	3.5	1.4	8.4	3.18	4.35	5.11	6.57	7.44	7.78	4	6	7	9	10
M2	0.37	0.40	0.25							5.0	3.71	5.13	5.96	7.86	9.07	1.4	1.9	2.2	3.0	3.4	2.6	
N	1.12	1.19	0.25	20	0.4	5.7	330	2.0%	4.9	1.1	6.8	3.41	4.69	5.47	7.04	7.97	8.34	4	5	6	8	9
O	0.15	0.20	0.25	60	5	6.1				6.1	3.51	4.83	5.64	7.25	8.22	8.59	0.5	0.7	0.8	1.5	1.7	

FINAL DRAINAGE REPORT - SURFACE ROUTING SUMMARY										
Design Point(s)	Contributing Basins	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity		Flow		Facility Size	
					I(5)	I(100)	Q(5)	Q(100)		
7	H3	0.85	1.00	13.8	3.69	6.38	3	6	4" TYPE R SUMP INLET	
8	H4	0.23	0.27	9.4	4.19	7.45	1	2	4" TYPE R SUMP INLET	
9	I1	1.65	1.95	10.8	3.98	7.08	7	14	6" TYPE R SUMP INLET	
10	I2	0.94	1.11	10.0	4.11	7.31	4	8	4" TYPE R SUMP INLET	
11	DP 7 - DP 10 (Westerly Flow into Pond 2)	3.66	4.33	16.9	3.27	5.82	12	25	30" RCP	
12	M1	1.33	1.40	8.4	4.38	7.78	6	11	4" TYPE R SUMP INLET	
13	M2 & N	1.50	1.58	6.8	4.69	8.34	7	13	6" TYPE R SUMP INLET	
14	DP 12 & DP 13 (Easterly Flow into Pond 2)	2.82	2.99	8.9	4.29	7.63	12	23	30" RCP	
15	Total Flow into Pond 2 (incl. Basins K & L)	11.48	12.79	16.9	3.27	5.82	38	74	2.3 AC-FT. POND 2	
	OS-1, OS-2, OS-3, O AND POND 2 RELEASE	SCS MODEL					15	37		

CLASSIC

CONSULTING ENGINEERS & SURVEYORS

6385 Corporate Drive, Suite 101  
Colorado Springs, Colorado 80919

(719) 785-0790  
(719) 785-0799 (Fax)

BENT GRASS EAST COMM. FILING NO. 2

FINAL DRAINAGE REPORT  
DEVELOPED CONDITIONS MAP

DESIGNED BY

MAW

SCALE

DATE

07-22-14

DRAWN BY

MAW

(H) 1"= 100'

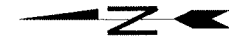
SHEET 1 OF 1

CHECKED BY

(V) 1"= N/A

JOB NO.

2177-53

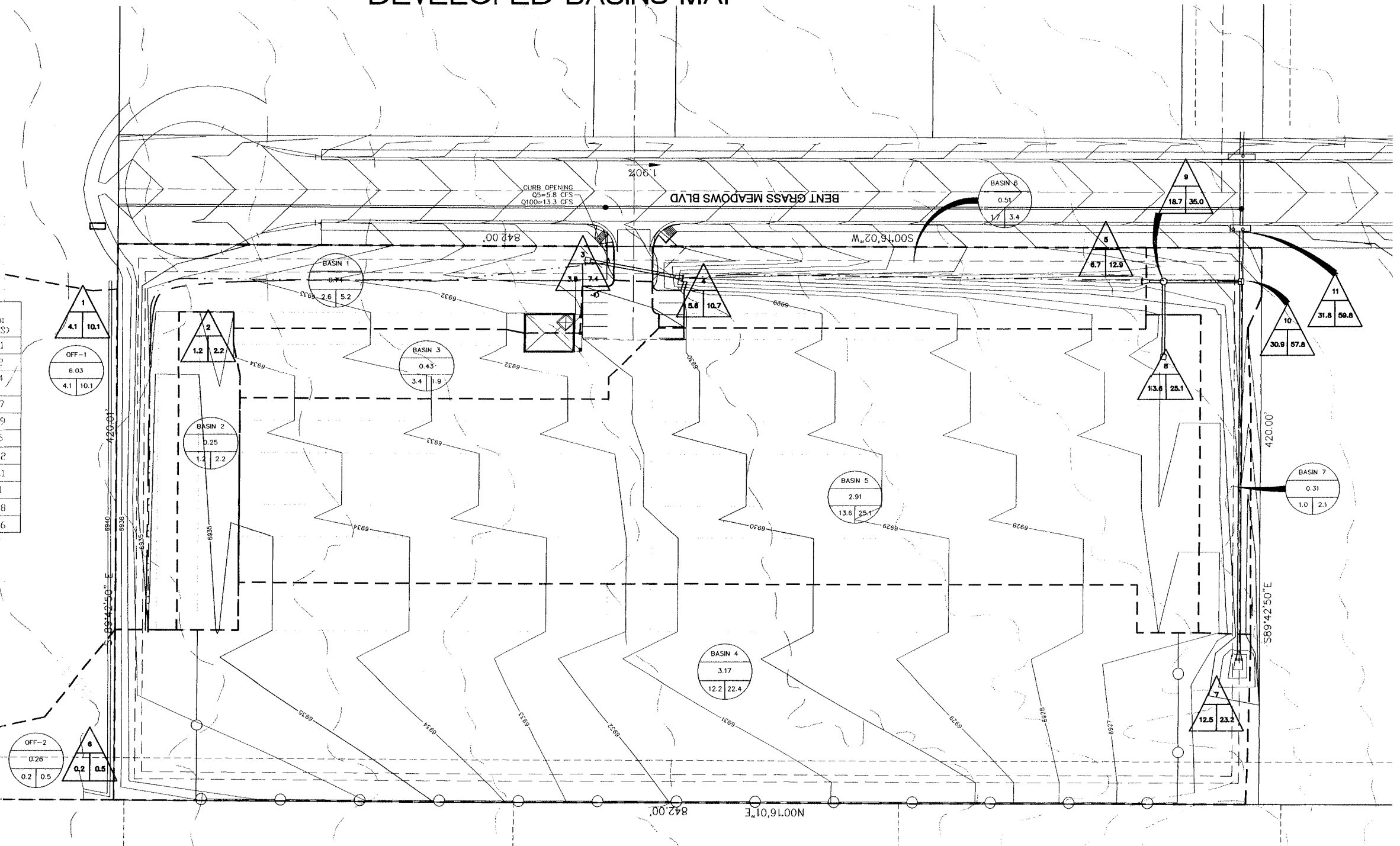


SCALE: 1"=40'



# LOT 1 LATIGO BUSINESS CENTER DEVELOPED BASINS MAP

DESIGN POINT	CONTRIBUTING BASINS	TIME OF CONCENTRATION (MINUTES)	Q <sub>5</sub> (CFS)	Q <sub>100</sub> (CFS)
1	OFF-1	22.6	4.1	10.1
2	BASIN 2	5.0	1.2	2.2
3	BASIN 1, BASIN 2	5.2	3.8	7.4
4	DP-3, BASIN 3	5.3	5.6	10.7
5	DP-4, BASIN 6	7.3	6.7	12.9
6	OFF-2	17.5	0.2	0.5
7	DP-6, BASIN 4	7.1	12.5	23.2
8	BASIN 5	5.0	13.6	25.1
9	BASIN 7	6.4	1.0	2.1
10	DP-9, DP-7	7.4	30.9	57.8
11	DP-10, BASIN 7	7.4	31.8	59.6



REVISIONS:		
NO.	DESCRIPTION	DATE

ENGINEER: \_\_\_\_\_  
DESIGNED BY: DC DATE: 7/17/04  
DRAWN BY: DC DATE: 7/17/04  
CHECKED BY: XXX DATE: XX/XX/XX  
48 HOURS BEFORE YOU DIG,  
CALL UTILITY LOCATORS  
1-800-922-1987  
(SEE COVER FOR LIST OF UTILITY COMPANIES)

PROJECT LATIGO BUSINESS CENTER LOT 1  
SHEET TITLE NA  
FROM \_\_\_\_\_ TO \_\_\_\_\_  
JOB NO. 2004-1 SHEET 2 OF 2

**APPENDIX B**  
**Hydrologic Computations**

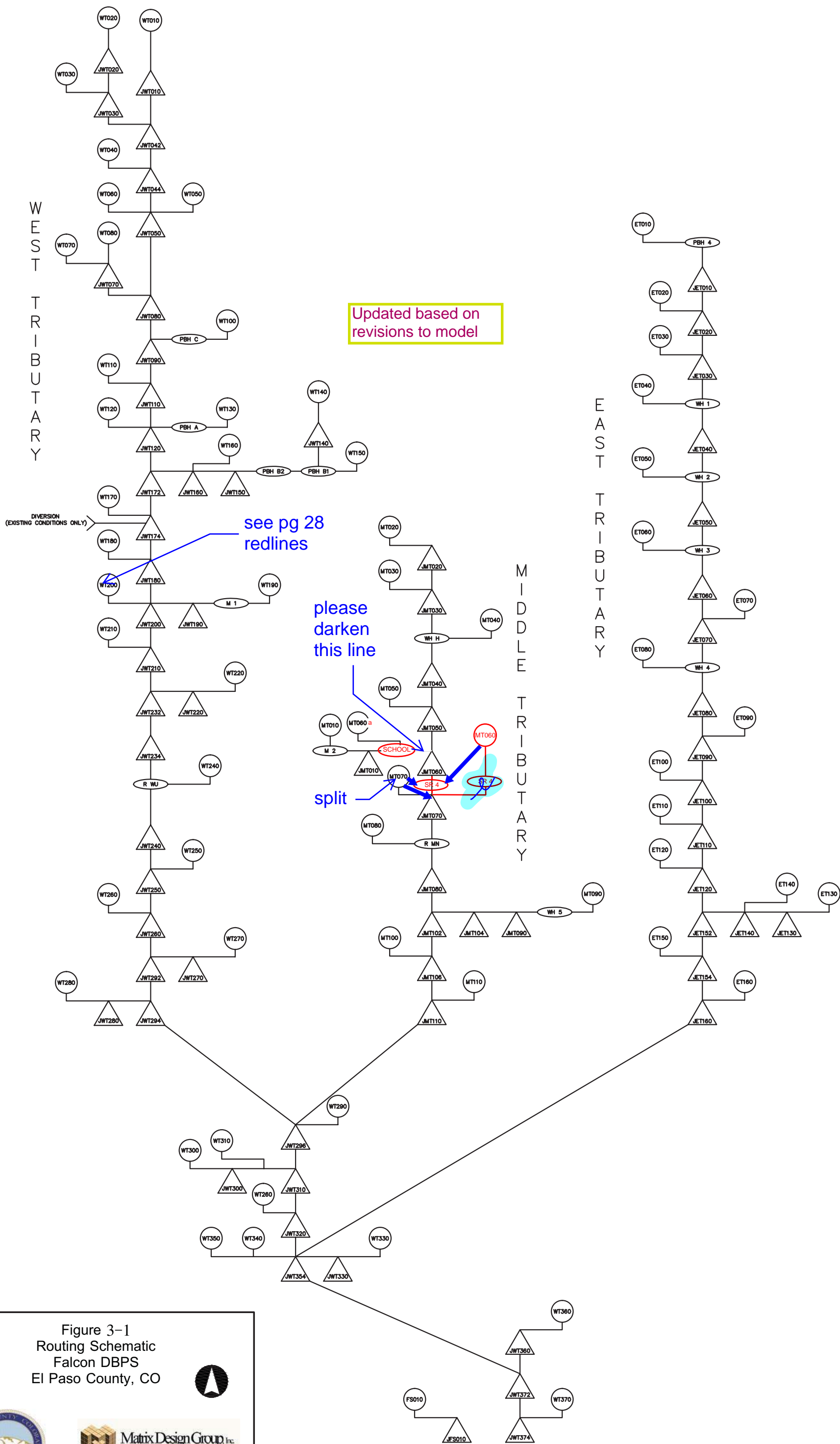


Figure 3-1  
Routing Schematic  
Falcon DBPS  
El Paso County, CO



DRAWING NOT TO SCALE

## Current HMS Model

CURRENT 100-YEAR STORM

Hydrologic Element	Drainage Area (MI <sup>2</sup> )	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
WT020	0.0671383	41.9	01Jan2011, 06:21	4.8
JWT020	0.0671383	41.9	01Jan2011, 06:21	4.8
RWT030	0.0671383	41.9	01Jan2011, 06:29	4.8
WT030	0.0764732	75.3	01Jan2011, 06:07	5.5
JWT030	0.1436115	85.4	01Jan2011, 06:09	10.3
RWT042	0.1436115	85.3	01Jan2011, 06:15	10.3
WT010	0.1353300	88.9	01Jan2011, 06:17	9.3
JWT010	0.1353300	88.9	01Jan2011, 06:17	9.3
RWT044	0.1353300	88.8	01Jan2011, 06:24	9.3
JWT042	0.2789415	167.0	01Jan2011, 06:21	19.6
RWT046	0.2789415	166.7	01Jan2011, 06:28	19.6
WT040	0.1850600	92.7	01Jan2011, 06:28	12.8
JWT044	0.4640015	259.4	01Jan2011, 06:28	32.4
RWT054	0.4640015	258.8	01Jan2011, 06:35	32.3
WT060	0.1956300	116.8	01Jan2011, 06:26	15.1
WT050	0.1899300	139.4	01Jan2011, 06:19	15.3
JWT050	0.8495615	475.4	01Jan2011, 06:31	62.7
RWT092	0.8495615	475.2	01Jan2011, 06:32	62.7
WT070	0.1711000	133.9	01Jan2011, 06:12	11.8
JWT070	0.1711000	133.9	01Jan2011, 06:12	11.8
RWT080	0.1711000	133.4	01Jan2011, 06:22	11.8
WT080	0.0691596	67.3	01Jan2011, 06:10	5.6
Sub Regional Pond SR1	1.0898211	513.2	01Jan2011, 06:40	78.4
JWT080	1.0898211	513.2	01Jan2011, 06:40	78.4
RWT094	1.0898211	512.4	01Jan2011, 06:45	78.3
WT100-REV	0.1292700	203.0	01Jan2011, 06:04	12.9
W26-REV	0.0720000	103.6	01Jan2011, 06:03	6.4
WS3-1	0.0720000	102.8	01Jan2011, 06:10	6.4
Paint Brush Hills Pond C	0.2012700	64.4	01Jan2011, 06:26	19.2
WT090	0.1533300	162.4	01Jan2011, 06:09	12.8
JWT090	1.4444211	595.9	01Jan2011, 06:44	110.2
RWT122	1.4444211	595.5	01Jan2011, 06:45	110.2
WT110	0.1942800	169.9	01Jan2011, 06:14	16.2
JWT110	1.6387011	651.0	01Jan2011, 06:43	126.4
RWT124	1.6387011	650.8	01Jan2011, 06:47	126.3
WT130-REV	0.1016250	130.0	01Jan2011, 06:11	10.9
Paint Brush Hills Pond A	0.1016250	53.8	01Jan2011, 06:32	10.9
WT120-REV	0.0430300	51.1	01Jan2011, 06:08	3.8



**CURRENT 100-YEAR STORM**

Hydrologic Element	Drainage Area (MI <sup>2</sup> )	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
JWT120	1.7833561	703.6	01Jan2011, 06:46	140.9
RWT172	1.7833561	702.5	01Jan2011, 06:58	140.5
WT140-REV	0.1445300	194.2	01Jan2011, 06:12	16.8
JWT140	0.1445300	194.2	01Jan2011, 06:12	16.8
RWT150	0.1445300	193.3	01Jan2011, 06:22	16.8
WT150-REV	0.1308100	202.5	01Jan2011, 06:08	15.0
Paint Brush Hills Pond...	0.2753400	235.6	01Jan2011, 06:29	31.8
W34B2-REV	0.0935900	141.8	01Jan2011, 06:07	10.2
Paint Brush Hills Pond...	0.3689300	234.3	01Jan2011, 06:43	38.9
JWT150	0.3689300	234.3	01Jan2011, 06:43	38.9
RWT160	0.3689300	234.2	01Jan2011, 06:49	38.8
WT160-REV	0.0734800	109.9	01Jan2011, 06:06	7.5
JWT160	0.4424100	244.8	01Jan2011, 06:48	46.3
RWT174	0.4424100	244.7	01Jan2011, 06:56	46.2
WT170-REV	0.1060150	85.2	01Jan2011, 06:19	9.2
W34-CY-REV	0.0465469	38.1	01Jan2011, 06:16	3.8
JWT172	2.3783280	981.9	01Jan2011, 06:56	199.7
RWT176	2.3783280	981.6	01Jan2011, 06:57	199.7
Sub Regional Pond SR2	2.3783280	972.9	01Jan2011, 07:01	194.8
JWT174	2.3783280	972.9	01Jan2011, 07:01	194.8
RWT180	2.3783280	972.1	01Jan2011, 07:10	194.2
WT180-REV	0.0409400	29.3	01Jan2011, 06:19	3.2
JWT180	2.4192680	978.0	01Jan2011, 07:10	197.4
RWT202	2.4192680	977.3	01Jan2011, 07:21	196.8
WT200	0.3017100	186.8	01Jan2011, 06:30	26.0
WT190	0.0574561	74.7	01Jan2011, 06:05	5.0
The Meadows Pond #1	0.0574561	2.1	01Jan2011, 08:29	2.8
JWT190	0.0574561	2.1	01Jan2011, 08:29	2.8
RWT204	0.0574561	2.1	01Jan2011, 08:55	2.7
JWT200	2.7784341	1041.0	01Jan2011, 07:19	225.5
RWT210	2.7784341	1040.5	01Jan2011, 07:24	225.1
WT210	0.2654600	187.9	01Jan2011, 06:35	28.0
JWT210	3.0438941	1113.0	01Jan2011, 07:23	253.1
RWT232	3.0438941	1112.6	01Jan2011, 07:27	252.7
WT220	0.1895300	250.4	01Jan2011, 06:12	21.3
JWT220	0.1895300	250.4	01Jan2011, 06:12	21.3
RWT234	0.1895300	249.6	01Jan2011, 06:20	21.3
JWT232	3.2334241	1138.4	01Jan2011, 07:26	274.0

Does the model include Bent Grass Residential 2? Values don't match table on the plan.

TABLES ON PLAN HAVE BEEN UPDATED. CURRENT MODEL DOES NOT ACCOUNT FOR DEVELOPMENT IN BG R2. FUTURE MODEL ACCOUNTS FOR ALL DEVELOPMENT IN FALCON MEADOWS AND BG. TABLE ON PLAN NOW INCLUDES HMS FLOWS ENTERING & EXITING SITE (DP 40 & DP CC)

CURRENT 100-YEAR STORM

Hydrologic Element	Drainage Area (MI <sup>2</sup> )	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
RWT236	3.2334241	1138.3	01Jan2011, 07:26	274.0
WT230	0.1981800	346.7	01Jan2011, 06:05	23.1
JWT234	3.4316041	1155.6	01Jan2011, 07:26	297.0
RWT240	3.4316041	1155.0	01Jan2011, 07:29	296.8
WT240	0.0761461	160.3	01Jan2011, 06:01	9.1
Regional Pond WU No...	3.5077502	1160.9	01Jan2011, 07:30	304.7
Regional Pond WU Di...	3.5077502	1122.2	01Jan2011, 07:30	261.4
Old Meridian	0.0335900	85.0	01Jan2011, 06:07	6.1
RWT-OM	0.0335900	84.2	01Jan2011, 06:12	6.1
Regional Pond WU So...	3.5413402	925.0	01Jan2011, 07:53	260.3
RWT240_Diversion R...	0.0000000	38.8	01Jan2011, 07:35	43.1
JWT240	3.5413402	963.5	01Jan2011, 07:53	303.4
RWT250	3.5413402	963.3	01Jan2011, 07:53	303.3
WT250	0.1469500	291.4	01Jan2011, 06:02	17.1
JWT250	3.6882902	975.6	01Jan2011, 07:53	320.5
RWT260	3.6882902	975.1	01Jan2011, 08:04	319.5
	0.1388002	77.5	01Jan2011, 06:34	11.5
	3.8270904	988.4	01Jan2011, 08:03	331.0
	3.8270904	988.3	01Jan2011, 08:05	330.8
	0.0324738	57.1	01Jan2011, 06:04	3.6
	0.0324738	57.1	01Jan2011, 06:04	3.6
RWT292	0.0324738	56.9	01Jan2011, 06:08	3.5
JWT292	3.8595642	990.9	01Jan2011, 08:05	334.3
RWT295	3.8595642	990.8	01Jan2011, 08:07	334.2
WT280	0.2669500	251.8	01Jan2011, 06:12	22.3
JWT280	0.2669500	251.8	01Jan2011, 06:12	22.3
RWT294	0.2669500	251.2	01Jan2011, 06:15	22.2
JWT294	4.1265142	1008.6	01Jan2011, 08:06	356.4
RWT296	4.1265142	1008.1	01Jan2011, 08:12	355.7
MT040	0.3084200	455.2	01Jan2011, 06:11	38.1
MT030	0.1566300	228.6	01Jan2011, 06:05	15.1
MT020	0.0902033	143.1	01Jan2011, 06:04	9.0
JMT020	0.0902033	143.1	01Jan2011, 06:04	9.0
RMT030	0.0902033	141.8	01Jan2011, 06:17	8.9
JMT030	0.2468333	294.4	01Jan2011, 06:07	24.0
RMT040	0.2468333	293.0	01Jan2011, 06:11	24.0
Woodmen Hills Pond H	0.5552533	751.7	01Jan2011, 06:11	61.7
JMT040	0.5552533	751.7	01Jan2011, 06:11	61.7

997 per previous model? Model with old outlet structure

YES - PREVIOUS MODEL HAD OUTDATED INFO FOR OUTLET STRUCTURE

# CURRENT 100-YEAR STORM

Hydrologic Element	Drainage Area (MI <sup>2</sup> )	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
RMT050	0.5552533	745.8	01Jan2011, 06:14	61.7
MT010	0.2898900	139.9	01Jan2011, 06:24	17.7
The Meadows Pond #2	0.2898900	63.4	01Jan2011, 06:55	14.1
JMT010	0.2898900	63.4	01Jan2011, 06:55	14.1
RMT062	0.2898900	63.4	01Jan2011, 07:07	14.1
MT060a	0.0311000	48.5	01Jan2011, 06:03	2.9
School Site	0.3209900	55.8	01Jan2011, 07:31	16.1
JMT060a	0.3209900	55.8	01Jan2011, 07:31	16.1
RMT060a	0.3209900	55.8	01Jan2011, 07:36	16.0
MT050	0.1186100	109.7	01Jan2011, 06:18	11.4
JMT050	0.9948533	858.2	01Jan2011, 06:14	89.1
RMT064	0.9948533	853.7	01Jan2011, 06:21	89.0
MT060	0.1588000	196.8	01Jan2011, 06:08	14.7
Sub Regional Pond SR4	1.1536533	614.5	01Jan2011, 06:38	89.5
JMT060	1.1536533	614.5	01Jan2011, 06:38	89.5
RMT070	1.1536533	611.6	01Jan2011, 06:43	89.4
MT070	0.1994800	170.2	01Jan2011, 06:22	19.6
JMT070	1.3531333	717.7	01Jan2011, 06:42	108.9
RMT080	1.3531333	716.9	01Jan2011, 06:44	108.9
MT080	0.0638371	191.9	01Jan2011, 06:00	11.0
Regional Pond MN	1.4169704	693.2	01Jan2011, 06:49	117.4
JMT080	1.4169704	693.2	01Jan2011, 06:49	117.4
RMT102	1.4169704	690.3	01Jan2011, 06:56	117.1
MT090	0.0435103	127.4	01Jan2011, 06:00	7.1
Woodmen Hills Pond #5	0.0435103	18.6	01Jan2011, 06:07	5.9
JMT090	0.0435103	18.6	01Jan2011, 06:07	5.9
RMT090	0.0435103	18.6	01Jan2011, 06:08	5.9
JMT104	0.0435103	18.6	01Jan2011, 06:08	5.9
RMT104	0.0435103	18.6	01Jan2011, 06:12	5.9
JMT102	1.4604807	705.4	01Jan2011, 06:56	123.0
RMT106	1.4604807	700.0	01Jan2011, 06:58	122.9
MT100	0.0557682	88.2	01Jan2011, 06:05	5.9
JMT106	1.5162489	706.7	01Jan2011, 06:58	128.8
RMT112	1.5162489	703.2	01Jan2011, 07:10	128.1
MT110	0.1163900	117.4	01Jan2011, 06:16	11.5
JMT110	1.6326389	722.2	01Jan2011, 07:10	139.7
RMT114	1.6326389	721.0	01Jan2011, 07:15	139.4
WT290	0.1037800	110.3	01Jan2011, 06:09	8.7

Split into N and S

SPLIT INTO 2  
BASINS (MT070-N  
& MT070-S)

CURRENT 100-YEAR STORM

Hydrologic Element	Drainage Area (MI <sup>2</sup> )	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
Regional Pond R1	5.8629331	1340.4	01Jan2011, 07:21	496.3
JWT296	5.8629331	1340.4	01Jan2011, 07:21	496.3
RWT314	5.8629331	1339.6	01Jan2011, 07:27	495.4
WT300	0.0970199	91.6	01Jan2011, 06:12	8.1
JWT300	0.0970199	91.6	01Jan2011, 06:12	8.1
RWT312	0.0970199	91.1	01Jan2011, 06:29	8.1
WT310	0.2774200	246.7	01Jan2011, 06:13	22.3
JWT310	6.2373730	1373.9	01Jan2011, 07:27	525.8
RWT320	6.2373730	1371.4	01Jan2011, 07:33	524.8
WT320	0.2061400	200.6	01Jan2011, 06:11	17.2
JWT320	6.4435130	1386.3	01Jan2011, 07:33	542.0
RWT352	6.4435130	1383.5	01Jan2011, 07:43	540.8
ET020	0.2131700	360.5	01Jan2011, 06:06	24.8
ET010	0.1451300	198.3	01Jan2011, 06:11	16.4
Paint Brush Hills Pond...	0.1451300	150.9	01Jan2011, 06:20	16.3
JET010	0.1451300	150.9	01Jan2011, 06:20	16.3
RET020	0.1451300	150.0	01Jan2011, 06:37	16.3
Sub Regional Pond SR6	0.3583000	195.4	01Jan2011, 06:41	37.9
JET020	0.3583000	195.4	01Jan2011, 06:41	37.9
RET030	0.3583000	194.9	01Jan2011, 07:02	37.5
ET030	0.2042800	242.0	01Jan2011, 06:15	23.0
JET030	0.5625800	266.0	01Jan2011, 06:43	60.5
RET040	0.5625800	265.2	01Jan2011, 06:50	60.3
Woodmen Hills Pond ...	0.7117200	263.5	01Jan2011, 07:09	75.5
ET040	0.1491400	165.7	01Jan2011, 06:14	15.3
Woodmen Hills Pond ...	0.7117200	261.1	01Jan2011, 07:18	69.5
JET040	0.7117200	261.1	01Jan2011, 07:18	69.5
RET050	0.7117200	261.1	01Jan2011, 07:23	69.4
ET050	0.1171900	197.1	01Jan2011, 06:03	11.6
Woodmen Hills Pond #2	0.8289100	250.3	01Jan2011, 07:46	79.3
JET050	0.8289100	250.3	01Jan2011, 07:46	79.3
RET060	0.8289100	250.3	01Jan2011, 07:53	79.1
ET060	0.2854300	529.3	01Jan2011, 06:01	29.3
Woodmen Hills Pond #3	1.1143400	360.9	01Jan2011, 06:06	105.9
JET060	1.1143400	360.9	01Jan2011, 06:06	105.9
RET070	1.1143400	356.7	01Jan2011, 06:16	105.6
ET070	0.2497500	461.0	01Jan2011, 06:02	27.3
JET070	1.3640900	636.4	01Jan2011, 06:04	132.9

CURRENT 100-YEAR STORM

Hydrologic Element	Drainage Area (MI <sup>2</sup> )	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
RET080	1.3640900	517.5	01Jan2011, 06:23	131.3
ET080	0.2916400	517.9	01Jan2011, 06:07	37.1
Woodmen Hills Pond #4	1.6557300	288.0	01Jan2011, 07:00	139.2
JET080	1.6557300	288.0	01Jan2011, 07:00	139.2
RET090	1.6557300	287.3	01Jan2011, 07:03	139.0
ET090	0.1242400	133.0	01Jan2011, 06:22	14.9
JET090	1.7799700	330.8	01Jan2011, 06:59	153.9
RET100	1.7799700	330.7	01Jan2011, 07:01	153.8
ET100	0.0480615	72.0	01Jan2011, 06:02	4.0
JET100	1.8280315	335.4	01Jan2011, 07:01	157.8
RET110	1.8280315	335.2	01Jan2011, 07:05	157.6
ET110	0.2260300	198.8	01Jan2011, 06:12	17.5
JET110	2.0540615	362.1	01Jan2011, 07:03	175.1
RET120	2.0540615	361.3	01Jan2011, 07:09	174.7
ET120	0.1091300	89.4	01Jan2011, 06:14	8.5
JET120	2.1631915	403.2	01Jan2011, 06:17	183.2
RET152	2.1631915	402.2	01Jan2011, 06:24	182.9
ET130	0.1348100	85.4	01Jan2011, 06:27	11.2
JET130	0.1348100	85.4	01Jan2011, 06:27	11.2
RET140	0.1348100	84.7	01Jan2011, 06:54	11.1
ET140	0.2675900	122.8	01Jan2011, 06:46	22.2
JET140	0.4024000	204.8	01Jan2011, 06:51	33.3
RET154	0.4024000	204.4	01Jan2011, 07:05	33.2
JET152	2.5655915	572.3	01Jan2011, 07:10	216.1
RET156	2.5655915	572.0	01Jan2011, 07:14	215.8
ET150	0.1777300	136.2	01Jan2011, 06:18	14.3
JET154	2.7433215	595.8	01Jan2011, 07:12	230.1
RET162	2.7433215	595.1	01Jan2011, 07:25	228.9
ET160	0.1889200	137.2	01Jan2011, 06:23	16.3
JET160	2.9322415	633.6	01Jan2011, 06:38	245.2
RET164	2.9322415	629.0	01Jan2011, 06:47	244.7
WT350	0.3037700	276.7	01Jan2011, 06:14	26.3
JWT352	9.6795245	2009.6	01Jan2011, 07:40	811.9
RWT354	9.6795245	2009.5	01Jan2011, 07:40	811.9
WT330	0.3266800	249.3	01Jan2011, 06:19	27.2
JWT330	0.3266800	249.3	01Jan2011, 06:19	27.2
RWT344	0.3266800	248.4	01Jan2011, 06:25	27.2
WT340	0.2780000	147.3	01Jan2011, 06:37	23.1

CURRENT 100-YEAR STORM

Hydrologic Element	Drainage Area (MI <sup>2</sup> )	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
JWT354	10.2842045	2085.2	01Jan2011, 07:39	862.1
RWT372	10.2842045	2082.7	01Jan2011, 07:45	861.0
WT360	0.0656830	54.8	01Jan2011, 06:15	5.3
JWT360	0.0656830	54.8	01Jan2011, 06:15	5.3
RWT374	0.0656830	54.6	01Jan2011, 06:24	5.3
Regional Pond R2	10.3498875	2086.0	01Jan2011, 07:47	862.9
JWT372	10.3498875	2086.0	01Jan2011, 07:47	862.9
RWT376	10.3498875	2080.6	01Jan2011, 07:57	860.5
WT370	0.2147600	123.3	01Jan2011, 06:12	11.5
JWT374_OUTLET	10.5646475	2090.7	01Jan2011, 07:57	872.0
FS010	0.1220000	74.9	01Jan2011, 06:16	7.7
JFS010_OUTLET	0.1220000	74.9	01Jan2011, 06:16	7.7

Project: Aug15\_Working\_Falcon\_DBPS\_S  
Simulation Run: FU 100-yr Reservoir: School Site

Start of Run:	01Jan2011, 00:00	Basin Model:	Falcon_DBPS_Future
End of Run:	02Jan2011, 00:00	Meteorologic Model:	100-yr
Compute Time:	29Apr2021, 19:00:07	Control Specifications:	24-hr Storm

Volume Units: AC-FT

#### Computed Results

Peak Inflow :	66.4 (CFS)	Date/Time of Peak Inflow :	01Jan2011, 07:05
Peak Outflow :	55.8 (CFS)	Date/Time of Peak Outflow :	01Jan2011, 07:31
Total Inflow :	17.0 (AC-FT)	Peak Storage :	2.7 (AC-FT)
Total Outflow :	16.1 (AC-FT)	Peak Elevation :	6958.2 (FT)



Project: Aug15\_Working\_Falcon\_DBPS\_S  
Simulation Run: FU 100-yr Reservoir: Sub Regional Pond SR4

Start of Run:	01Jan2011, 00:00	Basin Model:	Falcon_DBPS_Future
End of Run:	02Jan2011, 00:00	Meteorologic Model:	100-yr
Compute Time:	29Apr2021, 19:00:07	Control Specifications:	24-hr Storm

Volume Units: AC-FT

#### Computed Results

Peak Inflow :	957.6 (CFS)	Date/Time of Peak Inflow :	01Jan2011, 06:20
Peak Outflow :	614.5 (CFS)	Date/Time of Peak Outflow :	01Jan2011, 06:38
Total Inflow :	103.7 (AC-FT)	Peak Storage :	26.3 (AC-FT)
Total Outflow :	89.5 (AC-FT)	Peak Elevation :	6896.9 (FT)

Project: Aug15\_Working\_Falcon\_DBPS\_S  
Simulation Run: FU 100-yr Reservoir: Regional Pond MN

Start of Run: 01Jan2011, 00:00 Basin Model: Falcon\_DBPS\_Future  
End of Run: 02Jan2011, 00:00 Meteorologic Model: 100-yr  
Compute Time: 29Apr2021, 19:00:07 Control Specifications: 24-hr Storm

Volume Units: AC-FT

#### Computed Results

Peak Inflow :	727.0 (CFS)	Date/Time of Peak Inflow :	01Jan2011, 06:44
Peak Outflow :	693.2 (CFS)	Date/Time of Peak Outflow :	01Jan2011, 06:49
Total Inflow :	119.9 (AC-FT)	Peak Storage :	6.7 (AC-FT)
Total Outflow :	117.4 (AC-FT)	Peak Elevation :	6853.6 (FT)

CURRENT 5-YEAR STORM

Hydrologic Element	Drainage Area (MI <sup>2</sup> )	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
WT020	0.0671383	10.3	01Jan2011, 06:23	1.4
JWT020	0.0671383	10.3	01Jan2011, 06:23	1.4
RWT030	0.0671383	10.3	01Jan2011, 06:34	1.4
WT030	0.0764732	19.5	01Jan2011, 06:08	1.6
JWT030	0.1436115	20.0	01Jan2011, 06:09	3.0
RWT042	0.1436115	19.9	01Jan2011, 06:18	3.0
WT010	0.1353300	21.2	01Jan2011, 06:19	2.6
JWT010	0.1353300	21.2	01Jan2011, 06:19	2.6
RWT044	0.1353300	21.2	01Jan2011, 06:29	2.6
JWT042	0.2789415	37.2	01Jan2011, 06:24	5.6
RWT046	0.2789415	37.2	01Jan2011, 06:35	5.6
WT040	0.1850600	21.9	01Jan2011, 06:31	3.6
JWT044	0.4640015	58.9	01Jan2011, 06:34	9.2
RWT054	0.4640015	58.7	01Jan2011, 06:43	9.2
WT060	0.1956300	30.1	01Jan2011, 06:29	4.5
WT050	0.1899300	37.3	01Jan2011, 06:21	4.7
JWT050	0.8495615	108.6	01Jan2011, 06:38	18.4
RWT092	0.8495615	108.5	01Jan2011, 06:39	18.4
WT070	0.1711000	32.6	01Jan2011, 06:13	3.4
JWT070	0.1711000	32.6	01Jan2011, 06:13	3.4
RWT080	0.1711000	32.5	01Jan2011, 06:28	3.3
WT080	0.0691596	18.5	01Jan2011, 06:12	1.7
Sub Regional Pond SR1	1.0898211	113.8	01Jan2011, 06:50	21.9
JWT080	1.0898211	113.8	01Jan2011, 06:50	21.9
RWT094	1.0898211	113.7	01Jan2011, 06:58	21.8
WT100-REV	0.1292700	67.7	01Jan2011, 06:05	4.5
W26-REV	0.0720000	33.7	01Jan2011, 06:04	2.1
WS3-1	0.0720000	33.4	01Jan2011, 06:13	2.1
Paint Brush Hills Pond C	0.2012700	14.0	01Jan2011, 06:38	6.5
WT090	0.1533300	46.0	01Jan2011, 06:10	4.0
JWT090	1.4444211	133.8	01Jan2011, 06:57	32.3
RWT122	1.4444211	133.7	01Jan2011, 07:01	32.3
WT110	0.1942800	47.0	01Jan2011, 06:16	5.1
JWT110	1.6387011	144.0	01Jan2011, 07:00	37.4
RWT124	1.6387011	144.0	01Jan2011, 07:08	37.3
WT130-REV	0.1016250	43.5	01Jan2011, 06:12	3.9
Paint Brush Hills Pond A	0.1016250	9.3	01Jan2011, 06:49	3.9
WT120-REV	0.0430300	14.8	01Jan2011, 06:09	1.2

CURRENT 5-YEAR STORM

Hydrologic Element	Drainage Area (MI <sup>2</sup> )	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
JWT120	1.7833561	154.4	01Jan2011, 07:08	42.4
RWT172	1.7833561	154.2	01Jan2011, 07:18	42.2
WT140-REV	0.1445300	65.2	01Jan2011, 06:14	6.1
JWT140	0.1445300	65.2	01Jan2011, 06:14	6.1
RWT150	0.1445300	64.9	01Jan2011, 06:24	6.1
WT150-REV	0.1308100	71.3	01Jan2011, 06:08	5.5
Paint Brush Hills Pond...	0.2753400	110.4	01Jan2011, 06:15	11.6
W34B2-REV	0.0935900	49.1	01Jan2011, 06:08	3.7
Paint Brush Hills Pond...	0.3689300	20.1	01Jan2011, 07:15	13.8
JWT150	0.3689300	20.1	01Jan2011, 07:15	13.8
RWT160	0.3689300	20.0	01Jan2011, 07:24	13.8
WT160-REV	0.0734800	36.3	01Jan2011, 06:07	2.6
JWT160	0.4424100	37.3	01Jan2011, 06:07	16.4
RWT174	0.4424100	36.9	01Jan2011, 06:20	16.3
WT170-REV	0.1060150	24.0	01Jan2011, 06:21	2.9
W34-CY-REV	0.0465469	10.7	01Jan2011, 06:18	1.2
JWT172	2.3783280	181.3	01Jan2011, 07:17	62.6
RWT176	2.3783280	181.2	01Jan2011, 07:18	62.6
Sub Regional Pond SR2	2.3783280	171.7	01Jan2011, 07:30	59.3
JWT174	2.3783280	171.7	01Jan2011, 07:30	59.3
RWT180	2.3783280	171.6	01Jan2011, 07:45	59.0
WT180-REV	0.0409400	7.6	01Jan2011, 06:21	1.0
JWT180	2.4192680	172.6	01Jan2011, 07:45	59.9
RWT202	2.4192680	172.6	01Jan2011, 08:03	59.5
WT200	0.3017100	52.2	01Jan2011, 06:33	8.3
WT190	0.0574561	22.5	01Jan2011, 06:06	1.6
The Meadows Pond #1	0.0574561	0.6	01Jan2011, 10:18	0.9
JWT190	0.0574561	0.6	01Jan2011, 10:18	0.9
RWT204	0.0574561	0.6	01Jan2011, 10:56	0.8
JWT200	2.7784341	182.8	01Jan2011, 08:02	68.6
RWT210	2.7784341	182.7	01Jan2011, 08:10	68.3
WT210	0.2654600	59.7	01Jan2011, 06:38	9.8
JWT210	3.0438941	194.3	01Jan2011, 08:09	78.2
RWT232	3.0438941	194.3	01Jan2011, 08:16	77.9
WT220	0.1895300	84.8	01Jan2011, 06:13	7.8
JWT220	0.1895300	84.8	01Jan2011, 06:13	7.8
RWT234	0.1895300	84.4	01Jan2011, 06:25	7.7
JWT232	3.2334241	200.7	01Jan2011, 08:16	85.7



CURRENT 5-YEAR STORM

Hydrologic Element	Drainage Area (MI <sup>2</sup> )	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
RWT236	3.2334241	200.7	01Jan2011, 08:16	85.7
WT230	0.1981800	124.0	01Jan2011, 06:06	8.5
JWT234	3.4316041	205.6	01Jan2011, 08:15	94.2
RWT240	3.4316041	205.4	01Jan2011, 08:21	94.0
WT240	0.0761461	61.0	01Jan2011, 06:02	3.4
Regional Pond WU No...	3.5077502	206.4	01Jan2011, 08:23	96.3
Regional Pond WU Di...	3.5077502	169.3	01Jan2011, 08:23	64.8
Old Meridian	0.0335900	38.2	01Jan2011, 06:09	2.8
RWT-OM	0.0335900	37.8	01Jan2011, 06:14	2.8
Regional Pond WU So...	3.5413402	165.5	01Jan2011, 08:33	61.2
RWT240_Diversion R...	0.0000000	37.1	01Jan2011, 08:29	31.4
JWT240	3.5413402	202.6	01Jan2011, 08:33	92.6
RWT250	3.5413402	202.5	01Jan2011, 08:34	92.6
WT250	0.1469500	107.5	01Jan2011, 06:03	6.3
JWT250	3.6882902	205.1	01Jan2011, 08:34	98.9
RWT260	3.6882902	204.9	01Jan2011, 08:49	98.4
WT260	0.1388002	21.0	01Jan2011, 06:36	3.6
JWT260	3.8270904	207.6	01Jan2011, 08:49	102.0
RWT291	3.8270904	207.5	01Jan2011, 08:53	101.8
WT270	0.0324738	20.0	01Jan2011, 06:04	1.3
JWT270	0.0324738	20.0	01Jan2011, 06:04	1.3
RWT292	0.0324738	19.9	01Jan2011, 06:10	1.3
JWT292	3.8595642	208.0	01Jan2011, 08:53	103.1
RWT295	3.8595642	208.0	01Jan2011, 08:54	103.0
WT280	0.2669500	70.1	01Jan2011, 06:14	6.9
JWT280	0.2669500	70.1	01Jan2011, 06:14	6.9
RWT294	0.2669500	70.0	01Jan2011, 06:17	6.9
JWT294	4.1265142	211.4	01Jan2011, 08:54	110.0
RWT296	4.1265142	211.2	01Jan2011, 09:02	109.5
MT040	0.3084200	163.5	01Jan2011, 06:12	14.5
MT030	0.1566300	73.4	01Jan2011, 06:06	5.1
MT020	0.0902033	47.3	01Jan2011, 06:05	3.1
JMT020	0.0902033	47.3	01Jan2011, 06:05	3.1
RMT030	0.0902033	46.8	01Jan2011, 06:21	3.1
JMT030	0.2468333	93.6	01Jan2011, 06:07	8.1
RMT040	0.2468333	92.8	01Jan2011, 06:12	8.1
Woodmen Hills Pond H	0.5552533	242.5	01Jan2011, 06:16	22.5
JMT040	0.5552533	242.5	01Jan2011, 06:16	22.5

CURRENT 5-YEAR STORM

Hydrologic Element	Drainage Area (MI <sup>2</sup> )	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
RMT050	0.5552533	242.2	01Jan2011, 06:19	22.5
MT010	0.2898900	36.7	01Jan2011, 06:26	5.2
The Meadows Pond #2	0.2898900	2.1	01Jan2011, 10:50	1.8
JMT010	0.2898900	2.1	01Jan2011, 10:50	1.8
RMT062	0.2898900	2.1	01Jan2011, 11:26	1.7
MT060a	0.0311000	15.6	01Jan2011, 06:03	1.0
School Site	0.3209900	2.3	01Jan2011, 14:14	1.9
JMT060a	0.3209900	2.3	01Jan2011, 14:14	1.9
RMT060a	0.3209900	2.3	01Jan2011, 14:25	1.9
MT050	0.1186100	33.2	01Jan2011, 06:20	3.8
JMT050	0.9948533	275.4	01Jan2011, 06:19	28.2
RMT064	0.9948533	273.1	01Jan2011, 06:29	28.1
MT060	0.1588000	60.1	01Jan2011, 06:09	4.8
Sub Regional Pond SR4	1.1536533	24.1	01Jan2011, 08:42	22.9
JMT060	1.1536533	24.1	01Jan2011, 08:42	22.9
RMT070	1.1536533	24.1	01Jan2011, 08:51	22.7
MT070	0.1994800	51.6	01Jan2011, 06:24	6.6
JMT070	1.3531333	55.6	01Jan2011, 06:25	29.4
RMT080	1.3531333	55.6	01Jan2011, 06:28	29.3
MT080	0.0638371	91.5	01Jan2011, 06:00	5.0
Regional Pond MN	1.4169704	62.4	01Jan2011, 06:32	31.8
JMT080	1.4169704	62.4	01Jan2011, 06:32	31.8
RMT102	1.4169704	62.2	01Jan2011, 06:41	31.6
MT090	0.0435103	59.3	01Jan2011, 06:00	3.2
Woodmen Hills Pond #5	0.0435103	2.2	01Jan2011, 08:01	2.3
JMT090	0.0435103	2.2	01Jan2011, 08:01	2.3
RMT090	0.0435103	2.2	01Jan2011, 08:01	2.3
JMT104	0.0435103	2.2	01Jan2011, 08:01	2.3
RMT104	0.0435103	2.2	01Jan2011, 08:07	2.3
JMT102	1.4604807	64.3	01Jan2011, 06:41	33.9
RMT106	1.4604807	64.0	01Jan2011, 06:43	33.9
MT100	0.0557682	29.8	01Jan2011, 06:06	2.1
JMT106	1.5162489	67.8	01Jan2011, 06:42	35.9
RMT112	1.5162489	66.0	01Jan2011, 07:16	35.0
MT110	0.1163900	36.3	01Jan2011, 06:18	3.9
JMT110	1.6326389	72.0	01Jan2011, 07:16	39.0
RMT114	1.6326389	71.2	01Jan2011, 07:25	38.7
WT290	0.1037800	31.2	01Jan2011, 06:10	2.7

CURRENT 5-YEAR STORM

Hydrologic Element	Drainage Area (MI <sup>2</sup> )	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
Regional Pond R1	5.8629331	241.6	01Jan2011, 09:13	143.9
JWT296	5.8629331	241.6	01Jan2011, 09:13	143.9
RWT314	5.8629331	241.5	01Jan2011, 09:20	143.2
WT300	0.0970199	25.5	01Jan2011, 06:14	2.5
JWT300	0.0970199	25.5	01Jan2011, 06:14	2.5
RWT312	0.0970199	25.4	01Jan2011, 06:34	2.5
WT310	0.2774200	67.1	01Jan2011, 06:14	6.9
JWT310	6.2373730	246.1	01Jan2011, 09:20	152.6
RWT320	6.2373730	245.9	01Jan2011, 09:28	151.8
WT320	0.2061400	56.1	01Jan2011, 06:13	5.4
JWT320	6.4435130	248.4	01Jan2011, 09:28	157.2
RWT352	6.4435130	248.2	01Jan2011, 09:36	156.3
ET020	0.2131700	128.1	01Jan2011, 06:07	9.2
ET010	0.1451300	67.4	01Jan2011, 06:12	5.9
Paint Brush Hills Pond...	0.1451300	48.8	01Jan2011, 06:22	5.9
JET010	0.1451300	48.8	01Jan2011, 06:22	5.9
RET020	0.1451300	48.7	01Jan2011, 06:37	5.9
Sub Regional Pond SR6	0.3583000	19.9	01Jan2011, 07:26	13.5
JET020	0.3583000	19.9	01Jan2011, 07:26	13.5
RET030	0.3583000	19.7	01Jan2011, 08:14	13.1
ET030	0.2042800	81.2	01Jan2011, 06:17	8.4
JET030	0.5625800	81.2	01Jan2011, 06:17	21.5
RET040	0.5625800	80.9	01Jan2011, 06:28	21.4
Woodmen Hills Pond ...	0.7117200	103.5	01Jan2011, 06:35	26.6
ET040	0.1491400	52.6	01Jan2011, 06:15	5.3
Woodmen Hills Pond ...	0.7117200	32.8	01Jan2011, 07:14	21.7
JET040	0.7117200	32.8	01Jan2011, 07:14	21.7
RET050	0.7117200	32.8	01Jan2011, 07:22	21.6
ET050	0.1171900	66.6	01Jan2011, 06:03	4.0
Woodmen Hills Pond #2	0.8289100	29.6	01Jan2011, 08:07	23.9
JET050	0.8289100	29.6	01Jan2011, 08:07	23.9
RET060	0.8289100	29.6	01Jan2011, 08:19	23.7
ET060	0.2854300	185.5	01Jan2011, 06:02	10.2
Woodmen Hills Pond #3	1.1143400	82.1	01Jan2011, 06:08	31.5
JET060	1.1143400	82.1	01Jan2011, 06:08	31.5
RET070	1.1143400	81.0	01Jan2011, 06:18	31.2
ET070	0.2497500	164.1	01Jan2011, 06:03	9.8
JET070	1.3640900	164.5	01Jan2011, 06:03	41.0



CURRENT 5-YEAR STORM

Hydrologic Element	Drainage Area (MI <sup>2</sup> )	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
RET080	1.3640900	123.5	01Jan2011, 06:29	40.2
ET080	0.2916400	192.2	01Jan2011, 06:08	14.3
Woodmen Hills Pond #4	1.6557300	26.7	01Jan2011, 14:58	26.8
JET080	1.6557300	26.7	01Jan2011, 14:58	26.8
RET090	1.6557300	26.7	01Jan2011, 15:03	26.6
ET090	0.1242400	46.0	01Jan2011, 06:23	5.6
JET090	1.7799700	50.6	01Jan2011, 06:24	32.2
RET100	1.7799700	50.6	01Jan2011, 06:28	32.1
ET100	0.0480615	22.3	01Jan2011, 06:02	1.3
JET100	1.8280315	53.2	01Jan2011, 06:28	33.3
RET110	1.8280315	53.1	01Jan2011, 06:35	33.1
ET110	0.2260300	52.7	01Jan2011, 06:13	5.3
JET110	2.0540615	86.0	01Jan2011, 06:13	38.4
RET120	2.0540615	85.1	01Jan2011, 06:19	38.1
ET120	0.1091300	23.5	01Jan2011, 06:16	2.5
JET120	2.1631915	107.9	01Jan2011, 06:19	40.7
RET152	2.1631915	107.7	01Jan2011, 06:25	40.4
ET130	0.1348100	23.2	01Jan2011, 06:30	3.5
JET130	0.1348100	23.2	01Jan2011, 06:30	3.5
RET140	0.1348100	23.1	01Jan2011, 07:00	3.5
ET140	0.2675900	33.4	01Jan2011, 06:49	6.9
JET140	0.4024000	55.3	01Jan2011, 06:56	10.4
RET154	0.4024000	55.2	01Jan2011, 07:19	10.3
JET152	2.5655915	108.6	01Jan2011, 06:26	50.8
RET156	2.5655915	108.3	01Jan2011, 06:30	50.6
ET150	0.1777300	36.6	01Jan2011, 06:20	4.4
JET154	2.7433215	138.8	01Jan2011, 06:29	55.0
RET162	2.7433215	135.5	01Jan2011, 06:54	54.2
ET160	0.1889200	38.5	01Jan2011, 06:25	5.2
JET160	2.9322415	154.7	01Jan2011, 06:53	59.4
RET164	2.9322415	154.3	01Jan2011, 06:58	59.2
WT350	0.3037700	78.7	01Jan2011, 06:16	8.4
JWT352	9.6795245	342.0	01Jan2011, 08:07	223.9
RWT354	9.6795245	341.9	01Jan2011, 08:07	223.8
WT330	0.3266800	68.2	01Jan2011, 06:21	8.5
JWT330	0.3266800	68.2	01Jan2011, 06:21	8.5
RWT344	0.3266800	67.9	01Jan2011, 06:30	8.5
WT340	0.2780000	40.0	01Jan2011, 06:39	7.2

CURRENT 5-YEAR STORM

Hydrologic Element	Drainage Area (MI <sup>2</sup> )	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
JWT354	10.2842045	359.4	01Jan2011, 08:07	239.5
RWT372	10.2842045	359.2	01Jan2011, 08:11	238.9
WT360	0.0656830	14.8	01Jan2011, 06:17	1.6
JWT360	0.0656830	14.8	01Jan2011, 06:17	1.6
RWT374	0.0656830	14.7	01Jan2011, 06:32	1.6
Regional Pond R2	10.3498875	360.4	01Jan2011, 08:12	237.3
JWT372	10.3498875	360.4	01Jan2011, 08:12	237.3
RWT376	10.3498875	359.9	01Jan2011, 08:21	236.1
WT370	0.2147600	23.4	01Jan2011, 06:15	2.8
JWT374_OUTLET	10.5646475	362.2	01Jan2011, 08:21	238.9
FS010	0.1220000	16.6	01Jan2011, 06:18	2.1
JFS010_OUTLET	0.1220000	16.6	01Jan2011, 06:18	2.1

Project: Aug15\_Working\_Falcon\_DBPS\_S  
Simulation Run: FU 5-yr Reservoir: School Site

Start of Run:	01Jan2011, 00:00	Basin Model:	Falcon_DBPS_Future
End of Run:	02Jan2011, 00:00	Meteorologic Model:	5-yr
Compute Time:	29Apr2021, 19:08:55	Control Specifications:	24-hr Storm

Volume Units: AC-FT

#### Computed Results

Peak Inflow :	15.6 (CFS)	Date/Time of Peak Inflow :	01Jan2011, 06:03
Peak Outflow :	2.3 (CFS)	Date/Time of Peak Outflow :	01Jan2011, 14:14
Total Inflow :	2.7 (AC-FT)	Peak Storage :	0.9 (AC-FT)
Total Outflow :	1.9 (AC-FT)	Peak Elevation :	6956.3 (FT)

Project: Aug15\_Working\_Falcon\_DBPS\_S  
Simulation Run: FU 5-yr Reservoir: Sub Regional Pond SR4

Start of Run:	01Jan2011, 00:00	Basin Model:	Falcon_DBPS_Future
End of Run:	02Jan2011, 00:00	Meteorologic Model:	5-yr
Compute Time:	29Apr2021, 19:08:55	Control Specifications:	24-hr Storm

Volume Units: AC-FT

#### Computed Results

Peak Inflow :	292.9 (CFS)	Date/Time of Peak Inflow :	01Jan2011, 06:29
Peak Outflow :	24.1 (CFS)	Date/Time of Peak Outflow :	01Jan2011, 08:42
Total Inflow :	32.9 (AC-FT)	Peak Storage :	16.2 (AC-FT)
Total Outflow :	22.9 (AC-FT)	Peak Elevation :	6893.9 (FT)

Project: Aug15\_Working\_Falcon\_DBPS\_S  
Simulation Run: FU 5-yr Reservoir: Regional Pond MN

Start of Run:	01Jan2011, 00:00	Basin Model:	Falcon_DBPS_Future
End of Run:	02Jan2011, 00:00	Meteorologic Model:	5-yr
Compute Time:	29Apr2021, 19:08:55	Control Specifications:	24-hr Storm

Volume Units: AC-FT

#### Computed Results

Peak Inflow :	99.9 (CFS)	Date/Time of Peak Inflow :	01Jan2011, 06:01
Peak Outflow :	62.4 (CFS)	Date/Time of Peak Outflow :	01Jan2011, 06:32
Total Inflow :	34.3 (AC-FT)	Peak Storage :	2.8 (AC-FT)
Total Outflow :	31.8 (AC-FT)	Peak Elevation :	6851.6 (FT)

CURRENT 2-YEA STORM

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
WT020	0.0671383	4.4	01Jan2011, 06:25	0.7
JWT020	0.0671383	4.4	01Jan2011, 06:25	0.7
RWT030	0.0671383	4.4	01Jan2011, 06:39	0.7
WT030	0.0764732	8.6	01Jan2011, 06:09	0.8
JWT030	0.1436115	8.7	01Jan2011, 06:09	1.5
RWT042	0.1436115	8.7	01Jan2011, 06:20	1.5
WT010	0.1353300	8.8	01Jan2011, 06:21	1.3
JWT010	0.1353300	8.8	01Jan2011, 06:21	1.3
RWT044	0.1353300	8.8	01Jan2011, 06:33	1.3
JWT042	0.2789415	15.1	01Jan2011, 06:26	2.8
RWT046	0.2789415	15.1	01Jan2011, 06:40	2.8
WT040	0.1850600	9.1	01Jan2011, 06:34	1.8
JWT044	0.4640015	23.9	01Jan2011, 06:39	4.5
RWT054	0.4640015	23.8	01Jan2011, 06:50	4.5
WT060	0.1956300	13.6	01Jan2011, 06:30	2.3
WT050	0.1899300	17.3	01Jan2011, 06:23	2.4
JWT050	0.8495615	42.8	01Jan2011, 06:47	9.3
RWT092	0.8495615	42.7	01Jan2011, 06:49	9.3
WT070	0.1711000	13.6	01Jan2011, 06:15	1.6
JWT070	0.1711000	13.6	01Jan2011, 06:15	1.6
RWT080	0.1711000	13.6	01Jan2011, 06:34	1.6
WT080	0.0691596	8.7	01Jan2011, 06:13	0.9
Sub Regional Pond SR1	1.0898211	41.9	01Jan2011, 07:03	10.4
JWT080	1.0898211	41.9	01Jan2011, 07:03	10.4
RWT094	1.0898211	41.9	01Jan2011, 07:14	10.3
WT100-REV	0.1292700	37.0	01Jan2011, 06:05	2.5
W26-REV	0.0720000	18.4	01Jan2011, 06:04	1.2
WS3-1	0.0720000	18.1	01Jan2011, 06:15	1.2
Paint Brush Hills Pond C	0.2012700	10.4	01Jan2011, 06:34	3.7
WT090	0.1533300	22.1	01Jan2011, 06:11	2.1
JWT090	1.4444211	54.5	01Jan2011, 07:12	16.1
RWT122	1.4444211	54.5	01Jan2011, 07:17	16.1
WT110	0.1942800	22.3	01Jan2011, 06:17	2.7
JWT110	1.6387011	58.6	01Jan2011, 07:16	18.7
RWT124	1.6387011	58.6	01Jan2011, 07:26	18.7
WT130-REV	0.1016250	24.0	01Jan2011, 06:13	2.3
Paint Brush Hills Pond A	0.1016250	4.8	01Jan2011, 06:53	2.3
WT120-REV	0.0430300	7.2	01Jan2011, 06:09	0.6

CURRENT 2-YEA STORM

Hydrologic Element	Drainage Area (MI <sup>2</sup> )	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
JWT120	1.7833561	63.9	01Jan2011, 07:26	21.6
RWT172	1.7833561	63.8	01Jan2011, 07:38	21.5
WT140-REV	0.1445300	35.7	01Jan2011, 06:14	3.6
JWT140	0.1445300	35.7	01Jan2011, 06:14	3.6
RWT150	0.1445300	35.5	01Jan2011, 06:25	3.6
WT150-REV	0.1308100	40.8	01Jan2011, 06:09	3.3
Paint Brush Hills Pond...	0.2753400	58.7	01Jan2011, 06:19	6.8
W34B2-REV	0.0935900	27.9	01Jan2011, 06:08	2.2
Paint Brush Hills Pond...	0.3689300	9.8	01Jan2011, 07:30	8.0
JWT150	0.3689300	9.8	01Jan2011, 07:30	8.0
RWT160	0.3689300	9.8	01Jan2011, 07:40	8.0
WT160-REV	0.0734800	19.7	01Jan2011, 06:07	1.5
JWT160	0.4424100	20.1	01Jan2011, 06:07	9.5
RWT174	0.4424100	19.8	01Jan2011, 06:23	9.4
WT170-REV	0.1060150	11.6	01Jan2011, 06:22	1.6
W34-CY-REV	0.0465469	5.2	01Jan2011, 06:19	0.6
JWT172	2.3783280	81.2	01Jan2011, 06:39	33.1
RWT176	2.3783280	81.1	01Jan2011, 06:40	33.1
Sub Regional Pond SR2	2.3783280	66.8	01Jan2011, 08:06	30.0
JWT174	2.3783280	66.8	01Jan2011, 08:06	30.0
RWT180	2.3783280	66.8	01Jan2011, 08:25	29.7
WT180-REV	0.0409400	3.4	01Jan2011, 06:22	0.5
JWT180	2.4192680	67.2	01Jan2011, 08:25	30.2
RWT202	2.4192680	67.1	01Jan2011, 08:51	29.9
WT200	0.3017100	25.3	01Jan2011, 06:34	4.4
WT190	0.0574561	11.3	01Jan2011, 06:07	0.9
The Meadows Pond #1	0.0574561	0.3	01Jan2011, 13:19	0.4
JWT190	0.0574561	0.3	01Jan2011, 13:19	0.4
RWT204	0.0574561	0.3	01Jan2011, 14:16	0.4
JWT200	2.7784341	70.6	01Jan2011, 08:50	34.8
RWT210	2.7784341	70.6	01Jan2011, 09:00	34.6
WT210	0.2654600	31.9	01Jan2011, 06:39	5.6
JWT210	3.0438941	74.5	01Jan2011, 08:59	40.2
RWT232	3.0438941	74.5	01Jan2011, 09:08	40.0
WT220	0.1895300	47.1	01Jan2011, 06:14	4.5
JWT220	0.1895300	47.1	01Jan2011, 06:14	4.5
RWT234	0.1895300	46.9	01Jan2011, 06:26	4.5
JWT232	3.2334241	76.6	01Jan2011, 09:08	44.5

CURRENT 2-YEA STORM

Hydrologic Element	Drainage Area (MI <sup>2</sup> )	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
RWT236	3.2334241	76.6	01Jan2011, 09:09	44.5
WT230	0.1981800	71.3	01Jan2011, 06:06	5.0
JWT234	3.4316041	84.5	01Jan2011, 06:43	49.5
RWT240	3.4316041	84.0	01Jan2011, 06:48	49.4
WT240	0.0761461	36.4	01Jan2011, 06:02	2.1
Regional Pond WU No...	3.5077502	89.8	01Jan2011, 06:10	50.3
Regional Pond WU Di...	3.5077502	62.4	01Jan2011, 06:10	27.5
Old Meridian	0.0335900	24.6	01Jan2011, 06:09	1.9
RWT-OM	0.0335900	24.3	01Jan2011, 06:16	1.8
Regional Pond WU So...	3.5413402	45.0	01Jan2011, 09:51	23.1
RWT240_Diversion R...	0.0000000	27.1	01Jan2011, 06:16	22.8
JWT240	3.5413402	68.8	01Jan2011, 09:44	45.9
RWT250	3.5413402	68.8	01Jan2011, 09:46	45.8
WT250	0.1469500	63.0	01Jan2011, 06:03	3.7
JWT250	3.6882902	70.5	01Jan2011, 09:46	49.5
RWT260	3.6882902	70.5	01Jan2011, 10:06	49.2
WT260	0.1388002	9.9	01Jan2011, 06:38	1.9
JWT260	3.8270904	71.5	01Jan2011, 10:06	51.1
RWT291	3.8270904	71.5	01Jan2011, 10:10	51.0
WT270	0.0324738	11.3	01Jan2011, 06:05	0.7
JWT270	0.0324738	11.3	01Jan2011, 06:05	0.7
RWT292	0.0324738	11.2	01Jan2011, 06:11	0.7
JWT292	3.8595642	71.9	01Jan2011, 06:29	51.7
RWT295	3.8595642	71.8	01Jan2011, 10:12	51.7
WT280	0.2669500	33.4	01Jan2011, 06:15	3.7
JWT280	0.2669500	33.4	01Jan2011, 06:15	3.7
RWT294	0.2669500	33.4	01Jan2011, 06:18	3.7
JWT294	4.1265142	94.0	01Jan2011, 06:30	55.3
RWT296	4.1265142	91.9	01Jan2011, 06:40	55.0
MT040	0.3084200	94.6	01Jan2011, 06:13	8.8
MT030	0.1566300	39.0	01Jan2011, 06:06	2.8
MT020	0.0902033	25.8	01Jan2011, 06:05	1.7
JMT020	0.0902033	25.8	01Jan2011, 06:05	1.7
RMT030	0.0902033	25.4	01Jan2011, 06:20	1.7
JMT030	0.2468333	50.1	01Jan2011, 06:10	4.5
RMT040	0.2468333	49.3	01Jan2011, 06:16	4.5
Woodmen Hills Pond H	0.5552533	107.8	01Jan2011, 06:25	13.2
JMT040	0.5552533	107.8	01Jan2011, 06:25	13.2



CURRENT 2-YEA STORM

Hydrologic Element	Drainage Area (MI <sup>2</sup> )	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
RMT050	0.5552533	107.4	01Jan2011, 06:28	13.2
MT010	0.2898900	17.3	01Jan2011, 06:28	2.7
The Meadows Pond #2	0.2898900	0.0	01Jan2011, 00:00	0.0
JMT010	0.2898900	0.0	01Jan2011, 00:00	0.0
RMT062	0.2898900	0.0	01Jan2011, 00:00	0.0
MT060a	0.0311000	8.3	01Jan2011, 06:04	0.5
School Site	0.3209900	0.0	01Jan2011, 00:00	0.0
JMT060a	0.3209900	0.0	01Jan2011, 00:00	0.0
RMT060a	0.3209900	0.0	01Jan2011, 00:00	0.0
MT050	0.1186100	17.0	01Jan2011, 06:21	2.1
JMT050	0.9948533	123.1	01Jan2011, 06:27	15.3
RMT064	0.9948533	121.2	01Jan2011, 06:40	15.2
MT060	0.1588000	30.7	01Jan2011, 06:10	2.7
Sub Regional Pond SR4	1.1536533	11.2	01Jan2011, 09:34	13.5
JMT060	1.1536533	11.2	01Jan2011, 09:34	13.5
RMT070	1.1536533	11.2	01Jan2011, 09:45	13.4
MT070	0.1994800	26.4	01Jan2011, 06:25	3.7
JMT070	1.3531333	29.0	01Jan2011, 06:26	17.1
RMT080	1.3531333	29.0	01Jan2011, 06:29	17.0
MT080	0.0638371	62.4	01Jan2011, 06:00	3.4
Regional Pond MN	1.4169704	30.9	01Jan2011, 06:37	17.9
JMT080	1.4169704	30.9	01Jan2011, 06:37	17.9
RMT102	1.4169704	30.8	01Jan2011, 06:48	17.8
MT090	0.0435103	39.9	01Jan2011, 06:00	2.1
Woodmen Hills Pond #5	0.0435103	1.4	01Jan2011, 08:02	1.5
JMT090	0.0435103	1.4	01Jan2011, 08:02	1.5
RMT090	0.0435103	1.4	01Jan2011, 08:02	1.5
JMT104	0.0435103	1.4	01Jan2011, 08:02	1.5
RMT104	0.0435103	1.4	01Jan2011, 08:09	1.5
JMT102	1.4604807	32.1	01Jan2011, 06:48	19.3
RMT106	1.4604807	31.8	01Jan2011, 06:51	19.3
MT100	0.0557682	16.5	01Jan2011, 06:06	1.2
JMT106	1.5162489	33.6	01Jan2011, 06:51	20.5
RMT112	1.5162489	33.0	01Jan2011, 07:29	19.8
MT110	0.1163900	18.9	01Jan2011, 06:19	2.2
JMT110	1.6326389	35.8	01Jan2011, 07:29	22.0
RMT114	1.6326389	35.7	01Jan2011, 07:40	21.8
WT290	0.1037800	15.0	01Jan2011, 06:11	1.4

CURRENT 2-YEA STORM

Hydrologic Element	Drainage Area (MI <sup>2</sup> )	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
Regional Pond R1	5.8629331	91.0	01Jan2011, 10:31	71.4
JWT296	5.8629331	91.0	01Jan2011, 10:31	71.4
RWT314	5.8629331	90.9	01Jan2011, 10:41	70.8
WT300	0.0970199	12.2	01Jan2011, 06:15	1.3
JWT300	0.0970199	12.2	01Jan2011, 06:15	1.3
RWT312	0.0970199	12.1	01Jan2011, 06:39	1.3
WT310	0.2774200	31.3	01Jan2011, 06:16	3.6
JWT310	6.2373730	93.2	01Jan2011, 10:41	75.7
RWT320	6.2373730	93.1	01Jan2011, 10:50	75.2
WT320	0.2061400	26.8	01Jan2011, 06:14	2.8
JWT320	6.4435130	94.3	01Jan2011, 10:50	78.0
RWT352	6.4435130	94.3	01Jan2011, 11:02	77.3
ET020	0.2131700	73.4	01Jan2011, 06:07	5.4
ET010	0.1451300	37.5	01Jan2011, 06:12	3.5
Paint Brush Hills Pond...	0.1451300	29.4	01Jan2011, 06:21	3.5
JET010	0.1451300	29.4	01Jan2011, 06:21	3.5
RET020	0.1451300	29.3	01Jan2011, 06:37	3.5
Sub Regional Pond SR6	0.3583000	9.3	01Jan2011, 07:43	7.9
JET020	0.3583000	9.3	01Jan2011, 07:43	7.9
RET030	0.3583000	9.3	01Jan2011, 08:37	7.6
ET030	0.2042800	44.9	01Jan2011, 06:17	4.9
JET030	0.5625800	44.9	01Jan2011, 06:17	12.5
RET040	0.5625800	44.6	01Jan2011, 06:30	12.4
Woodmen Hills Pond ...	0.7117200	60.8	01Jan2011, 06:33	15.4
ET040	0.1491400	27.9	01Jan2011, 06:16	3.0
Woodmen Hills Pond ...	0.7117200	9.6	01Jan2011, 12:57	12.0
JET040	0.7117200	9.6	01Jan2011, 12:57	12.0
RET050	0.7117200	9.6	01Jan2011, 13:08	11.8
ET050	0.1171900	36.5	01Jan2011, 06:03	2.2
Woodmen Hills Pond #2	0.8289100	10.4	01Jan2011, 13:06	12.5
JET050	0.8289100	10.4	01Jan2011, 13:06	12.5
RET060	0.8289100	10.4	01Jan2011, 13:21	12.3
ET060	0.2854300	105.0	01Jan2011, 06:02	5.8
Woodmen Hills Pond #3	1.1143400	12.6	01Jan2011, 13:03	15.7
JET060	1.1143400	12.6	01Jan2011, 13:03	15.7
RET070	1.1143400	12.6	01Jan2011, 13:18	15.5
ET070	0.2497500	93.5	01Jan2011, 06:03	5.7
JET070	1.3640900	93.6	01Jan2011, 06:03	21.2

CURRENT 2-YEA STORM

Hydrologic Element	Drainage Area (MI <sup>2</sup> )	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
RET080	1.3640900	64.9	01Jan2011, 06:31	20.7
ET080	0.2916400	113.3	01Jan2011, 06:08	8.7
Woodmen Hills Pond #4	1.6557300	9.8	02Jan2011, 00:00	12.0
JET080	1.6557300	9.8	02Jan2011, 00:00	12.0
RET090	1.6557300	9.8	02Jan2011, 00:00	11.9
ET090	0.1242400	26.0	01Jan2011, 06:24	3.3
JET090	1.7799700	29.2	01Jan2011, 06:25	15.3
RET100	1.7799700	29.1	01Jan2011, 06:30	15.2
ET100	0.0480615	11.4	01Jan2011, 06:02	0.7
JET100	1.8280315	30.6	01Jan2011, 06:30	15.8
RET110	1.8280315	30.6	01Jan2011, 06:38	15.7
ET110	0.2260300	24.0	01Jan2011, 06:15	2.7
JET110	2.0540615	41.4	01Jan2011, 06:32	18.4
RET120	2.0540615	41.4	01Jan2011, 06:39	18.2
ET120	0.1091300	10.7	01Jan2011, 06:17	1.3
JET120	2.1631915	49.7	01Jan2011, 06:21	19.5
RET152	2.1631915	49.5	01Jan2011, 06:29	19.4
ET130	0.1348100	10.9	01Jan2011, 06:31	1.8
JET130	0.1348100	10.9	01Jan2011, 06:31	1.8
RET140	0.1348100	10.9	01Jan2011, 07:06	1.8
ET140	0.2675900	15.9	01Jan2011, 06:51	3.6
JET140	0.4024000	25.8	01Jan2011, 07:01	5.5
RET154	0.4024000	25.7	01Jan2011, 07:27	5.4
JET152	2.5655915	53.7	01Jan2011, 07:01	24.8
RET156	2.5655915	53.5	01Jan2011, 07:06	24.7
ET150	0.1777300	17.0	01Jan2011, 06:21	2.3
JET154	2.7433215	62.3	01Jan2011, 06:34	27.0
RET162	2.7433215	59.6	01Jan2011, 07:07	26.4
ET160	0.1889200	18.6	01Jan2011, 06:26	2.8
JET160	2.9322415	66.8	01Jan2011, 07:06	29.2
RET164	2.9322415	66.5	01Jan2011, 07:12	29.1
WT350	0.3037700	38.3	01Jan2011, 06:17	4.5
JWT352	9.6795245	134.9	01Jan2011, 08:21	110.9
RWT354	9.6795245	134.9	01Jan2011, 08:21	110.9
WT330	0.3266800	32.2	01Jan2011, 06:23	4.5
JWT330	0.3266800	32.2	01Jan2011, 06:23	4.5
RWT344	0.3266800	32.0	01Jan2011, 06:34	4.5
WT340	0.2780000	18.9	01Jan2011, 06:42	3.8

CURRENT 2-YEA STORM

Hydrologic Element	Drainage Area (MI <sup>2</sup> )	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
JWT354	10.2842045	143.7	01Jan2011, 08:20	119.2
RWT372	10.2842045	143.6	01Jan2011, 08:26	118.7
WT360	0.0656830	6.9	01Jan2011, 06:18	0.8
JWT360	0.0656830	6.9	01Jan2011, 06:18	0.8
RWT374	0.0656830	6.9	01Jan2011, 06:36	0.8
Regional Pond R2	10.3498875	144.3	01Jan2011, 08:27	116.4
JWT372	10.3498875	144.3	01Jan2011, 08:27	116.4
RWT376	10.3498875	144.0	01Jan2011, 08:37	115.6
WT370	0.2147600	7.2	01Jan2011, 06:17	1.2
JWT374_OUTLET	10.5646475	144.8	01Jan2011, 08:37	116.8
FS010	0.1220000	6.3	01Jan2011, 06:20	1.0
JFS010_OUTLET	0.1220000	6.3	01Jan2011, 06:20	1.0

Project: Aug15\_Working\_Falcon\_DBPS\_S  
Simulation Run: FU 2-yr Reservoir: School Site

Start of Run:	01Jan2011, 00:00	Basin Model:	Falcon_DBPS_Future
End of Run:	02Jan2011, 00:00	Meteorologic Model:	2-yr
Compute Time:	29Apr2021, 19:05:35	Control Specifications:	24-hr Storm

Volume Units: AC-FT

#### Computed Results

Peak Inflow :	8.3 (CFS)	Date/Time of Peak Inflow :	01Jan2011, 06:04
Peak Outflow :	0.0 (CFS)	Date/Time of Peak Outflow :	01Jan2011, 00:00
Total Inflow :	0.5 (AC-FT)	Peak Storage :	0.5 (AC-FT)
Total Outflow :	0.0 (AC-FT)	Peak Elevation :	6955.5 (FT)

Project: Aug15\_Working\_Falcon\_DBPS\_S  
Simulation Run: FU 2-yr Reservoir: Sub Regional Pond SR4

Start of Run:	01Jan2011, 00:00	Basin Model:	Falcon_DBPS_Future
End of Run:	02Jan2011, 00:00	Meteorologic Model:	2-yr
Compute Time:	29Apr2021, 19:05:35	Control Specifications:	24-hr Storm

Volume Units: AC-FT

#### Computed Results

Peak Inflow :	128.2 (CFS)	Date/Time of Peak Inflow :	01Jan2011, 06:40
Peak Outflow :	11.2 (CFS)	Date/Time of Peak Outflow :	01Jan2011, 09:34
Total Inflow :	17.9 (AC-FT)	Peak Storage :	8.9 (AC-FT)
Total Outflow :	13.5 (AC-FT)	Peak Elevation :	6891.4 (FT)

Project: Aug15\_Working\_Falcon\_DBPS\_S  
Simulation Run: FU 2-yr Reservoir: Regional Pond MN

Start of Run:	01Jan2011, 00:00	Basin Model:	Falcon_DBPS_Future
End of Run:	02Jan2011, 00:00	Meteorologic Model:	2-yr
Compute Time:	29Apr2021, 19:05:35	Control Specifications:	24-hr Storm

Volume Units: AC-FT

#### Computed Results

Peak Inflow :	64.9 (CFS)	Date/Time of Peak Inflow :	01Jan2011, 06:01
Peak Outflow :	30.9 (CFS)	Date/Time of Peak Outflow :	01Jan2011, 06:37
Total Inflow :	20.4 (AC-FT)	Peak Storage :	2.6 (AC-FT)
Total Outflow :	17.9 (AC-FT)	Peak Elevation :	6851.5 (FT)

Stage Storage Discharge

Data for spillway and embankment: The Meadows Pond #2

References: Topo and field survey

<i>Spillway Length (ft) =</i>	115
<i>Spillway Elevation (ft) =</i>	7011.0
<i>Spillway C<sub>d</sub><sup>1</sup> =</i>	0.56
<i>Embankment Length (ft) =</i>	62.5
<i>Embankment Elevation (ft) =</i>	7012.0
<i>Embankment C<sub>d</sub><sup>1</sup> =</i>	0.56
<i>Acceleration due to Gravity, g (ft/s<sup>2</sup>) =</i>	32.2

Data for outlet pipe and grate:

<i>Type</i>		<i>Width (ft)</i>	<i>Height (ft)</i>	<i>Diameter (in)</i>	<i>C<sub>d</sub><sup>1</sup></i>	<i>Area (ft<sup>2</sup>)</i>	<i>Centerline Elevation (ft)</i>	<i>Bottom Elevation<sup>2</sup> (ft)</i>	<i>Top Elevation<sup>3</sup> (ft)</i>
<i>Orifice 1:</i>	Rectangular	5	1.75		0.6	8.75	7009.30	7008.43	7010.18
<i>Orifice 2:</i>	Rectangular	5	1.75		0.6	8.75	7009.30	7008.43	7010.18
<i>Orifice 3:</i>	None Selected					0.00		0.00	0.00
<i>Orifice 4:</i>	None Selected					0.00		0.00	0.00

Stand Pipe Dimensions:

<i>Type</i>		<i>Width (ft)</i>	<i>Height (ft)</i>	<i>Diameter (ft)</i>	<i>C<sub>d</sub><sup>1</sup></i>	<i>Area (ft<sup>2</sup>)</i>	<i>Elevation (ft)</i>	<i>Perimeter (ft)</i>
<i>Grate :</i>	Rectangular	5.5	7.5		0.6	41.25	7011.0	26.00

Stage			Storage	Area		Volume <sup>4</sup>		Spillway <sup>5</sup> (cfs)	Embankment <sup>5</sup> (cfs)	Discharge				Total Flow <sup>6</sup> (cfs)
Stage	Elevation (ft)	Height (ft)		(ft <sup>2</sup> )	(acres)	(ac-ft)	(cum ac-ft)			Orifice (max outflow cfs)				
										1	2	3	4	
	7004.0	0.0		1202	0.03	0.00	0.00	-	-	-	-	-	-	-
	7006.0	2.0		46729	1.07	1.10	1.10	-	-	-	-	-	-	-
	7008.0	4.0		55287	1.27	2.34	3.44	-	-	-	-	-	-	-
	7010.0	6.0		67516	1.55	2.82	6.26	-	-	31.72	31.72	-	-	63.45
	7012.0	8.0		90179	2.07	3.62	9.88	344.54	-	69.23	69.23	-	-	566.45

DO NOT INCLUDE WATER QUALITY CAPTURE VOLUME IN THIS STORAGE AREA.

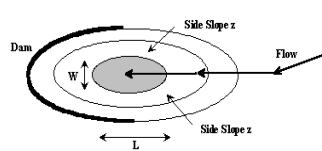
- Notes:
- 1) Coefficient of discharge, C<sub>d</sub>, taken from Hydrology and Hydraulic Systems by R.S. Gupta, 2001, page 303
  - 2) Bottom Elevation is the Centerline Elevation minus half the Height or the Diameter, example: 6132.25ft-0.5\*30in/(12ft/in)=6131.00ft
  - 3) Top Elevation is the Centerline Elevation plus half the Height of the Diameter, example: 6132.25ft+0.5\*30in/(12ft/in)=6133.50ft
  - 4) Volume for each elevation is calculated using the average end area and then accumulated, example: (5ft-3ft)(16.8ac+15.78ac)\*0.5=64.43ac-ft
  - 5) Weir equation for Embankment and Spill way is fromHydrology and Hydraulic Systems by R.S. Gupta, 2001, equation 6.22: Q= <sup>2</sup>/<sub>3</sub> C<sub>d</sub> (C<sub>g</sub>)<sup>0.5</sup> LH<sup>1.5</sup>
  - 6) Total Flow is the sum of the flows through the Embankment, Spillway, and Culvert (Does not account for outlet capacity, this needs to be checked seperately.)

Calculated by: BAS  
Date: \_\_\_\_\_  
Checked by: \_\_\_\_\_  
Date: \_\_\_\_\_



## STAGE-STORAGE SIZING FOR DETENTION BASINS

Project: **Falcon Meadows at Bent Grass**  
 Basin ID: **School Pond**



**Design Information (Input):**

Width of Basin Bottom, W =  ft

Length of Basin Bottom, L =  ft

Dam Side-slope (H:V),  $Z_d$  =  ft/ft

Right Triangle		OR...
Isoceles Triangle		OR...
Rectangle		OR...
Circle / Ellipse		OR...
Irregular		(Use Override values in cells G32:G52)

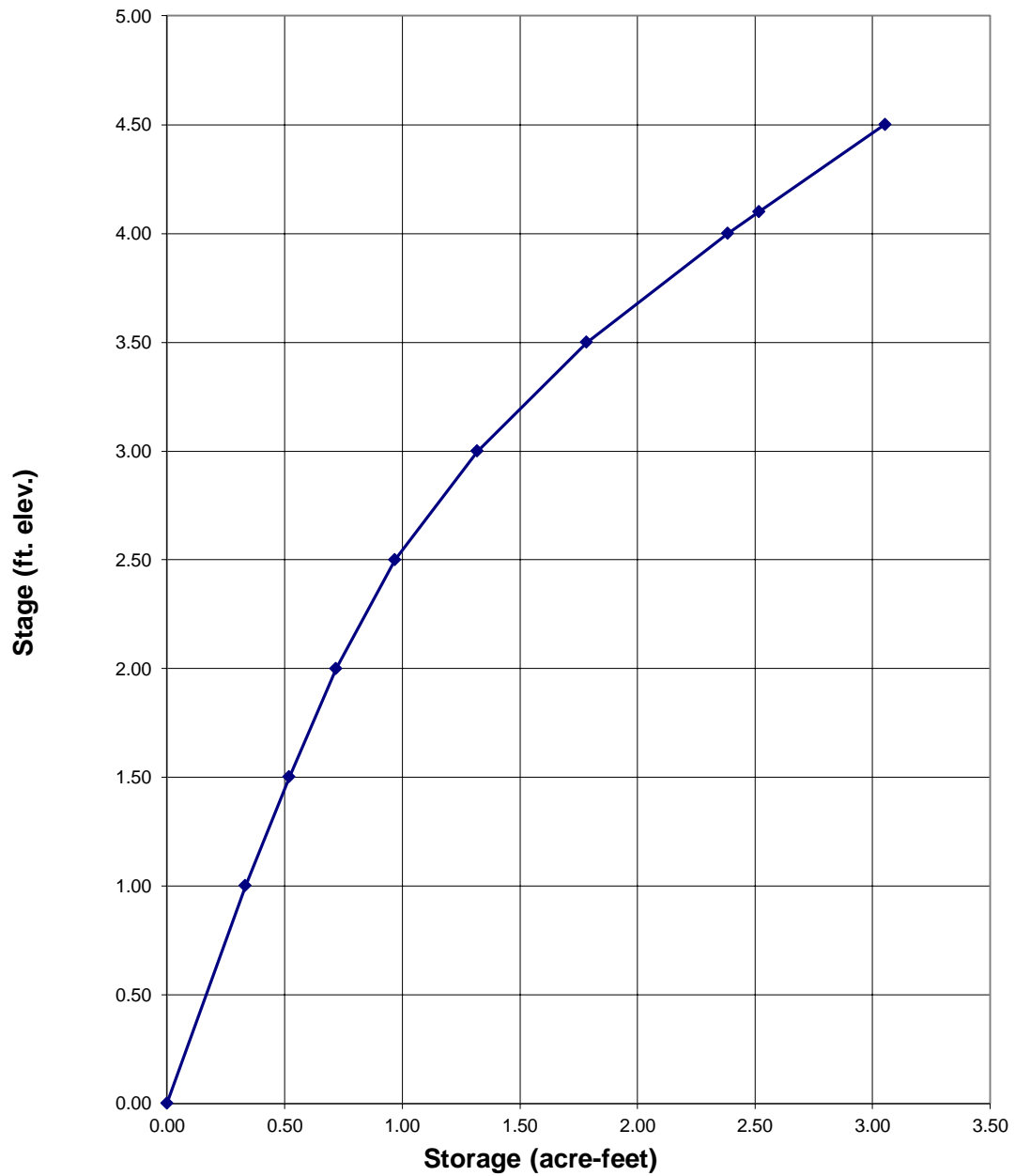
MINOR	MAJOR	
		acre-ft.
		acre-ft.
		acre-ft.

[illegible]

## STAGE-STORAGE SIZING FOR DETENTION BASINS

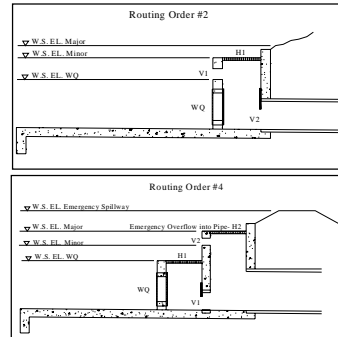
Project: \_\_\_\_\_  
Basin ID: \_\_\_\_\_

**STAGE-STORAGE CURVE FOR THE POND**



STAGE-DISCHARGE SIZING OF THE WEIRS AND ORIFICES (INLET CONTROL)	
--	--

Project: Falcon Meadows at Bent Grass  
Basin ID: School Site Pond - Current Conditions



**Routing 3: Single Stage - Water flows through WQCV plate and #1 horizontal opening into #1 vertical opening. This flow will be applied to culvert sheet (#2 vertical & horizontal openings is not used).**

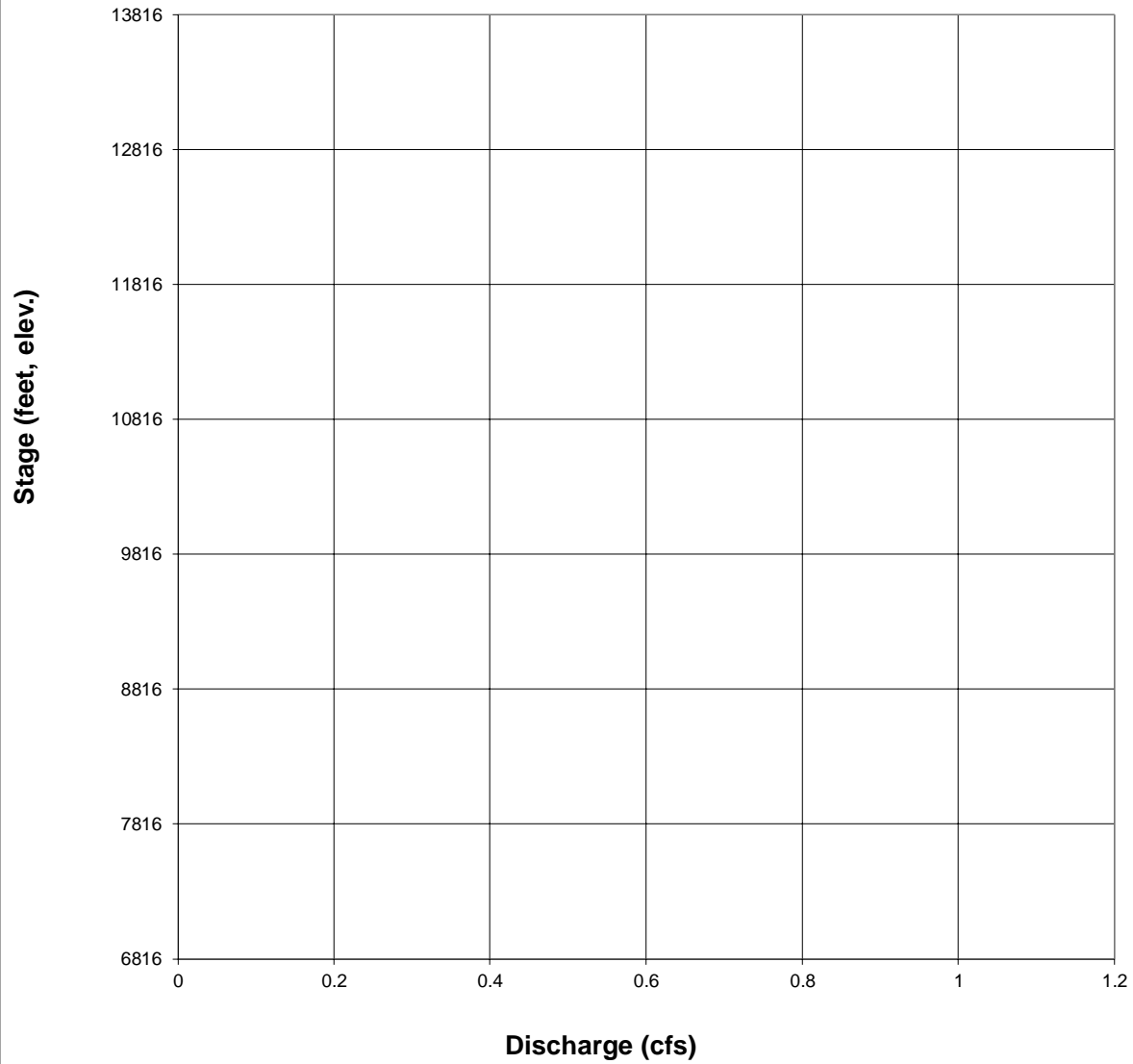
[illegible]

## STAGE-DISCHARGE SIZING OF THE WEIRS AND ORIFICES (INLET CONTROL)

Project: Falcon Meadows at Bent Grass

Basin ID: School Site Pond - Current Conditions

### STAGE-DISCHARGE CURVE FOR THE OUTLET STRUCTURE



## STAGE-DISCHARGE SIZING OF THE SPILLWAY

**Basin ID:** School Site Pond - Current Conditions

75.96  
4.00000

**Design Information (input):**

Bottom Length of Weir  
Angle of Side Slope Weir  
Elev. for Weir Crest  
Coef. for Rectangular Weir  
Coef. for Trapezoidal Weir

L =	30.00	feet
Angle =	75.96	degrees
EL. Crest =	3.00	feet
C <sub>w</sub> =	0.50	
C <sub>t</sub> =	0.60	

**Calculation of Spillway Capacity (output):**

[illegible]

## STAGE-DISCHARGE SIZING OF THE SPILLWAY

Project: Falcon Meadows at Bent Grass

Basin ID: School Site Pond - Current Conditions

# DETENTION VOLUME BY THE FULL SPECTRUM METHOD

Project: \_\_\_\_\_  
Basin ID: \_\_\_\_\_

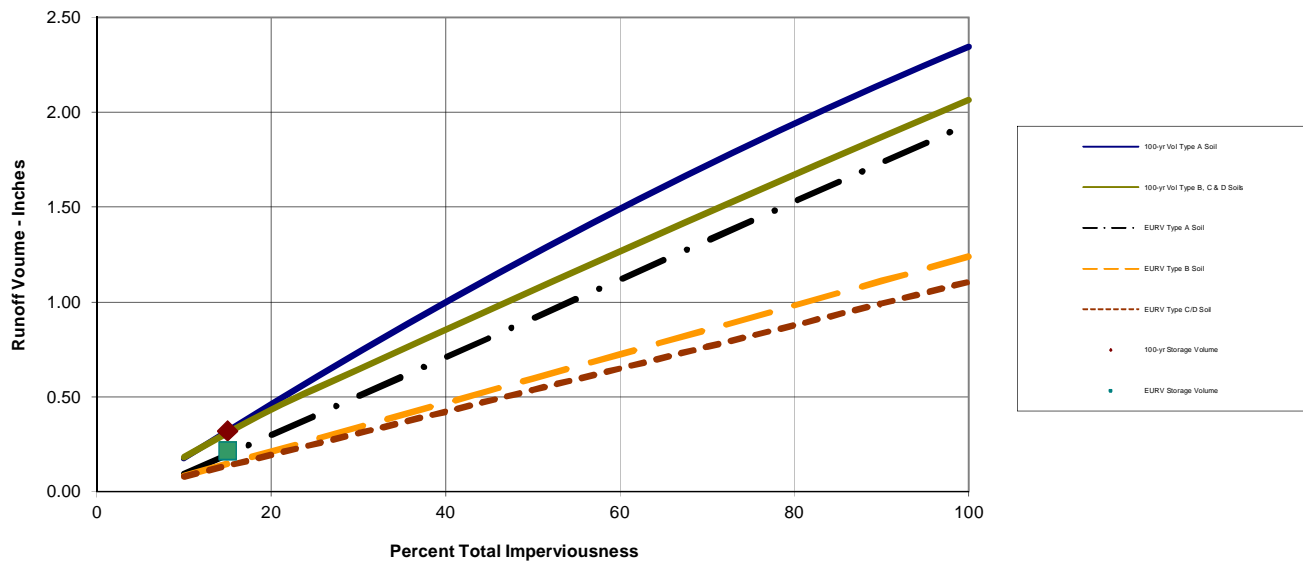
\* User input data  
shown in blue.

Area of Watershed (acres)	740.00	
Subwatershed Imperviousness	15.0%	
Level of Minimizing Directly Connected Impervious Area (MDCIA)	0	<div><div>0</div><div></div></div>
Effective Imperviousness <sup>1</sup>	15.0%	
Hydrologic Soil Type	Percentage of Area	Area (acres)
Type A	100.0%	740.0
Type B		0.0
Type C or D		0.0

Recommended Horton's Equation Parameters for CUHP		
Infiltration (inches per hour)		Decay Coefficient-- $\alpha$
Initial-- $f_i$	Final-- $f_o$	
5	1.0	0.0007
Detention Volumes <sup>2,5</sup>		Maximum Allowable Release Rate, cfs <sup>3</sup>
(watershed inches)	(acre-feet)	
0.22	13.30	Design Outlet to Empty EURV in 72 Hours
0.32	19.72	370.00

Excess Urban Runoff Volume<sup>4</sup>

100-year Detention Volume Including WQCV<sup>5</sup>



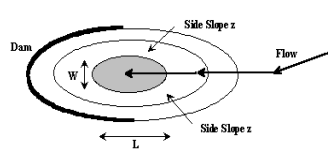
## Notes:

- 1) Effective imperviousness is based on Figure ND-1 of the Urban Storm Drainage Criteria Manual (USDCM).
- 2) Results shown reflect runoff reduction from Level 1 or 2 MDCIA and are plotted at the watershed's total imperviousness value; the impact of MDCIA is reflected by the results being below the curves.
- 3) Maximum allowable release rates for 100-year event are based on Table SO-1. Outlet for the Excess Urban Runoff Volume (EURV) to be designed to empty out the EURV in 72 hours. Outlet design is similar to one for the WQCV outlet of an extended detention basin (i.e., perforated plate with a micro-pool) and extends to top of EURV water surface elevation.
- 4) EURV approximates the difference between developed and pre-developed runoff volume.
- 5) 100-yr detention volume includes EURV. No need to add more volume for WQCV or EURV

<p align="center"><b>STAGE-STORAGE SIZING FOR DETENTION BASINS</b></p>
--

Project: FALCON MARKETPLACE

Basin ID: NORTH POND #1



**Design Information (Input):** \_\_\_\_\_ **Check Basin Shape** \_\_\_\_\_

Design Information Input:		Select Basin Shape	
Width of Basin Bottom, W =	<input type="text"/>	Right Triangle	OR...
Length of Basin Bottom, L =	<input type="text"/>	Isosceles Triangle	OR...
Dam Side-slope (H:V), Z <sub>d</sub> =	<input type="text"/>	Rectangle	OR...

### Check Basin Shape

Geometric Shape		
Right Triangle		OR...
Isosceles Triangle		OR...
Rectangle		OR...
Circle / Ellipse		OR...
Irregular		(Use Override values in cells G32:G52)

Storage Requirement from Sheet 'Moduled PAA':			acre-ft.
Storage Requirement from Sheet 'Hydrograph':			acre-ft.

	MINOR	MAJOR	
Storage Requirement from Sheet 'Modified FAA':			acre-ft.
Storage Requirement from Sheet 'Hydrograph':			acre-ft.
Storage Requirement from Sheet 'Full-Spectrum':	13.30	19.72	acre-ft.

[illegible]

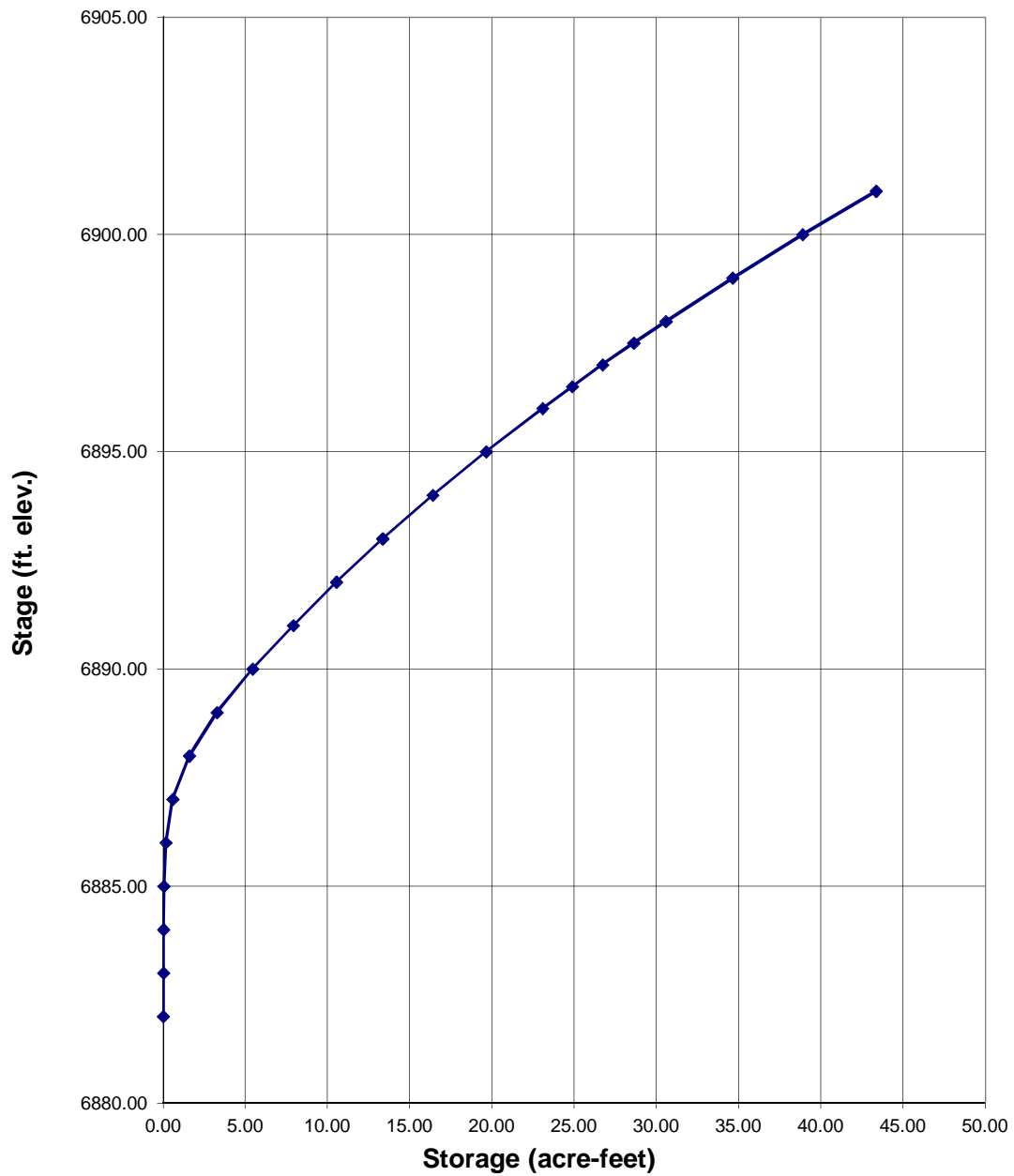


## STAGE-STORAGE SIZING FOR DETENTION BASINS

Project: \_\_\_\_\_

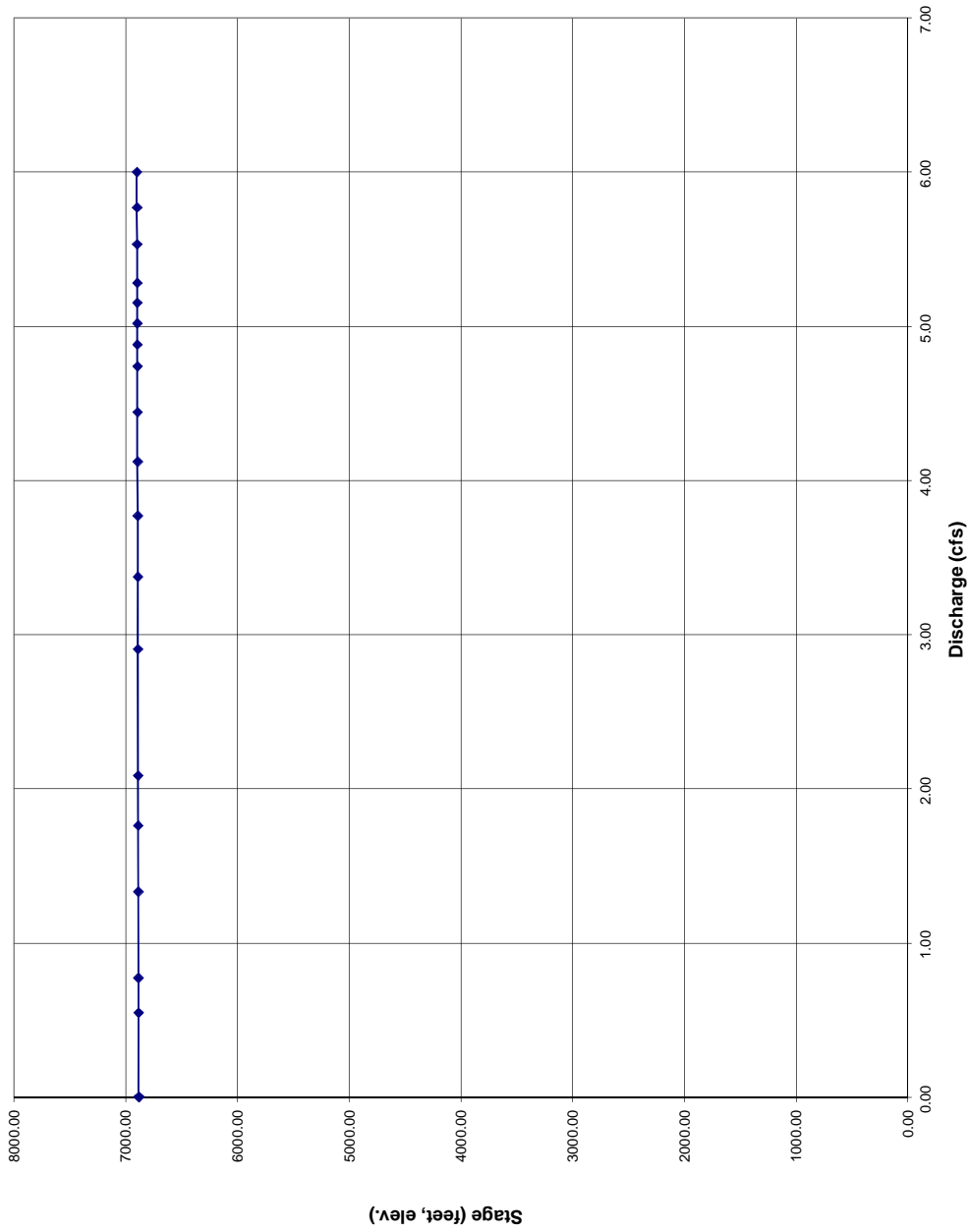
Basin ID: \_\_\_\_\_

### STAGE-STORAGE CURVE FOR THE POND



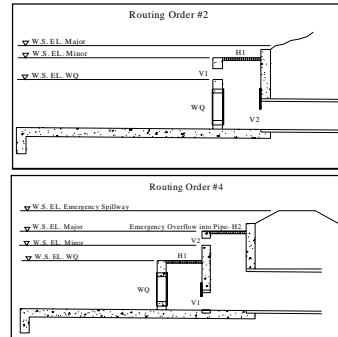


STAGE-DISCHARGE CURVE FOR THE WQCV OUTLET STRUCTURE



## STAGE-DISCHARGE SIZING OF THE WEIRS AND ORIFICES (INLET CONTROL)

Project: Falcon Marketplace #1  
Basin ID: NORTH POND #1

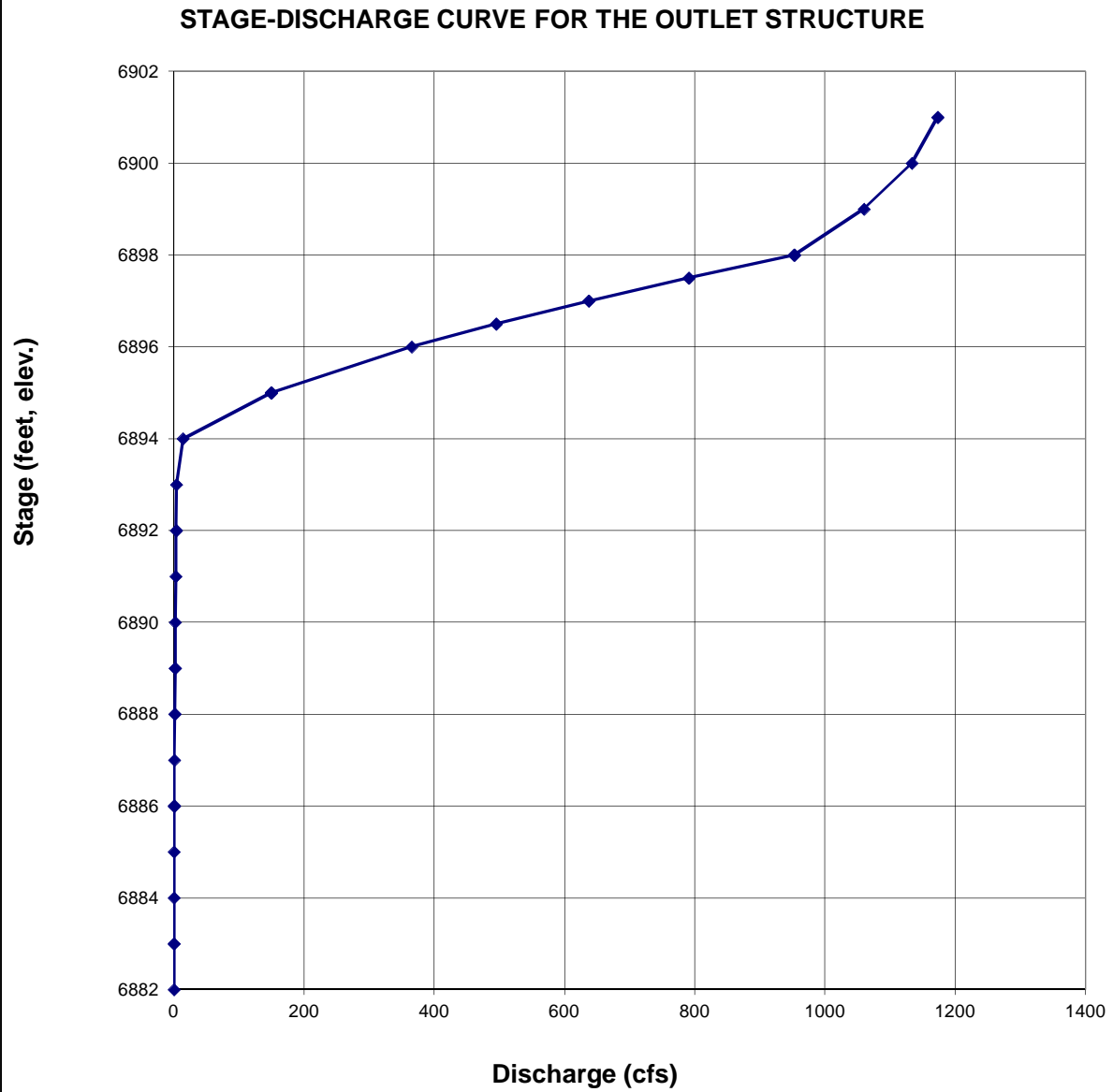


**Routing 3: Single Stage - Water flows through WQCV plate and #1 horizontal opening into #1 vertical opening. This flow will be applied to culvert sheet (#2 vertical & horizontal openings is not used).**

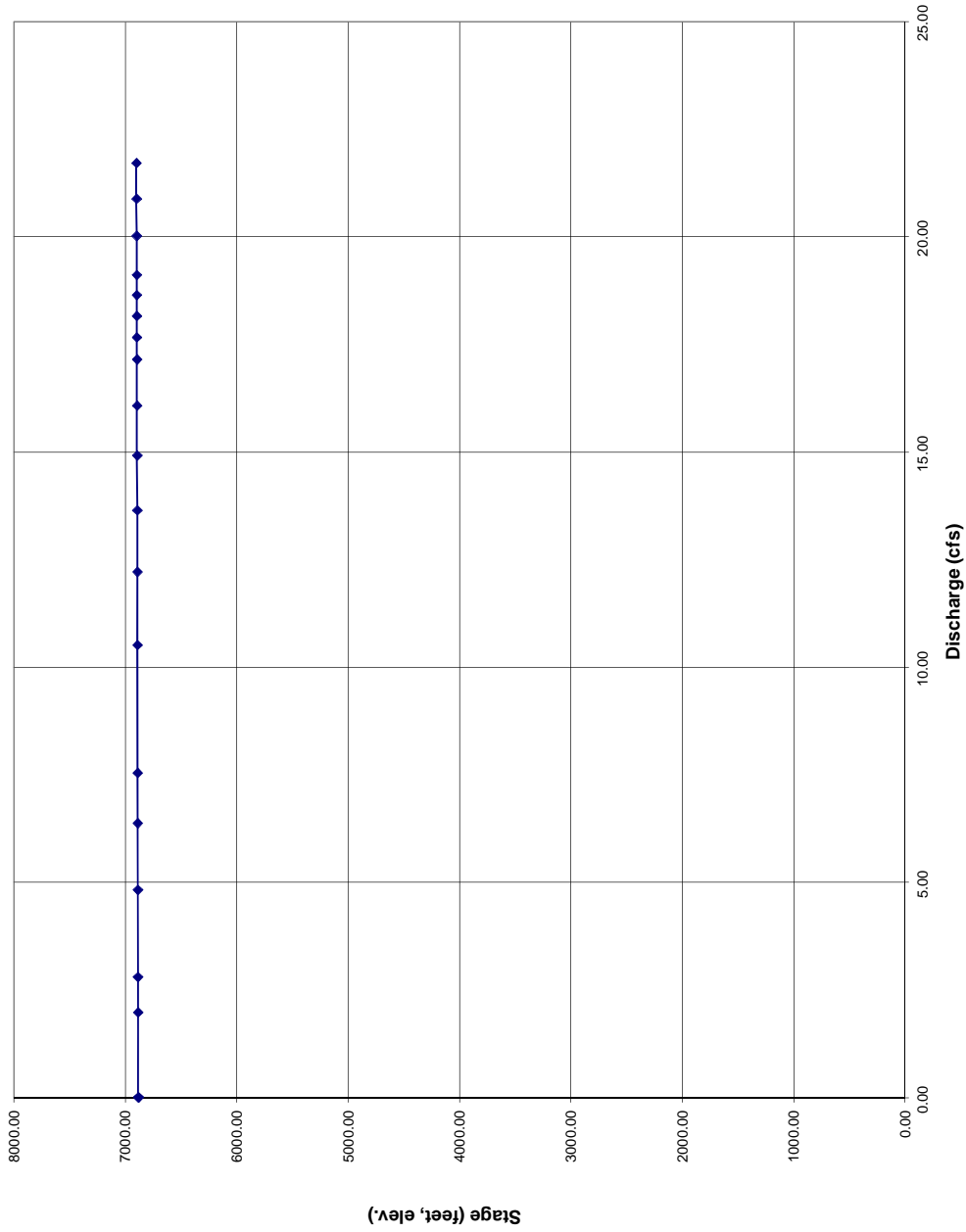
[illegible]

## STAGE-DISCHARGE SIZING OF THE WEIRS AND ORIFICES (INLET CONTROL)

Project: Falcon Marketplace #1  
Basin ID: NORTH POND #1



STAGE-DISCHARGE CURVE FOR THE WQCV OUTLET STRUCTURE



Project: **FALCON MARKETPLACE**  
Basin ID: **NORTH POND #1**

D = 96 in  
Grooved End with Headwall

Height (Rise) =   
Width (Span) =   
Square Edge w/ 90-15 deg. Flared Wingwall

No =	1	
$I_{elev}$ =	6881.97	ft. elev.
$O_{elev}$ =	6880.85	ft. elev.
L =	78.0	ft.
n =	0.0120	
$K_b$ =	0.00	
$K_v$ =	1.00	

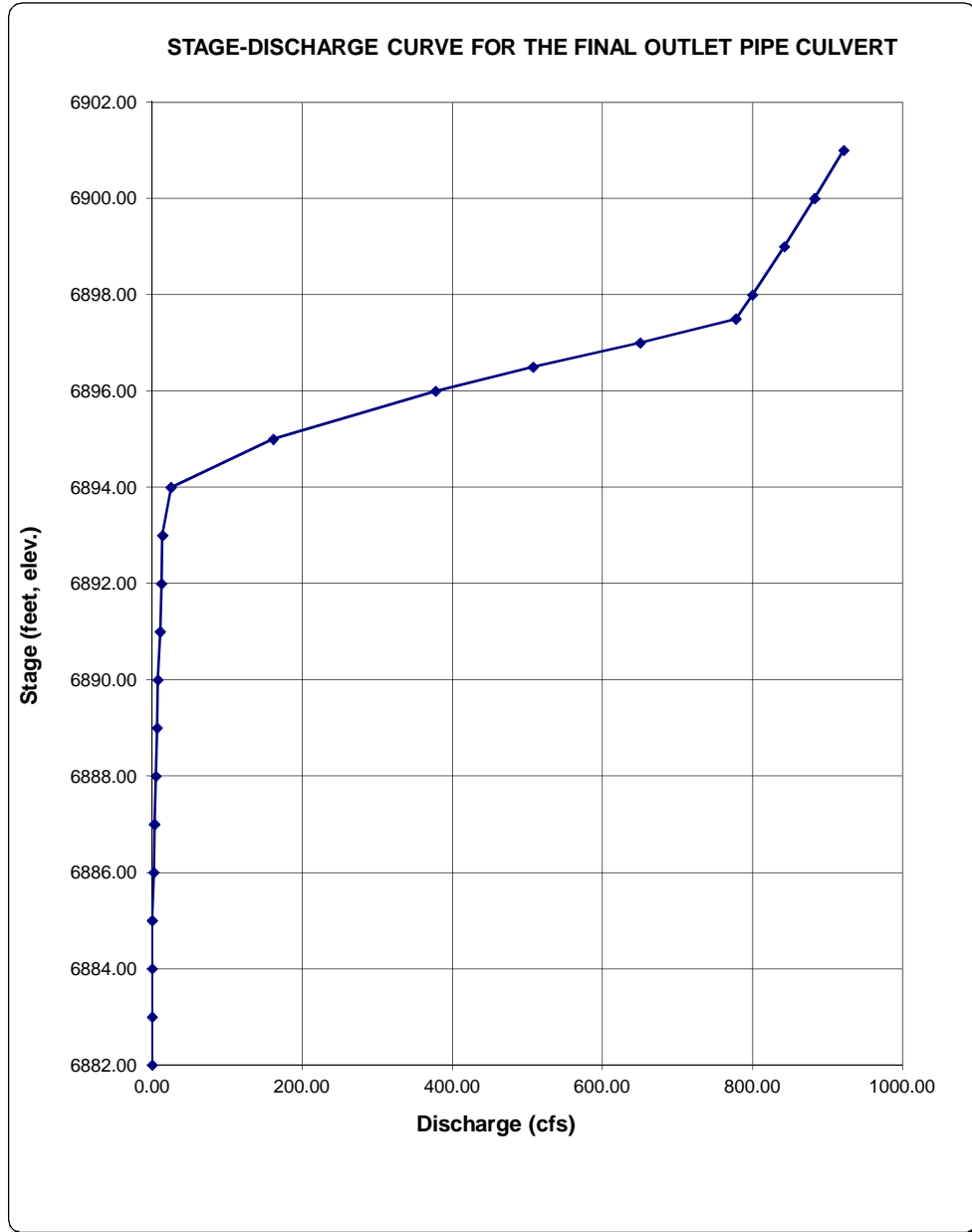
$K_e$	0.20
$K_f$	0.13
$K_s$	1.33
$C_d$	0.99
$KE_{low}$	-0.04

[illegible]

STAGE-DISCHARGE SIZING OF THE OUTLET CULVERT (INLET vs. OUTLET CONTROL WITH TAILWATER EFFECTS)

Project: FALCON MARKETPLACE

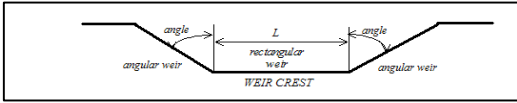
Basin ID: NORTH POND #1





<p align="center"><b>STAGE-DISCHARGE SIZING OF THE SPILLWAY</b></p>
---

**Basin ID:** NORTH POND #1



**Design Information (input):**

Bottom Length of Weir  
Angle of Side Slope Weir  
Elev. for Weir Crest  
Coef. for Rectangular Weir  
Coef. for Trapezoidal Weir

L =	160.00	feet
Angle =	75.96	degrees
EL. Crest =	6,898.00	feet
C <sub>w</sub> =		
C <sub>t</sub> =	3.50	

**Calculation of Spillway Capacity (output):**

[illegible]



-----  
AGENCY: El Paso County  
REPORT TYPE: Preliminary  
DATE: 6/19/2017

### SPILLWAY CALCULATIONS

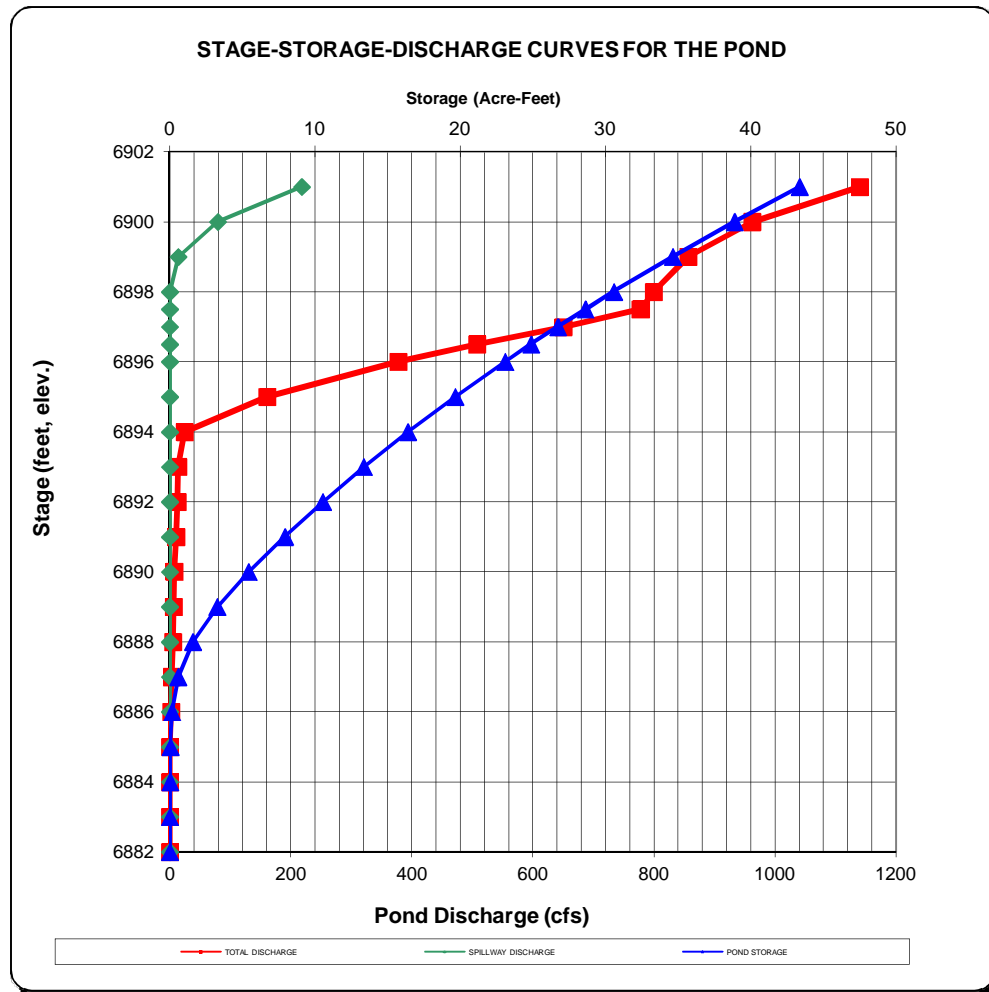
$$Q=CL(H^{2/3})$$

Weir coefficient C:	3.5
Depth H, ft:	1.5
Flowrate Q, cfs:	1016

**Required L, ft: 158.01**

## STAGE-DISCHARGE SIZING OF THE SPILLWAY

Project: FALCON MARKETPLACE  
Basin ID: NORTH POND #1



# Aluminum Bar Grating

TRASH RACK GRATE  
AT FRONT OF BOX

## RECTANGULAR BAR SWAGE-LOCKED 1-3/16" C/C Bearing Bars

## PRESS-LOCKED 1-3/16" C/C Bearing Bars

19-SR-4

19-SR-2

19-AP-4

19-AP-2



Cross Rods 4" C/C



Cross Rods 2" C/C



Cross Bars 4" C/C



Cross Bars 2" C/C

NON-SERRATED & SERRATED

### LOAD & DEFLECTION TABLE

Bar Size	Symbol	Approx. Weight psf	Sec. Mod. Per Ft. Of Width	SPAN (Direction of Bearing Bar)					
				24"	30"	36"	42"	48"	
3/4" x 1/8"	19-SR-4	1.4	0.118	U	237	152	105	77	
	19-SR-2	1.6		D	0.192	0.300	0.432	0.588	
	19-AP-4	1.5		C	237	189	158	135	
	19-AP-2	1.8		D	0.154	0.240	0.348	0.470	
3/4" x 3/16"	19-SR-4	1.9	0.178	U	355	227	158	116	
	19-SR-2	2.1		D	0.192	0.300	0.432	0.588	
	19-AP-4	2.2		C	355	284	237	203	
	19-AP-2	2.7		D	0.154	0.240	0.346	0.470	
1" x 1/8"	19-SR-4	1.7	0.211	U	421	269	187	137	105
	19-SR-2	1.9		D	0.144	0.225	0.324	0.441	0.576
	19-AP-4	1.8		C	421	337	281	241	211
	19-AP-2	2.2		D	0.115	0.180	0.259	0.353	0.461
1" x 3/16"	19-SR-4	2.5	0.316	U	632	404	281	206	158
	19-SR-2	2.7		D	0.144	0.225	0.324	0.441	0.576
	19-AP-4	2.8		C	632	505	421	361	316
	19-AP-2	3.3		D	0.115	0.180	0.259	0.353	0.461
1-1/4" x 1/8"	19-SR-4	2.1	0.329	U	658	421	292	215	164
	19-SR-2	2.3		D	0.115	0.180	0.259	0.353	0.461
	19-AP-4	2.4		C	658	526	439	376	329
	19-AP-2	2.8		D	0.092	0.144	0.207	0.282	0.369
1-1/4" x 3/16"	19-SR-4	3.1	0.493	U	987	632	439	322	247
	19-SR-2	3.3		D	0.115	0.180	0.259	0.353	0.461
	19-AP-4	3.5		C	987	789	658	564	493
	19-AP-2	4.2		D	0.092	0.144	0.207	0.282	0.369
1-1/2" x 1/8"	19-SR-4	2.5	0.474	U	947	606	421	309	237
	19-SR-2	2.7		D	0.096	0.150	0.216	0.294	0.384
	19-AP-4	2.8		C	947	758	632	541	474
	19-AP-2	3.2		D	0.077	0.120	0.173	0.235	0.307
1-1/2" x 3/16"	19-SR-4	3.7	0.711	U	1421	909	632	464	355
	19-SR-2	3.9		D	0.096	0.150	0.216	0.294	0.384
	19-AP-4	4.1		C	1421	1137	947	812	711
	19-AP-2	4.8		D	0.077	0.120	0.173	0.235	0.307
1-3/4" x 3/16"	19-SR-4	4.2	0.967	U	1934	1238	860	632	484
	19-SR-2	4.4		D	0.082	0.129	0.185	0.252	0.329
	19-AP-4	4.7		C	1934	1547	1289	1105	967
	19-AP-2	5.3		D	0.066	0.103	0.148	0.202	0.263
2" x 3/16"	19-SR-4	4.8	1.263	U	2526	1617	1123	825	632
	19-SR-2	5.0		D	0.072	0.113	0.162	0.221	0.288
	19-AP-4	5.3		C	2526	2021	1684	1444	1263
	19-AP-2	5.9		D	0.058	0.090	0.130	0.176	0.230
2-1/4" x 3/16"	19-SR-4	5.4	1.599	U	3197	2046	1421	1044	799
	19-SR-2	5.6		D	0.064	0.100	0.144	0.196	0.256
	19-AP-4	5.8		C	3197	2558	2132	1827	1599
	19-AP-2	6.5		D	0.051	0.080	0.115	0.157	0.205
2-1/2" x 3/16"	19-SR-4	5.9	1.974	U	3947	2526	1754	1289	987
	19-SR-2	6.1		D	0.058	0.090	0.130	0.176	0.230
	19-AP-4	6.4		C	3947	3158	2632	2256	1974
	19-AP-2	7.1		D	0.046	0.072	0.104	0.141	0.184

U = safe uniform load, psf (page 93)  
C = safe concentrated load, psf (page 93)  
D = deflection, inches  
E = modulus of elasticity, 10,000,000 psi  
F = fiber stress, 12,000 psi

Material: ASTM B-221, 6063 or 6061

Deflection: Spans and loads to the right of the bold line exceed 1/4" deflection for uniform load of 100 psf which provides safe pedestrian comfort. These can be exceeded for other types of loads with engineer's approval.

Serrated Bars: For serrated grating, the depth of grating required for a specified load is 1/4" deeper than that shown in the table.

General: Loads and deflections are theoretical and based on static loading.

Finish: Mill finish unless otherwise specified.

FALCON MARKETPLACE  
15-FT Head x 62.4 = 936 psf

### SR/AP-19 PANEL WIDTH (inches)

Note: Includes 1/4" (1/8" each side) for extended cross rods on swage-locked (SR) and extended cross bars on press-locked (AP).

No. of Bars	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1/8" Bar	1 1/16	2 1/4	3 1/2	5 1/8	6 3/16	7 1/2	8 11/16	9 7/8	11 1/16	12 1/4	13 3/16	14 5/8	15 13/16	17	18 3/16
3/16" Bar	1 5/8	2 13/16	4	5 3/16	6 3/8	7 9/16	8 3/4	9 9/16	11 1/8	12 5/16	13 1/2	14 11/16	15 7/8	17 1/16	18 1/4
No. of Bars	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
1/8" Bar	19 3/8	20 9/16	21 3/4	22 15/16	24 1/8	25 3/16	26 7/2	27 11/16	28 7/8	30 1/16	31 1/4	32 3/16	33 5/8	34 13/16	36
3/16" Bar	19 7/16	20 5/8	21 13/16	23	24 3/16	25 3/8	26 9/16	27 3/4	28 15/16	30 1/8	31 1/16	32 1/2	33 11/16	34 7/8	36 1/16

Flow depths entering Pond SR4

**CLOMR**

Min Ch El	6895.98
WS Elev	6898.75
Max flow depth (north)	<b>2.8</b> ft

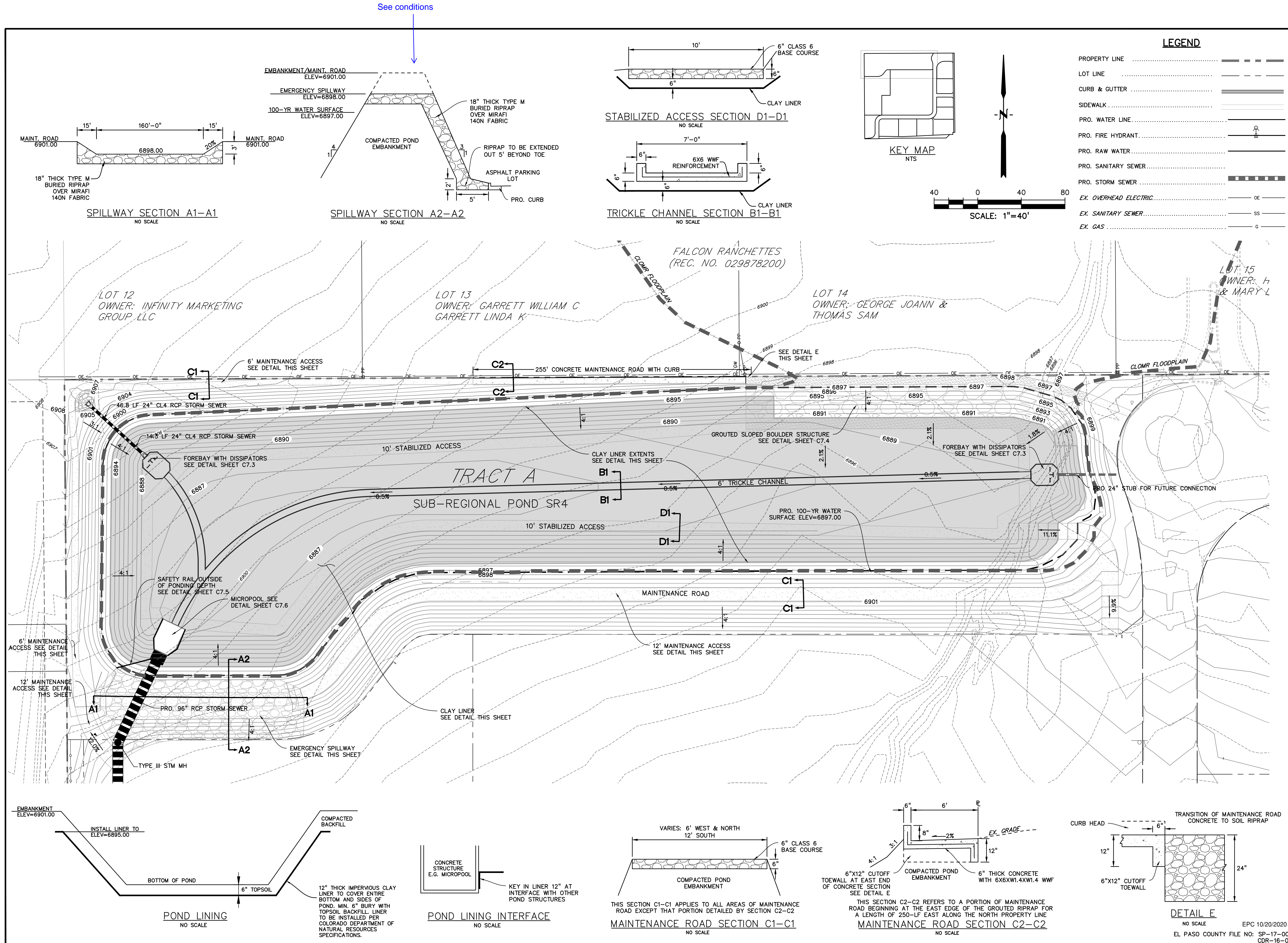
**NORTHWEST SWALE**

Assuming trapezoidal channelized flow at riprap entry

Q100	30.2 cfs
Width	8 ft
Side Slopes	5 :1
Slope	1.6 %
n	0.020

Calculated flow depth	<b>0.5</b> ft
-----------------------	---------------

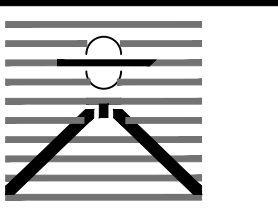




LEGEND

PROPERTY LINE	---
LOT LINE	- - -
CURB & GUTTER	=====
SIDEWALK	=====
PRO. WATER LINE	-----
PRO. FIRE HYDRANT	-----
PRO. RAW WATER	-----
PRO. SANITARY SEWER	-----
PRO. STORM SEWER	-----
EX. OVERHEAD ELECTRIC	-----
EX. SANITARY SEWER	-----
EX. GAS	-----

PREPARED BY:

  
DREXEL, BARRELL & CO.  
Engineers-Surveyors  
3 SOUTH 7TH STREET  
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CONTACT: TIM D. McCONNELL, P.E.  
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BOULDER • COLORADO SPRINGS


CLIENT:

**HUMMEL INVESTMENTS, LLC**  
8117 PRESTON ROAD, SUITE 120  
DALLAS, TEXAS 75225  
(214) 416-9820

OVERLOT GRADING, POND SR4 & UTILITY  
CONSTRUCTION DRAWINGS FOR

**FALCON  
MARKETPLACE**  
FALCON, COLORADO

ISSUE	DATE
1ST SUBMITTAL	6-20-17
RESUBMITTAL	9-6-18
REVISED	7-24-20
DESIGNED BY:	TDM
DRAWN BY:	KGV
CHECKED BY:	TDM
FILE NAME:	



PREPARED UNDER MY DIRECT  
SUPERVISION FOR AND ON BEHALF  
OF DREXEL, BARRELL & CO.

DRAWING SCALE:  
HORIZONTAL: 1"=40'  
VERTICAL: N/A

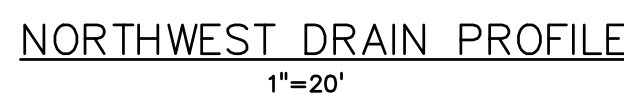
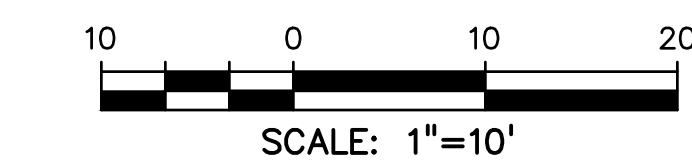
**SUB-REGIONAL  
POND #1 (SR4)**

PROJECT NO. 20988-00CSV  
DRAWING NO.

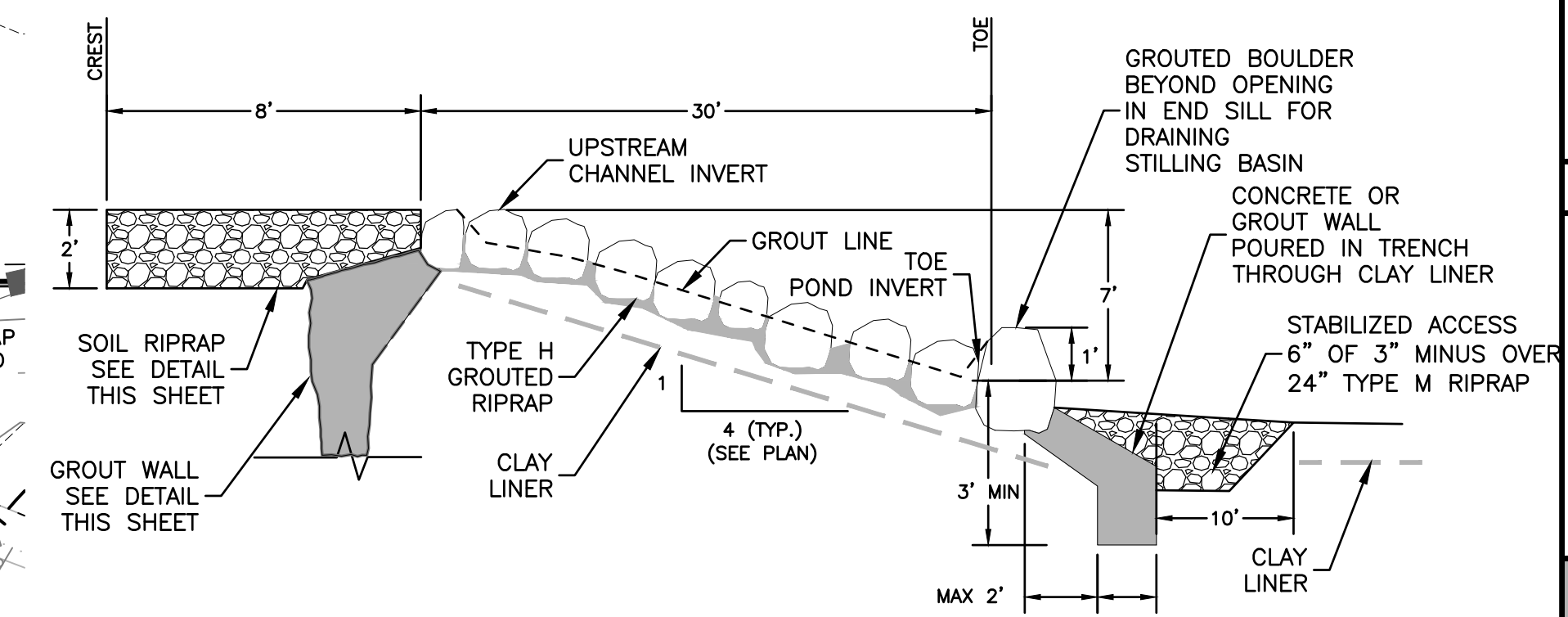
**C7.2**

SHEET: 9 OF 12

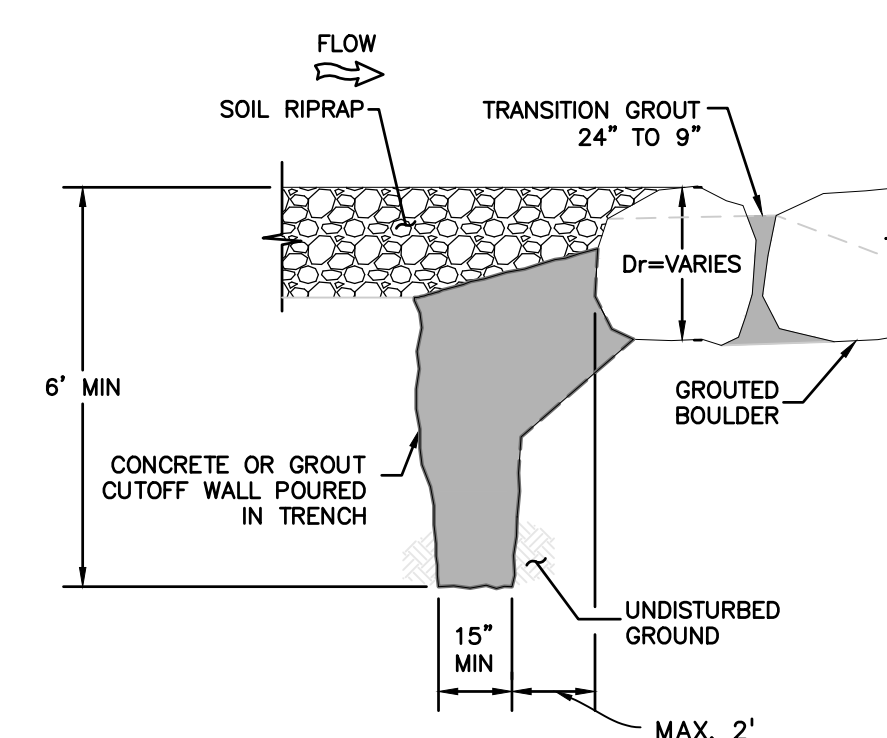
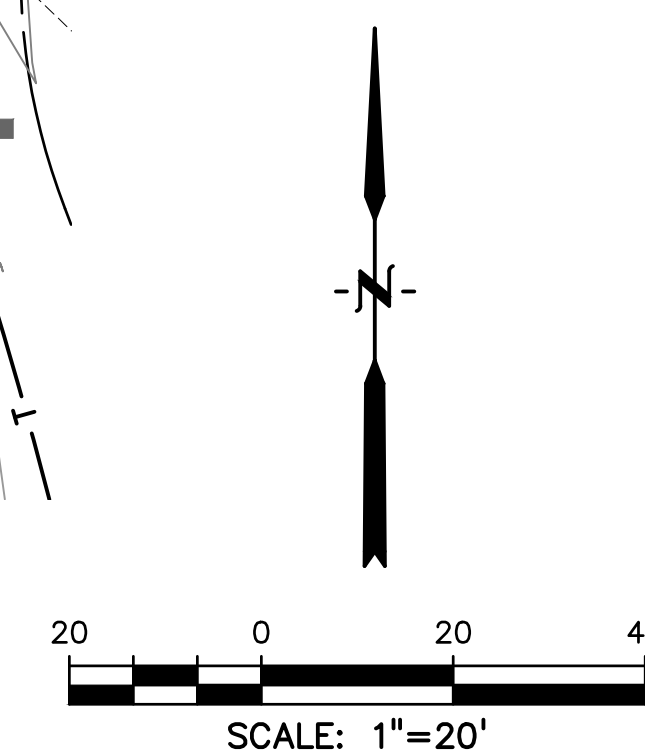




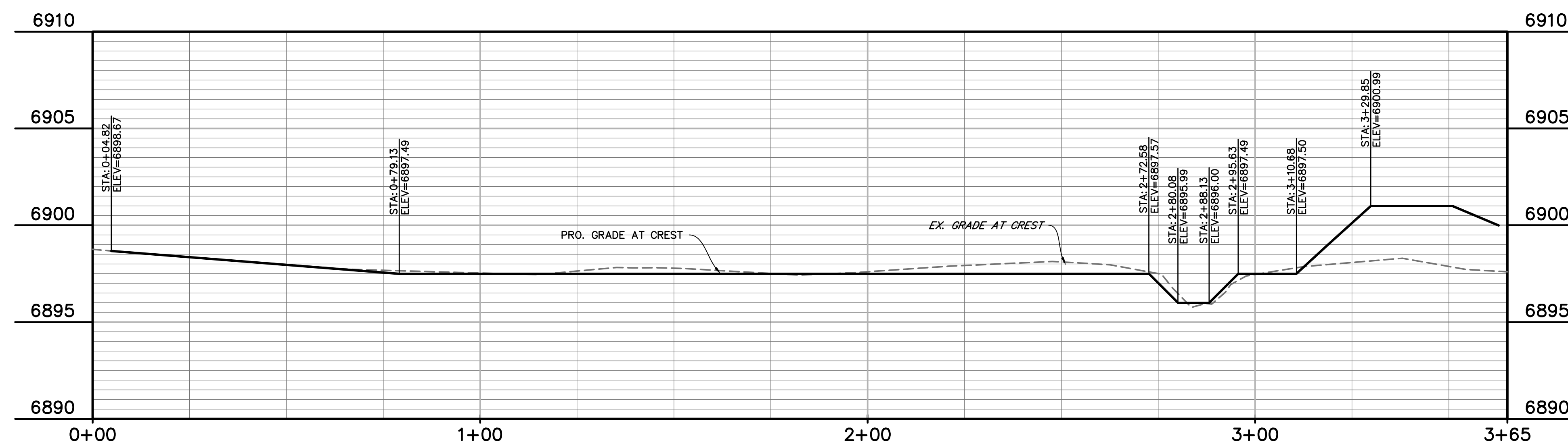
EPC 10/20/2020  
EL PASO COUNTY FILE NO: SP-17-001  
CDR-16-00



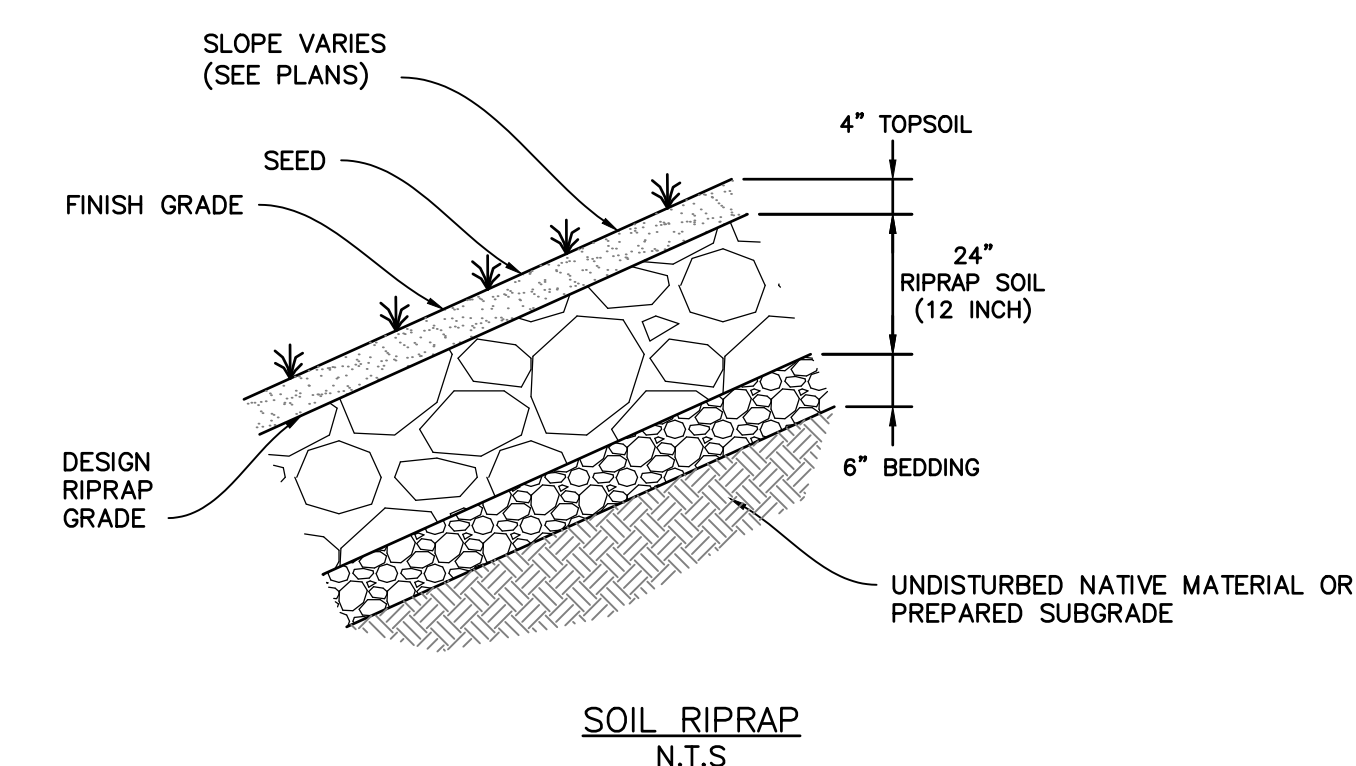
GROUTED SLOPED BOULDER STRUCTURE  
NO SCALE



GROUT WALL CONNECTION  
TRENCHED VERTICAL WALL  
UPSTREAM OF DROP



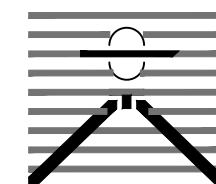
CREST PROFILE



**NOTE**

REFERENCE UDFCD SPECIFICATION SECTIONS 31 37 00 AND 31 37 19 FOR GROUT, BOULDER AND RIPRAP SPECIFICATIONS, REINFORCEMENT AND INSTALLATION GUIDELINES.

PREPARED BY:
--------------



**DREXEL, BARRELL & CO.**  
Engineers • Surveyors  
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(214) 416-9820

COVERLOT GRADING, POND SR4 & UTILITY  
CONSTRUCTION DRAWINGS FOR

FALCON  
MARKETPLACE

FALCON, COLORADO

ISSUE	DATE
1ST SUBMITTAL	6-20-17
RESUBMITTAL	9-6-18
REVISED	7-24-20

DESIGNED BY:	TDM
DRAWN BY:	KGV
CHECKED BY:	TDM
FILE NAME:	



PREPARED UNDER MY DIRECT  
SUPERVISION FOR AND ON BEHALF  
OF DREXEL, BARRELL & CO.

DRAWING SCALE:

HORIZONTAL: 1"=20'

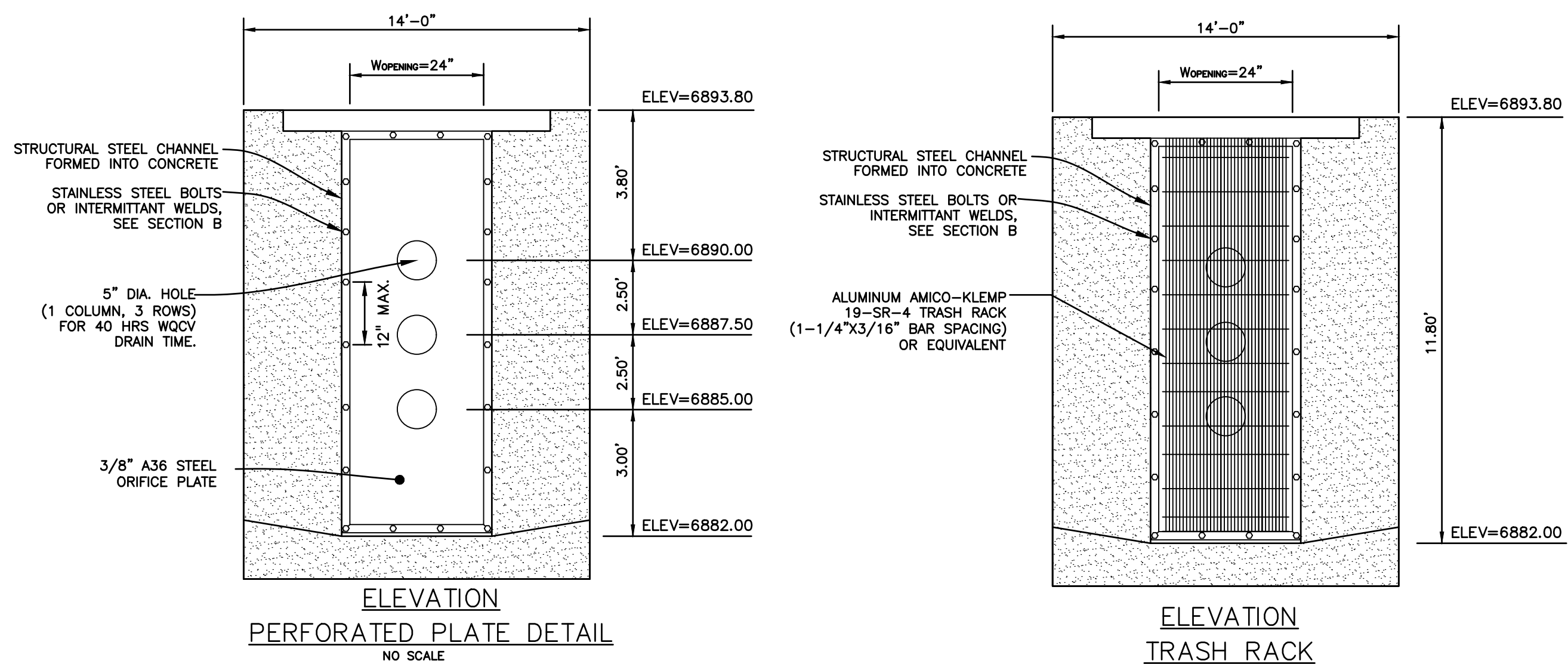
POND #1 (SR4)  
GROUTED DROP  
DETAILS

PROJECT NO. 20988-00CSCV
DRAWING NO.

## C7.4

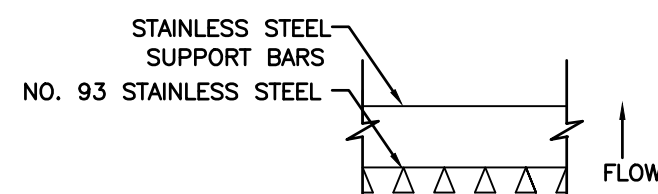
SHEET: 11 OF 12



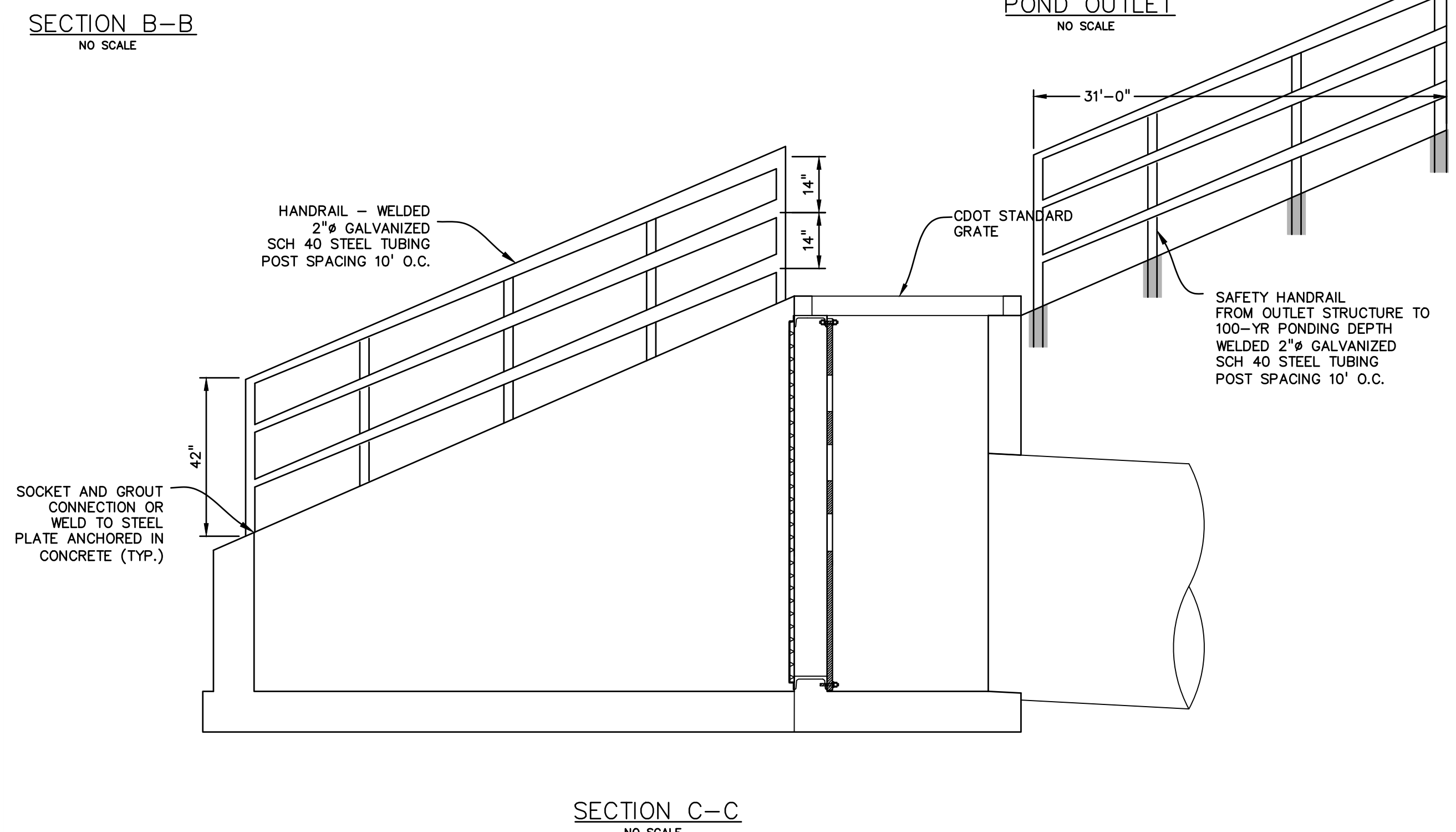
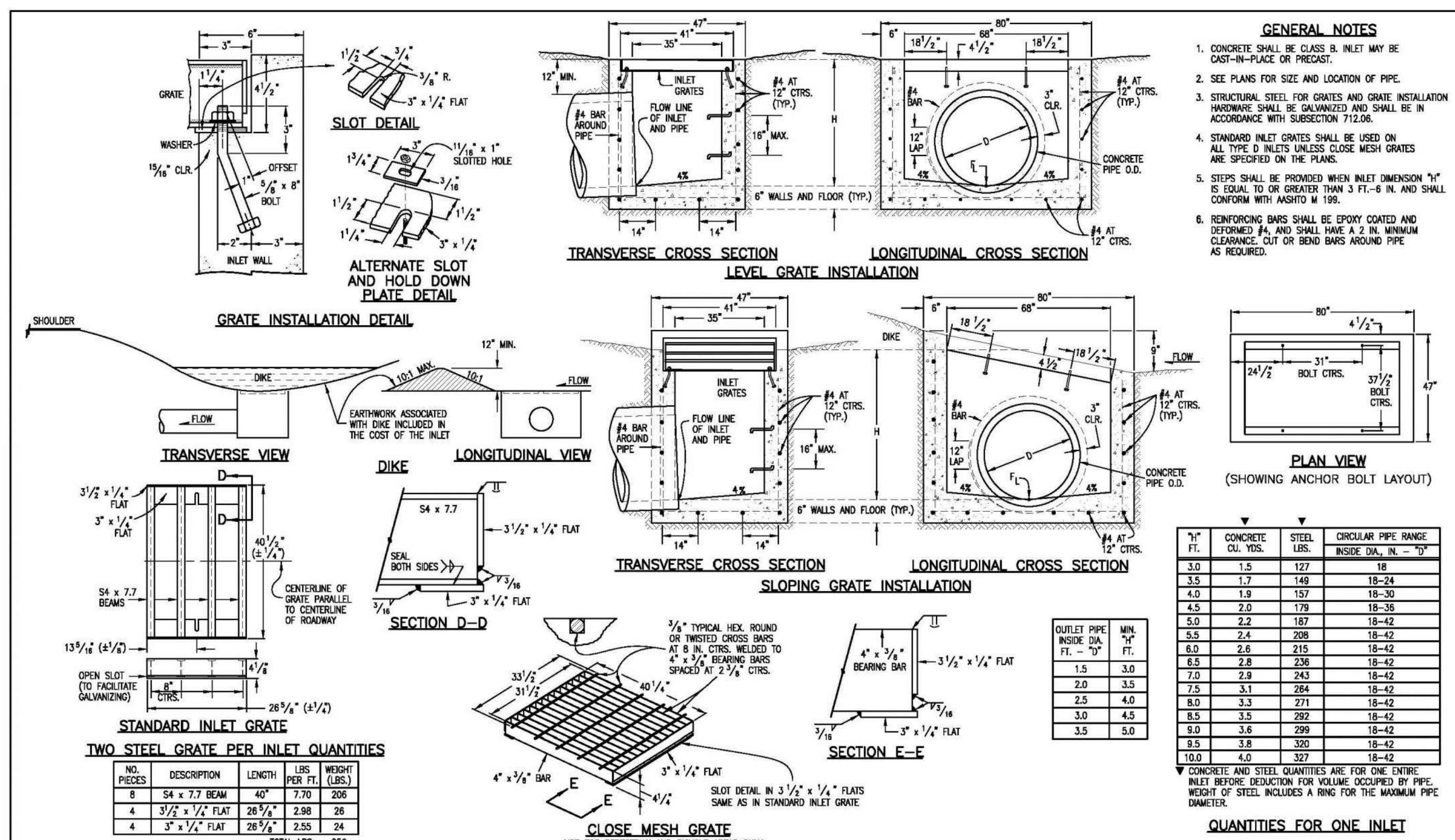
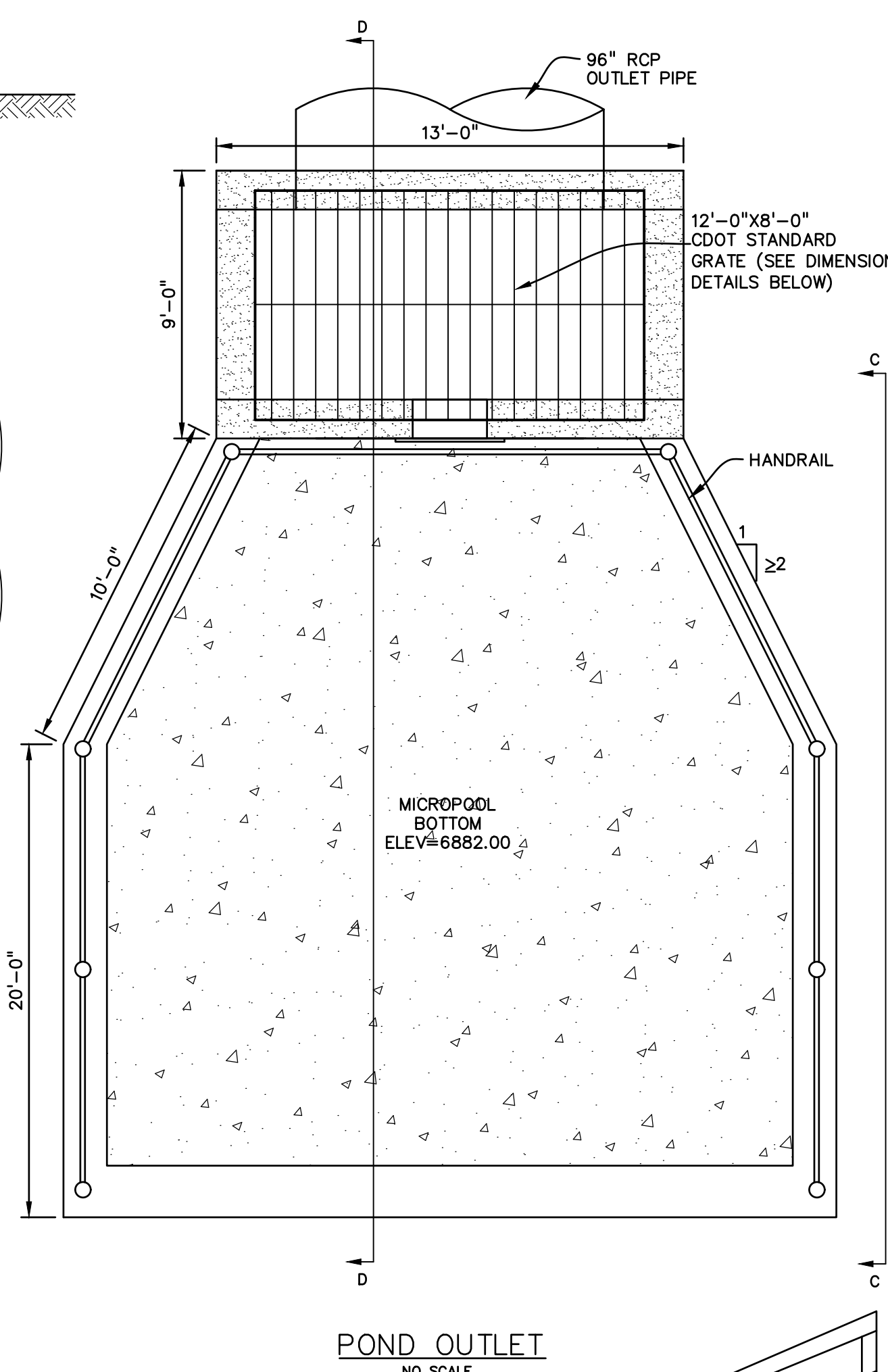
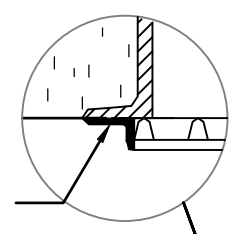
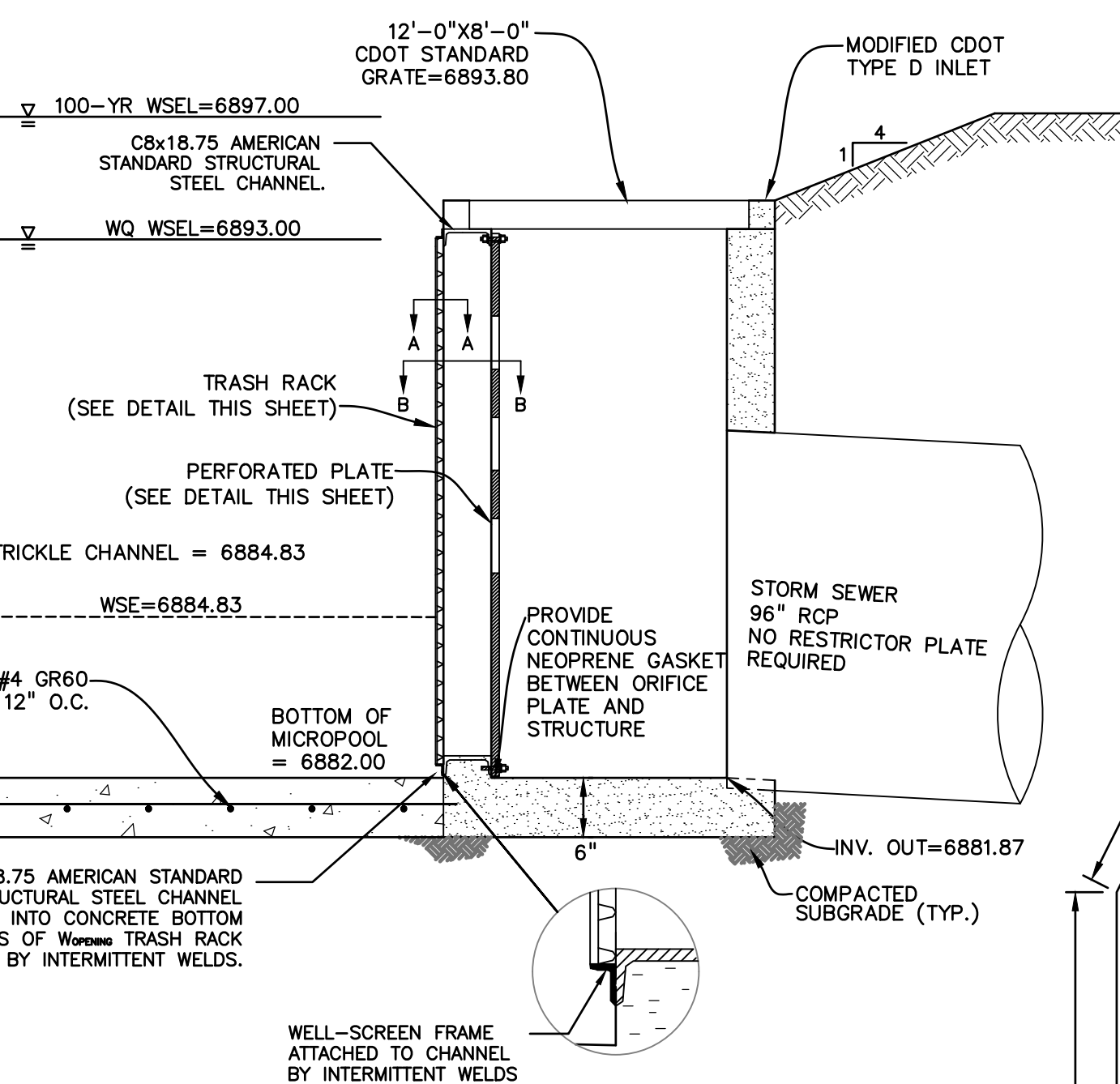


#### PERFORATED PLATE NOTES:

1. PROVIDE NEOPRENE GASKET MATERIAL OR GROUT BETWEEN THE ORIFICE PLATE AND CONCRETE.
2. BOLT PLATE TO CONCRETE @ 12" MAX. ON CENTER. ORIFICE PLATE IS TO BE REMOVABLE.
3. ALL NON STAINLESS STEEL SURFACES ARE TO BE COATED WITH ZRC COLD GALVANIZING COMPOUND.



WELL-SCREEN FRAME  
ATTACHED TO CHANNEL  
BY INTERMITTENT WELDS



Computer File Information		Sheet Revisions		Colorado Department of Transportation 4201 East Arkansas Avenue Denver, Colorado 80222 Phone: (303) 757-9083 Fax: (303) 757-1850	INLET, TYPE D STANDARD PLAN NO. M-604-11 Sheet No. 1 of 1
Creation Date: 07/04/06	Initials: SJR	Date:	Comments:		
Last Modification Date: 07/04/06	Initials: LTA				
Full Path: www.dot.state.co.us/DesignSupport/					
Drawing File Name: 6040110101.dwg					

**PREPARED BY:**

**DREXEL, BARRELL & CO.**  
Engineers • Surveyors  
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(214) 416-9820

## FALCON MARKETPLACE

OVERLOT GRADING, POND SR4 & UTILITY  
CONSTRUCTION DRAWINGS FOR  
FALCON, COLORADO

ISSUE	DATE
1ST SUBMITTAL	6-20-17
RESUBMITTAL	9-6-18
REVISED	7-24-20
DESIGNED BY:	TDM
DRAWN BY:	KGW
CHECKED BY:	TDM
FILE NAME:	

**PROFESSIONAL ENGINEER**  
33797  
8-28-20

PREPARED UNDER MY DIRECT SUPERVISION FOR AND ON BEHALF OF DREXEL, BARRELL & CO.

**DRAWING SCALE:**  
HORIZONTAL: N/A  
VERTICAL: N/A

**POND #1 (SR4) DETAILS**

PROJECT NO. 20988-00CSCV  
DRAWING NO.

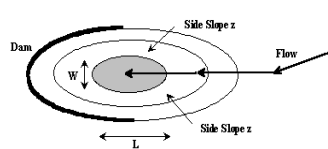
**C7.5**

SHEET: 12 OF 12

[illegible]

## STAGE-STORAGE SIZING FOR DETENTION BASINS

Basin ID: Pond WU



### Check Basin Shape

Right Triangle		OR...
Isosceles Triangle		OR...
Rectangle		OR...
Circle / Ellipse		OR...
Irregular		(Use Override values in cells G32:G52)

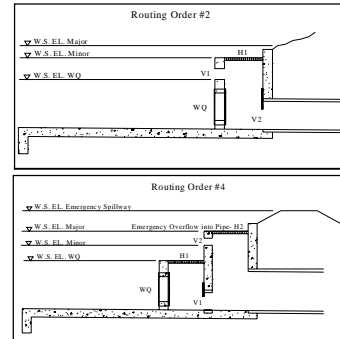
MINOR	MAJOR	
		acre-ft.
		acre-ft.
8.25	18.89	acre-ft.

[illegible]



## STAGE-DISCHARGE SIZING OF THE WEIRS AND ORIFICES (INLET CONTROL)

Basin ID:



**Design Information (Input):**

Diameter in Inches

W =	45.50				ft.
L or H =	10.50				ft.

Width in Feet  
Length (Height for Vertical)

% open =	100		100	%
$C_o$ =	0.60		0.50	
$C_w$ =	3.00			
$E_o$ =	6821.62			ft.

## Net Opening Area (after Trash Rack Reduction)

OPTIONAL: User-Override Net Opening Area

Perimeter as Weir Length

OPTIONAL: User-Override Weir Length

$L_w = 112.00$  ft.

Top Elevation of Vertical Orifice Opening, Top =	5.00	ft.
Center Elevation of Vertical Orifice Opening, Cen =	2.50	ft.

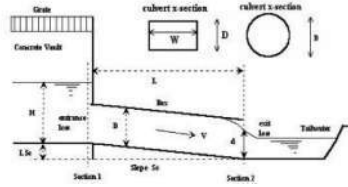
**Routing 3: Single Stage - Water flows through WQCV plate and #1 horizontal opening into #1 vertical opening. This flow will be applied to culvert sheet (#2 vertical & horizontal openings is not used).**

[illegible]

## STAGE-DISCHARGE SIZING OF THE OUTLET CULVERT (INLET vs. OUTLET CONTROL WITH TAILWATER EFFECTS)

**Basin ID: Pond WU - Exist 48" Outlet Pipe**

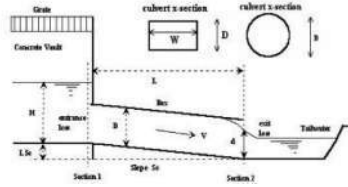
**Status:** Culvert Data is valid!



**Design Information (Input):**



**Project:** Bent Grass  
**Basin ID:** Pond WU - Exist 60" Outlet Pipe 1



**Status:** Culvert Data is valid!

**Design Information (Input):**

Circular Culvert: Barrel Diameter in Inches

Circular Culvert: Inlet Edge Type (choose from pull-down list)

OR:

Box Culvert: Barrel Height (Rise) in Feet

Box Culvert: Barrel Width (Span) in Feet

Box Culvert: Inlet Edge Type (choose from pull-down list)

Number of Barrels

### Inlet Elevation at Culvert Invert

### Outlet Elevation at Culvert Invert

Culvert Length in Feet

### Manning's Roughness

Bend Loss Coefficient

Exit Loss Coefficient

D = 60 in.

Grooved End with Headwall

Height (Rise) =  ft.

Width (Span) =  ft.

Square Edge w/ 90-15 deg. Flared Wingwall

No = 1

$$l_{\text{elev}} = 6816.75 \text{ ft. elev.}$$
$$O_{elev} = 6816.54 \text{ ft. elev.}$$

L = 82.5 ft.

$n = 0.0130$

 $K_b = 0.00$ 
$$K_x = 0.50$$

**Design Information (calculated):**

Entrance Loss Coefficient

Friction Loss Coefficient

Sum of All Loss Coefficients

Orifice Inlet Condition Coefficient

Minimum Energy Condition Coeffi

 $K_e = 0.20$ 

$K_f =$	0.30
---------	------

$K_3 =$	1.00
---------	------

$C_d =$	0.99
---------	------

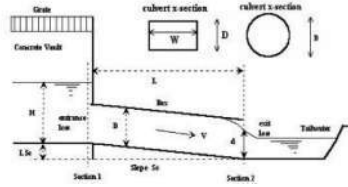
KE <sub>low</sub> =	0.00
---------------------	------

\_\_\_\_\_

**Calculations of Culvert Capacity (output):**

[illegible]

**Project:** Bent Grass  
**Basin ID:** Pond WU - Exist 60" Outlet Pipe 2



**Status:** Culvert Data is valid!

**Design Information (Input):**

Circular Culvert: Barrel Diameter (inches)  
Circular Culvert: Inlet Edge Type (choose from pull-down list)

**OR:**

Box Culvert: Barrel Height (Rise) in Feet  
Box Culvert: Barrel Width (Span) in Feet  
Box Culvert: Inlet Edge Type (choose from pull-down list)

D =	60	in
Grooved End with Headwall		

Height (Rise) =		ft
Width (Span) =		ft
Square Edge w/ 90-15 deg. Flared Wingwall		

Number of Barrels  
Inlet Elevation at Culvert Invert  
Outlet Elevation at Culvert Invert  
Culvert Length in Feet  
Manning's Roughness  
Bend Loss Coefficient  
Exit Loss Coefficient

No =	1	
$I_{elev}$ =	6816.11	ft. elev.
$O_{elev}$ =	6816.10	ft. elev.
L =	82.5	ft.
n =	0.0130	
$K_b$ =	0.00	
$K_x$ =	0.50	

**Design Information (calculated):**

Entrance Loss Coefficient  
Friction Loss Coefficient  
Sum of All Loss Coefficients  
Orifice Inlet Condition Coefficient  
Minimum Energy Condition Coefficient

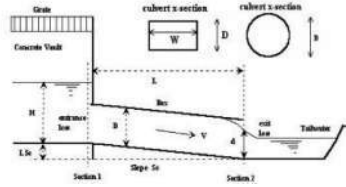
$K_e =$	0.20
$K_f =$	0.30
$K_s =$	1.00
$C_d =$	0.99
$KE_{low} =$	0.01

**Calculations of Culvert Capacity (output):**

[illegible]

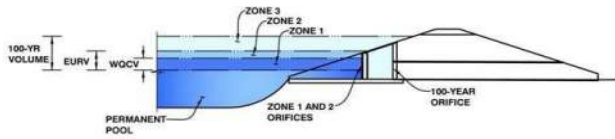


**Project:** Bent Grass  
**Basin ID:** Pond WU - Exist 60" Outlet Pipe 3

[illegible]



## UD-Detention, Version 3.07 (February 2017)



ED9
2291.20
27,984
0.020
7.33%
100.0%
0.0%
0.0%
40.0

F

V

Optional User Override  
1-hr Precipitation

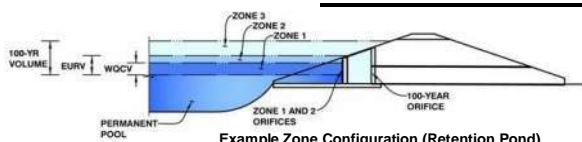

[illegible]

## Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)

Project: Challenger Homes

Basin ID: Channel and Pre-Pond Area



Example Zone Configuration (Retention Pond)

	Stage (ft)	Zone Volume (ac-ft)	Outlet Type
Zone 1 (WOCV)		9.764	Orifice Plate
Zone 2			
Zone 3			
		9.764	Total

User Input: Orifice at Underdrain Outlet (typically used to drain WOCV 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<sup>2</sup>  
Underdrain Orifice Centroid =  feet

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

Calculated Parameters for Plate

Invert of Lowest Orifice =  ft (relative to basin bottom at Stage = 0 ft)  
Depth at top of Zone using Orifice Plate =  ft (relative to basin bottom at Stage = 0 ft)  
Orifice Plate: Orifice Vertical Spacing =  inches  
Orifice Plate: Orifice Area per Row =  sq. inches (use rectangular openings)

WQ Orifice Area per Row =  ft<sup>2</sup>  
Elliptical Half-Width =   
Elliptical Slot Centroid =   
Elliptical Slot Area =

Yes-but this and previous sheet have been removed as basin area and WQ sizing have been accounted for on "Stage-Discharge Sizing of WQCV" & "Stage-Storage Sizing for Detention Basin" sheets.

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)
Stage of Orifice Centroid (ft)	0.00	1.00	2.00	3.00	4.00	5.00	
Orifice Area (sq. inches)	15.87	15.87	15.87	15.87	15.87	15.87	

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

User Input: Vertical Orifice (Circular or Rectangular)

Calculated Parameters for Vert

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

Vertical Orifice Area =  ft<sup>2</sup>  
Vertical Orifice Centroid =  feet

User Input: Overflow Weir (Dropbox) and Grate (Flat or Sloped)

Calculated Parameters for Overflow Weir

Overflow Weir Front Edge Height, H<sub>o</sub> =  ft (relative to basin bottom at Stage = 0 ft)  
Overflow Weir Front Edge Length =  feet  
Overflow Weir Slope =  H:V (enter zero for flat grate)  
Horiz. Length of Weir Sides =  feet  
Overflow Grate Open Area % =  % grate open area/total area  
Debris Clogging % =  %

Height of Grate Upper Edge, H<sub>1</sub> =  feet  
Over Flow Weir Slope Length =  feet  
Grate Open Area / 100-yr Orifice Area =  should be ≥ 4  
Overflow Grate Open Area w/o Debris =  ft<sup>2</sup>  
Overflow Grate Open Area w/ Debris =  ft<sup>2</sup>

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

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

Depth to Invert of Outlet Pipe =  ft (distance below basin bottom at Stage = 0 ft)  
Circular Orifice Diameter =  inches

Outlet Orifice Area =  ft<sup>2</sup>  
Outlet Orifice Centroid =  feet  
Half-Central Angle of Restrictor Plate on Pipe =  radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Calculated Parameters for Spillway

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

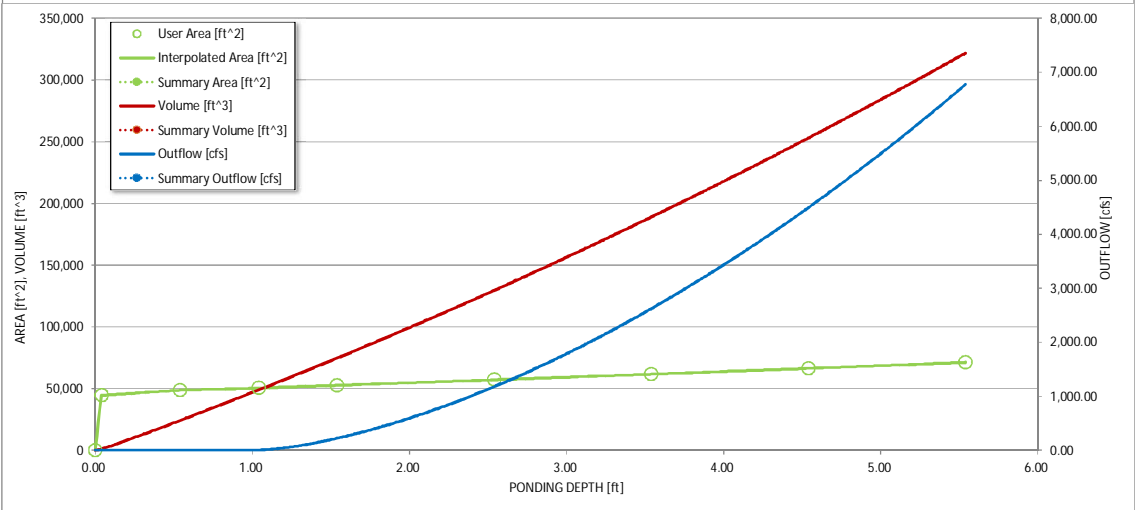
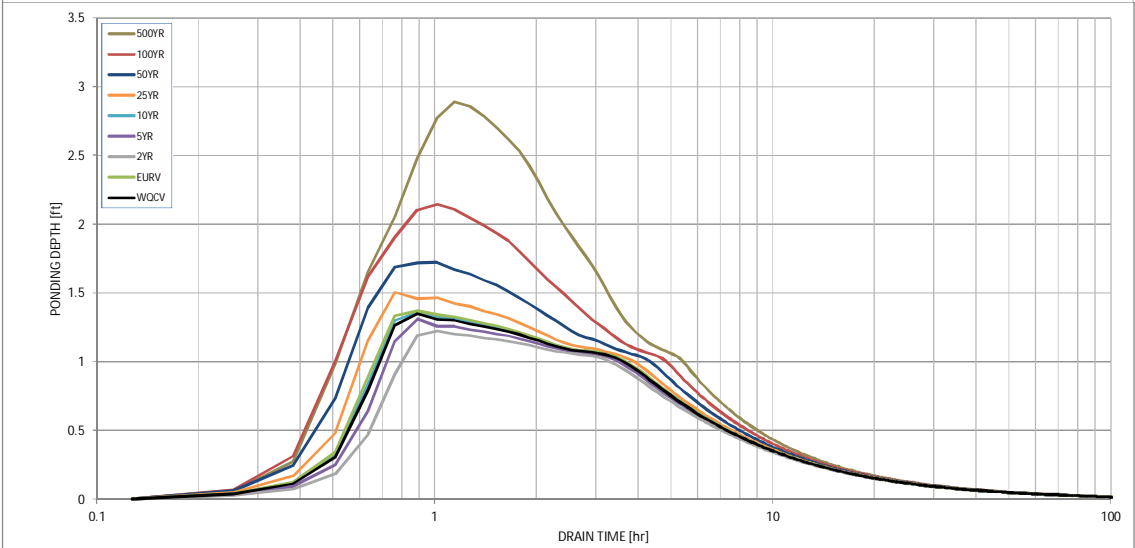
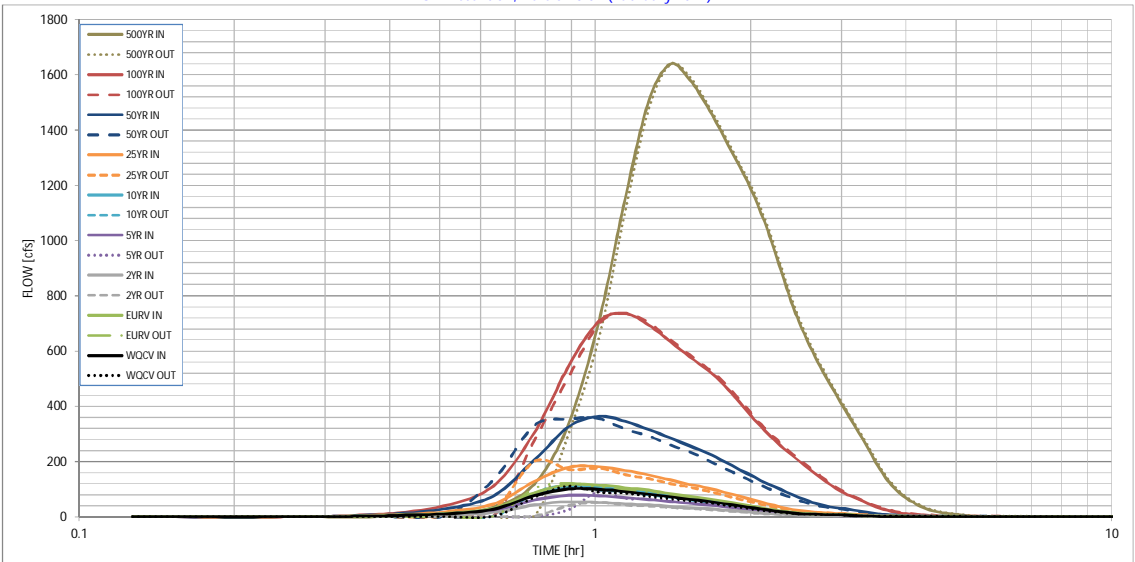
Spillway Design Flow Depth =  feet  
Stage at Top of Freeboard =  feet  
Basin Area at Top of Freeboard =  acres

### Routed Hydrograph Results

	WOCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
Design Storm Return Period =	0.53	1.07	0.84	1.12	1.36	1.72	2.01	2.31	3.07
One-Hour Rainfall Depth (in) =	9.764	11.312	5.157	7.503	10.464	17.753	37.566	82.799	201.813
Calculated Runoff Volume (acre-ft) =									
OPTIONAL Override Runoff Volume (acre-ft) =									
Inflow Hydrograph Volume (acre-ft) =	9.756	11.304	5.148	7.496	10.451	17.740	37.540	82.749	201.703
Predevelopment Unit Peak Flow, q (cfs/acre) =	0.00	0.00	0.00	0.00	0.01	0.01	0.11	0.27	0.68
Predevelopment Peak Q (cfs) =	0.0	0.0	0.7	5.4	13.0	32.3	249.1	626.2	1569.1
Peak Inflow Q (cfs) =	101.5	117.0	54.5	78.6	108.5	181.6	364.4	736.9	1639.4
Peak Outflow Q (cfs) =	111.1	121.5	52.7	92.0	116.0	201.0	355.9	736.7	1638.2
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	17.1	8.9	6.2	1.4	1.2	1.0
Structure Controlling Flow =	Spillway	Spillway	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) =	12	10	18	14	11	7	4	1	1
Time to Drain 99% of Inflow Volume (hours) =	25	23	37	30	24	17	10	6	3
Maximum Ponding Depth (ft) =	1.35	1.37	1.22	1.31	1.36	1.50	1.72	2.14	2.89
Area at Maximum Ponding Depth (acres) =	1.19	1.19	1.18	1.19	1.19	1.20	1.23	1.27	1.35
Maximum Volume Stored (acre-ft) =	1.489	1.500	1.335	1.441	1.489	1.668	1.936	2.460	3.441

# Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)

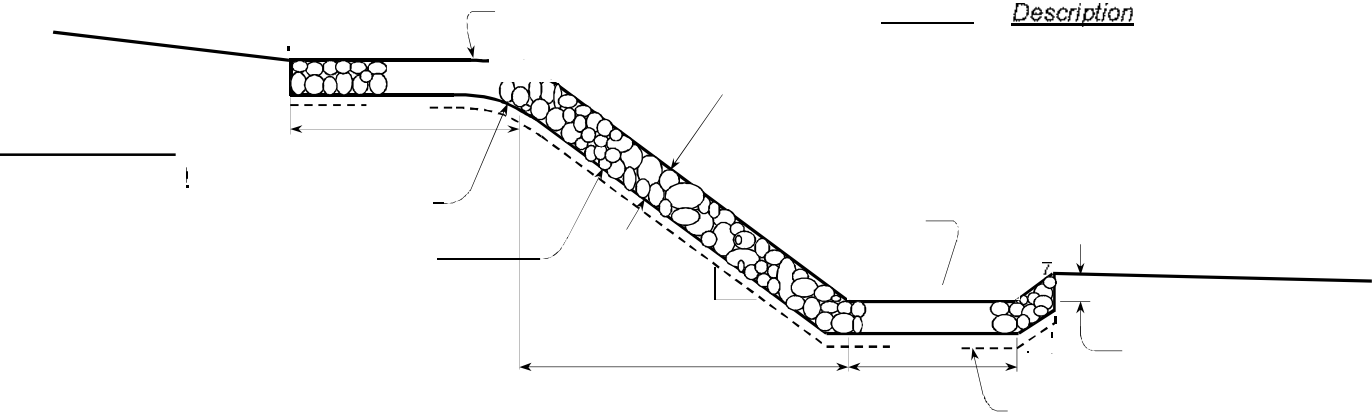
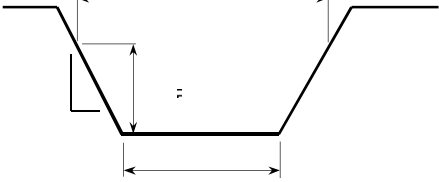
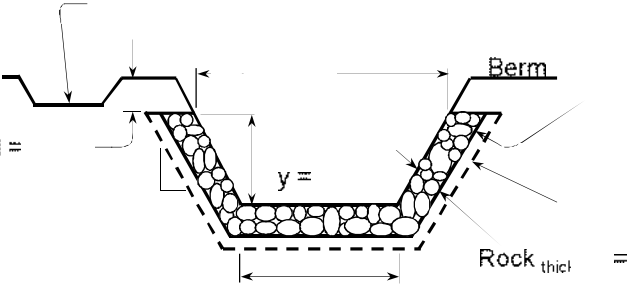
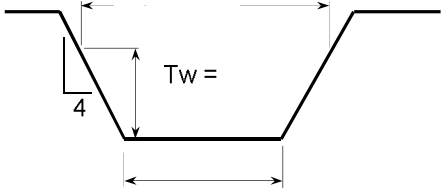


S-A-V-D Chart Axis Override	X-axis	Left Y-Axis	Right Y-Axis
minimum bound			
maximum bound			



Pond WU inflow structure?

Yes - Label added in project title in title block bottom right corner

<u>Design Values</u>	<u>Rock Gradation Envelope</u>	<u>Quantities</u>						
<u>Angular</u>	<div data-bbox="519 252 961 411"> <div></div> <div></div> <div></div> <div></div> <div></div> </div>	<u>Description</u>						
								
	Freeboard =							
	<table border="1"> <tr> <td colspan="2"></td> </tr> <tr> <td colspan="2"></td> </tr> <tr> <td> <div data-bbox="906 1696 1117 1873"> <div></div> <div></div> <div></div> <div></div> </div> </td> <td> <div data-bbox="1136 1717 1516 1747">Title:</div> <div data-bbox="1136 1747 1516 1789"></div> <div data-bbox="1136 1789 1516 1831"></div> <div data-bbox="1136 1831 1516 1873"></div> </td> </tr> </table>						<div data-bbox="906 1696 1117 1873"> <div></div> <div></div> <div></div> <div></div> </div>	<div data-bbox="1136 1717 1516 1747">Title:</div> <div data-bbox="1136 1747 1516 1789"></div> <div data-bbox="1136 1789 1516 1831"></div> <div data-bbox="1136 1831 1516 1873"></div>
<div data-bbox="906 1696 1117 1873"> <div></div> <div></div> <div></div> <div></div> </div>	<div data-bbox="1136 1717 1516 1747">Title:</div> <div data-bbox="1136 1747 1516 1789"></div> <div data-bbox="1136 1789 1516 1831"></div> <div data-bbox="1136 1831 1516 1873"></div>							

## **Future HMS Model**



FUTURE 100-YEAR STORM

Hydrologic Element	Drainage Area (MI <sup>2</sup> )	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
WT020	0.0671383	41.9	01Jan2011, 06:21	4.8
JWT020	0.0671383	41.9	01Jan2011, 06:21	4.8
RWT030	0.0671383	41.9	01Jan2011, 06:29	4.8
WT030	0.0764732	75.3	01Jan2011, 06:07	5.5
JWT030	0.1436115	85.4	01Jan2011, 06:09	10.3
RWT042	0.1436115	85.3	01Jan2011, 06:15	10.3
WT010	0.1353300	88.9	01Jan2011, 06:17	9.3
JWT010	0.1353300	88.9	01Jan2011, 06:17	9.3
RWT044	0.1353300	88.8	01Jan2011, 06:24	9.3
JWT042	0.2789415	167.0	01Jan2011, 06:21	19.6
RWT046	0.2789415	166.7	01Jan2011, 06:28	19.6
WT040	0.1850600	92.7	01Jan2011, 06:28	12.8
JWT044	0.4640015	259.4	01Jan2011, 06:28	32.4
RWT054	0.4640015	258.8	01Jan2011, 06:35	32.3
WT060	0.1956300	116.8	01Jan2011, 06:26	15.1
WT050	0.1899300	139.4	01Jan2011, 06:19	15.3
JWT050	0.8495615	475.4	01Jan2011, 06:31	62.7
RWT092	0.8495615	475.2	01Jan2011, 06:32	62.7
WT070	0.1711000	133.9	01Jan2011, 06:12	11.8
JWT070	0.1711000	133.9	01Jan2011, 06:12	11.8
RWT080	0.1711000	133.4	01Jan2011, 06:22	11.8
WT080	0.0691596	67.3	01Jan2011, 06:10	5.6
Sub Regional Pond SR1	1.0898211	513.2	01Jan2011, 06:40	78.4
JWT080	1.0898211	513.2	01Jan2011, 06:40	78.4
RWT094	1.0898211	512.4	01Jan2011, 06:45	78.3
WT100-REV	0.1292700	203.0	01Jan2011, 06:04	12.9
W26-REV	0.0720000	103.6	01Jan2011, 06:03	6.4
WS3-1	0.0720000	102.8	01Jan2011, 06:10	6.4
Paint Brush Hills Pond C	0.2012700	64.4	01Jan2011, 06:26	19.2
WT090	0.1533300	162.4	01Jan2011, 06:09	12.8
JWT090	1.4444211	595.9	01Jan2011, 06:44	110.2
RWT122	1.4444211	595.5	01Jan2011, 06:45	110.2
WT110	0.1942800	169.9	01Jan2011, 06:14	16.2
JWT110	1.6387011	651.0	01Jan2011, 06:43	126.4
RWT124	1.6387011	650.8	01Jan2011, 06:47	126.3
WT130-REV	0.1016250	130.0	01Jan2011, 06:11	10.9
Paint Brush Hills Pond A	0.1016250	53.8	01Jan2011, 06:32	10.9
WT120-REV	0.0430300	51.1	01Jan2011, 06:08	3.8

# FUTURE 100-YEAR STORM

Hydrologic Element	Drainage Area (MI <sup>2</sup> )	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
JWT120	1.7833561	703.6	01Jan2011, 06:46	140.9
RWT172	1.7833561	702.5	01Jan2011, 06:58	140.5
WT140-REV	0.1445300	194.2	01Jan2011, 06:12	16.8
JWT140	0.1445300	194.2	01Jan2011, 06:12	16.8
RWT150	0.1445300	193.3	01Jan2011, 06:22	16.8
WT150-REV	0.1308100	202.5	01Jan2011, 06:08	15.0
Paint Brush Hills Pond...	0.2753400	235.6	01Jan2011, 06:29	31.8
W34B2-REV	0.0935900	141.8	01Jan2011, 06:07	10.2
Paint Brush Hills Pond...	0.3689300	234.3	01Jan2011, 06:43	38.9
JWT150	0.3689300	234.3	01Jan2011, 06:43	38.9
RWT160	0.3689300	234.2	01Jan2011, 06:49	38.8
WT160-REV	0.0734800	109.9	01Jan2011, 06:06	7.5
JWT160	0.4424100	244.8	01Jan2011, 06:48	46.3
RWT174	0.4424100	244.7	01Jan2011, 06:56	46.2
WT170-REV	0.1060150	85.2	01Jan2011, 06:19	9.2
W34-CY-REV	0.0465469	38.1	01Jan2011, 06:16	3.8
JWT172	2.3783280	981.9	01Jan2011, 06:56	199.7
RWT176	2.3783280	981.6	01Jan2011, 06:57	199.7
Sub Regional Pond SR2	2.3783280	972.9	01Jan2011, 07:01	194.8
JWT174	2.3783280	972.9	01Jan2011, 07:01	194.8
RWT180	2.3783280	972.1	01Jan2011, 07:10	194.2
WT180-REV	0.0409400	29.3	01Jan2011, 06:19	3.2
JWT180	2.4192680	978.0	01Jan2011, 07:10	197.4
RWT202	2.4192680	977.3	01Jan2011, 07:21	196.8
WT200	0.3017100	186.8	01Jan2011, 06:30	26.0
WT190	0.0574561	74.7	01Jan2011, 06:05	5.0
The Meadows Pond #1	0.0574561	2.1	01Jan2011, 08:29	2.8
JWT190	0.0574561	2.1	01Jan2011, 08:29	2.8
RWT204	0.0574561	2.1	01Jan2011, 08:55	2.7
JWT200	2.7784341	1041.0	01Jan2011, 07:19	225.5
RWT210	2.7784341	1040.5	01Jan2011, 07:24	225.1
WT210	0.2654600	187.9	01Jan2011, 06:35	28.0
JWT210	3.0438941	1113.0	01Jan2011, 07:23	253.1
RWT232	3.0438941	1112.6	01Jan2011, 07:27	252.7
WT220	0.1895300	250.4	01Jan2011, 06:12	21.3
JWT220	0.1895300	250.4	01Jan2011, 06:12	21.3
RWT234	0.1895300	249.6	01Jan2011, 06:20	21.3
JWT232	3.2334241	1138.4	01Jan2011, 07:26	274.0

No difference between this and "current" values?

FUTURE 100-YEAR STORM

Hydrologic Element	Drainage Area (MI <sup>2</sup> )	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
RWT236	3.2334241	1138.3	01Jan2011, 07:26	274.0
WT230	0.1981800	346.7	01Jan2011, 06:05	23.1
JWT234	3.4316041	1155.6	01Jan2011, 07:26	297.0
RWT240	3.4316041	1155.0	01Jan2011, 07:29	296.8
WT240	0.0761461	160.3	01Jan2011, 06:01	9.1
Regional Pond WU No...	3.5077502	1160.9	01Jan2011, 07:30	304.7
Regional Pond WU Di...	3.5077502	1122.2	01Jan2011, 07:30	261.4
Old Meridian	0.0335900	85.0	01Jan2011, 06:07	6.1
RWT-OM	0.0335900	84.2	01Jan2011, 06:12	6.1
Regional Pond WU So...	3.5413402	925.0	01Jan2011, 07:53	260.3
RWT240_Diversion R...	0.0000000	38.8	01Jan2011, 07:35	43.1
JWT240	3.5413402	963.5	01Jan2011, 07:53	303.4
RWT250	3.5413402	963.3	01Jan2011, 07:53	303.3
WT250	0.1469500	291.4	01Jan2011, 06:02	17.1
JWT250	3.6882902	975.6	01Jan2011, 07:53	320.5
RWT260	3.6882902	975.1	01Jan2011, 08:04	319.5
WT260	0.1388002	77.5	01Jan2011, 06:34	11.5
JWT260	3.8270904	988.4	01Jan2011, 08:03	331.0
RWT291	3.8270904	988.3	01Jan2011, 08:05	330.8
WT270	0.0324738	57.1	01Jan2011, 06:04	3.6
JWT270	0.0324738	57.1	01Jan2011, 06:04	3.6
RWT292	0.0324738	56.9	01Jan2011, 06:08	3.5
JWT292	3.8595642	990.9	01Jan2011, 08:05	334.3
RWT295	3.8595642	990.8	01Jan2011, 08:07	334.2
WT280	0.2669500	251.8	01Jan2011, 06:12	22.3
JWT280	0.2669500	251.8	01Jan2011, 06:12	22.3
RWT294	0.2669500	251.2	01Jan2011, 06:15	22.2
JWT294	4.1265142	1008.6	01Jan2011, 08:06	356.4
RWT296	4.1265142	1008.1	01Jan2011, 08:12	355.7
MT040	0.3084200	455.2	01Jan2011, 06:11	38.1
MT030	0.1566300	228.6	01Jan2011, 06:05	15.1
MT020	0.0902033	143.1	01Jan2011, 06:04	9.0
JMT020	0.0902033	143.1	01Jan2011, 06:04	9.0
RMT030	0.0902033	141.8	01Jan2011, 06:17	8.9
JMT030	0.2468333	294.4	01Jan2011, 06:07	24.0
RMT040	0.2468333	293.0	01Jan2011, 06:11	24.0
Woodmen Hills Pond H	0.5552533	751.7	01Jan2011, 06:11	61.7
JMT040	0.5552533	751.7	01Jan2011, 06:11	61.7

FUTURE 100-YEAR STORM

Hydrologic Element	Drainage Area (MI <sup>2</sup> )	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
RMT050	0.5552533	745.8	01Jan2011, 06:14	61.7
MT010	0.2898900	139.9	01Jan2011, 06:24	17.7
The Meadows Pond #2	0.2898900	63.5	01Jan2011, 06:55	14.1
JMT010	0.2898900	63.5	01Jan2011, 06:55	14.1
RMT062	0.2898900	63.4	01Jan2011, 07:07	14.1
MT060a	0.0311000	48.5	01Jan2011, 06:03	2.9
School Site	0.3209900	16.4	01Jan2011, 09:09	12.2
JMT060a	0.3209900	16.4	01Jan2011, 09:09	12.2
RMT060a	0.3209900	16.4	01Jan2011, 09:16	12.1
MT050	0.1186100	109.7	01Jan2011, 06:18	11.4
JMT050	0.9948533	852.6	01Jan2011, 06:14	85.2
RMT064	0.9948533	847.9	01Jan2011, 06:21	85.1
MT060	0.1588000	196.8	01Jan2011, 06:08	14.7
Sub Regional Pond SR4	1.1536533	607.7	01Jan2011, 06:38	85.3
JMT060	1.1536533	607.7	01Jan2011, 06:38	85.3
RMT070	1.1536533	604.8	01Jan2011, 06:44	85.1
MT070	0.1994800	170.2	01Jan2011, 06:22	19.6
JMT070	1.3531333	710.9	01Jan2011, 06:42	104.7
RMT080	1.3531333	709.9	01Jan2011, 06:44	104.7
MT080	0.0638371	191.9	01Jan2011, 06:00	11.0
Regional Pond MN	1.4169704	686.6	01Jan2011, 06:49	113.2
JMT080	1.4169704	686.6	01Jan2011, 06:49	113.2
RMT102	1.4169704	683.7	01Jan2011, 06:56	112.9
MT090	0.0435103	127.4	01Jan2011, 06:00	7.1
Woodmen Hills Pond #5	0.0435103	18.6	01Jan2011, 06:07	5.9
JMT090	0.0435103	18.6	01Jan2011, 06:07	5.9
RMT090	0.0435103	18.6	01Jan2011, 06:08	5.9
JMT104	0.0435103	18.6	01Jan2011, 06:08	5.9
RMT104	0.0435103	18.6	01Jan2011, 06:12	5.9
JMT102	1.4604807	698.8	01Jan2011, 06:56	118.8
RMT106	1.4604807	693.3	01Jan2011, 06:58	118.7
MT100	0.0557682	88.2	01Jan2011, 06:05	5.9
JMT106	1.5162489	700.0	01Jan2011, 06:58	124.6
RMT112	1.5162489	696.5	01Jan2011, 07:10	123.9
MT110	0.1163900	117.4	01Jan2011, 06:16	11.5
JMT110	1.6326389	715.5	01Jan2011, 07:10	135.4
RMT114	1.6326389	714.4	01Jan2011, 07:15	135.1
WT290	0.1037800	110.3	01Jan2011, 06:09	8.7

FUTURE 100-YEAR STORM

Hydrologic Element	Drainage Area (MI <sup>2</sup> )	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
Regional Pond R1	5.8629331	1335.0	01Jan2011, 07:21	492.0
JWT296	5.8629331	1335.0	01Jan2011, 07:21	492.0
RWT314	5.8629331	1334.1	01Jan2011, 07:27	491.1
WT300	0.0970199	91.6	01Jan2011, 06:12	8.1
JWT300	0.0970199	91.6	01Jan2011, 06:12	8.1
RWT312	0.0970199	91.1	01Jan2011, 06:29	8.1
WT310	0.2774200	246.7	01Jan2011, 06:13	22.3
JWT310	6.2373730	1368.5	01Jan2011, 07:27	521.5
RWT320	6.2373730	1366.0	01Jan2011, 07:33	520.5
WT320	0.2061400	200.6	01Jan2011, 06:11	17.2
JWT320	6.4435130	1380.9	01Jan2011, 07:33	537.7
RWT352	6.4435130	1378.0	01Jan2011, 07:43	536.5
ET020	0.2131700	360.5	01Jan2011, 06:06	24.8
ET010	0.1451300	198.3	01Jan2011, 06:11	16.4
Paint Brush Hills Pond...	0.1451300	150.9	01Jan2011, 06:20	16.3
JET010	0.1451300	150.9	01Jan2011, 06:20	16.3
RET020	0.1451300	150.0	01Jan2011, 06:37	16.3
Sub Regional Pond SR6	0.3583000	195.4	01Jan2011, 06:41	37.9
JET020	0.3583000	195.4	01Jan2011, 06:41	37.9
RET030	0.3583000	194.9	01Jan2011, 07:02	37.5
ET030	0.2042800	242.0	01Jan2011, 06:15	23.0
JET030	0.5625800	266.0	01Jan2011, 06:43	60.5
RET040	0.5625800	265.2	01Jan2011, 06:50	60.3
Woodmen Hills Pond ...	0.7117200	263.5	01Jan2011, 07:09	75.5
ET040	0.1491400	165.7	01Jan2011, 06:14	15.3
Woodmen Hills Pond ...	0.7117200	261.1	01Jan2011, 07:18	69.5
JET040	0.7117200	261.1	01Jan2011, 07:18	69.5
RET050	0.7117200	261.1	01Jan2011, 07:23	69.4
ET050	0.1171900	197.1	01Jan2011, 06:03	11.6
Woodmen Hills Pond #2	0.8289100	250.3	01Jan2011, 07:46	79.3
JET050	0.8289100	250.3	01Jan2011, 07:46	79.3
RET060	0.8289100	250.3	01Jan2011, 07:53	79.1
ET060	0.2854300	529.3	01Jan2011, 06:01	29.3
Woodmen Hills Pond #3	1.1143400	360.9	01Jan2011, 06:06	105.9
JET060	1.1143400	360.9	01Jan2011, 06:06	105.9
RET070	1.1143400	356.7	01Jan2011, 06:16	105.6
ET070	0.2497500	461.0	01Jan2011, 06:02	27.3
JET070	1.3640900	636.4	01Jan2011, 06:04	132.9

FUTURE 100-YEAR STORM

Hydrologic Element	Drainage Area (MI <sup>2</sup> )	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
RET080	1.3640900	517.5	01Jan2011, 06:23	131.3
ET080	0.2916400	517.9	01Jan2011, 06:07	37.1
Woodmen Hills Pond #4	1.6557300	288.0	01Jan2011, 07:00	139.2
JET080	1.6557300	288.0	01Jan2011, 07:00	139.2
RET090	1.6557300	287.3	01Jan2011, 07:03	139.0
ET090	0.1242400	133.0	01Jan2011, 06:22	14.9
JET090	1.7799700	330.8	01Jan2011, 06:59	153.9
RET100	1.7799700	330.7	01Jan2011, 07:01	153.8
ET100	0.0480615	72.0	01Jan2011, 06:02	4.0
JET100	1.8280315	335.4	01Jan2011, 07:01	157.8
RET110	1.8280315	335.2	01Jan2011, 07:05	157.6
ET110	0.2260300	198.8	01Jan2011, 06:12	17.5
JET110	2.0540615	362.1	01Jan2011, 07:03	175.1
RET120	2.0540615	361.3	01Jan2011, 07:09	174.7
ET120	0.1091300	89.4	01Jan2011, 06:14	8.5
JET120	2.1631915	403.2	01Jan2011, 06:17	183.2
RET152	2.1631915	402.2	01Jan2011, 06:24	182.9
ET130	0.1348100	85.4	01Jan2011, 06:27	11.2
JET130	0.1348100	85.4	01Jan2011, 06:27	11.2
RET140	0.1348100	84.7	01Jan2011, 06:54	11.1
ET140	0.2675900	122.8	01Jan2011, 06:46	22.2
JET140	0.4024000	204.8	01Jan2011, 06:51	33.3
RET154	0.4024000	204.4	01Jan2011, 07:05	33.2
JET152	2.5655915	572.3	01Jan2011, 07:10	216.1
RET156	2.5655915	572.0	01Jan2011, 07:14	215.8
ET150	0.1777300	136.2	01Jan2011, 06:18	14.3
JET154	2.7433215	595.8	01Jan2011, 07:12	230.1
RET162	2.7433215	595.1	01Jan2011, 07:25	228.9
ET160	0.1889200	137.2	01Jan2011, 06:23	16.3
JET160	2.9322415	633.6	01Jan2011, 06:38	245.2
RET164	2.9322415	629.0	01Jan2011, 06:47	244.7
WT350	0.3037700	276.7	01Jan2011, 06:14	26.3
JWT352	9.6795245	2004.4	01Jan2011, 07:40	807.5
RWT354	9.6795245	2004.3	01Jan2011, 07:40	807.5
WT330	0.3266800	249.3	01Jan2011, 06:19	27.2
JWT330	0.3266800	249.3	01Jan2011, 06:19	27.2
RWT344	0.3266800	248.4	01Jan2011, 06:25	27.2
WT340	0.2780000	147.3	01Jan2011, 06:37	23.1

FUTURE 100-YEAR STORM

Hydrologic Element	Drainage Area (MI <sup>2</sup> )	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
JWT354	10.2842045	2080.2	01Jan2011, 07:39	857.8
RWT372	10.2842045	2077.7	01Jan2011, 07:45	856.7
WT360	0.0656830	54.8	01Jan2011, 06:15	5.3
JWT360	0.0656830	54.8	01Jan2011, 06:15	5.3
RWT374	0.0656830	54.6	01Jan2011, 06:24	5.3
Regional Pond R2	10.3498875	2080.9	01Jan2011, 07:47	858.6
JWT372	10.3498875	2080.9	01Jan2011, 07:47	858.6
RWT376	10.3498875	2075.5	01Jan2011, 07:57	856.1
WT370	0.2147600	123.3	01Jan2011, 06:12	11.5
JWT374_OUTLET	10.5646475	2085.6	01Jan2011, 07:57	867.6
FS010	0.1220000	74.9	01Jan2011, 06:16	7.7
JFS010_OUTLET	0.1220000	74.9	01Jan2011, 06:16	7.7

Project: Aug15\_Working\_Falcon\_DBPS\_S  
Simulation Run: FU 100-yr Reservoir: School Site

Start of Run:	01Jan2011, 00:00	Basin Model:	Falcon_DBPS_Future
End of Run:	02Jan2011, 00:00	Meteorologic Model:	100-yr
Compute Time:	29Apr2021, 19:59:08	Control Specifications:	24-hr Storm

Volume Units: AC-FT

#### Computed Results

Peak Inflow :	66.4 (CFS)	Date/Time of Peak Inflow :	01Jan2011, 07:05
Peak Outflow :	16.4 (CFS)	Date/Time of Peak Outflow :	01Jan2011, 09:09
Total Inflow :	17.0 (AC-FT)	Peak Storage :	7.9 (AC-FT)
Total Outflow :	12.2 (AC-FT)	Peak Elevation :	6957.0 (FT)



Project: Aug15\_Working\_Falcon\_DBPS\_S  
Simulation Run: FU 100-yr Reservoir: Sub Regional Pond SR4

Start of Run:	01Jan2011, 00:00	Basin Model:	Falcon_DBPS_Future
End of Run:	02Jan2011, 00:00	Meteorologic Model:	100-yr
Compute Time:	29Apr2021, 19:59:08	Control Specifications:	24-hr Storm

Volume Units: AC-FT

#### Computed Results

Peak Inflow :	952.1 (CFS)	Date/Time of Peak Inflow :	01Jan2011, 06:20
Peak Outflow :	607.7 (CFS)	Date/Time of Peak Outflow :	01Jan2011, 06:38
Total Inflow :	99.8 (AC-FT)	Peak Storage :	26.2 (AC-FT)
Total Outflow :	85.3 (AC-FT)	Peak Elevation :	6896.9 (FT)

Project: Aug15\_Working\_Falcon\_DBPS\_S  
Simulation Run: FU 100-yr Reservoir: Regional Pond MN

Start of Run:	01Jan2011, 00:00	Basin Model:	Falcon_DBPS_Future
End of Run:	02Jan2011, 00:00	Meteorologic Model:	100-yr
Compute Time:	29Apr2021, 19:59:08	Control Specifications:	24-hr Storm

Volume Units: AC-FT

#### Computed Results

Peak Inflow :	720.0 (CFS)	Date/Time of Peak Inflow :	01Jan2011, 06:44
Peak Outflow :	686.6 (CFS)	Date/Time of Peak Outflow :	01Jan2011, 06:49
Total Inflow :	115.7 (AC-FT)	Peak Storage :	6.7 (AC-FT)
Total Outflow :	113.2 (AC-FT)	Peak Elevation :	6853.6 (FT)

FUTURE 5-YEAR STORM

Hydrologic Element	Drainage Area (MI <sup>2</sup> )	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
WT020	0.0671383	10.3	01Jan2011, 06:23	1.4
JWT020	0.0671383	10.3	01Jan2011, 06:23	1.4
RWT030	0.0671383	10.3	01Jan2011, 06:34	1.4
WT030	0.0764732	19.5	01Jan2011, 06:08	1.6
JWT030	0.1436115	20.0	01Jan2011, 06:09	3.0
RWT042	0.1436115	19.9	01Jan2011, 06:18	3.0
WT010	0.1353300	21.2	01Jan2011, 06:19	2.6
JWT010	0.1353300	21.2	01Jan2011, 06:19	2.6
RWT044	0.1353300	21.2	01Jan2011, 06:29	2.6
JWT042	0.2789415	37.2	01Jan2011, 06:24	5.6
RWT046	0.2789415	37.2	01Jan2011, 06:35	5.6
WT040	0.1850600	21.9	01Jan2011, 06:31	3.6
JWT044	0.4640015	58.9	01Jan2011, 06:34	9.2
RWT054	0.4640015	58.7	01Jan2011, 06:43	9.2
WT060	0.1956300	30.1	01Jan2011, 06:29	4.5
WT050	0.1899300	37.3	01Jan2011, 06:21	4.7
JWT050	0.8495615	108.6	01Jan2011, 06:38	18.4
RWT092	0.8495615	108.5	01Jan2011, 06:39	18.4
WT070	0.1711000	32.6	01Jan2011, 06:13	3.4
JWT070	0.1711000	32.6	01Jan2011, 06:13	3.4
RWT080	0.1711000	32.5	01Jan2011, 06:28	3.3
WT080	0.0691596	18.5	01Jan2011, 06:12	1.7
Sub Regional Pond SR1	1.0898211	113.8	01Jan2011, 06:50	21.9
JWT080	1.0898211	113.8	01Jan2011, 06:50	21.9
RWT094	1.0898211	113.7	01Jan2011, 06:58	21.8
WT100-REV	0.1292700	67.7	01Jan2011, 06:05	4.5
W26-REV	0.0720000	33.7	01Jan2011, 06:04	2.1
WS3-1	0.0720000	33.4	01Jan2011, 06:13	2.1
Paint Brush Hills Pond C	0.2012700	14.0	01Jan2011, 06:38	6.5
WT090	0.1533300	46.0	01Jan2011, 06:10	4.0
JWT090	1.4444211	133.8	01Jan2011, 06:57	32.3
RWT122	1.4444211	133.7	01Jan2011, 07:01	32.3
WT110	0.1942800	47.0	01Jan2011, 06:16	5.1
JWT110	1.6387011	144.0	01Jan2011, 07:00	37.4
RWT124	1.6387011	144.0	01Jan2011, 07:08	37.3
WT130-REV	0.1016250	43.5	01Jan2011, 06:12	3.9
Paint Brush Hills Pond A	0.1016250	9.3	01Jan2011, 06:49	3.9
WT120-REV	0.0430300	14.8	01Jan2011, 06:09	1.2

FUTURE 5-YEAR STORM

Hydrologic Element	Drainage Area (MI <sup>2</sup> )	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
JWT120	1.7833561	154.4	01Jan2011, 07:08	42.4
RWT172	1.7833561	154.2	01Jan2011, 07:18	42.2
WT140-REV	0.1445300	65.2	01Jan2011, 06:14	6.1
JWT140	0.1445300	65.2	01Jan2011, 06:14	6.1
RWT150	0.1445300	64.9	01Jan2011, 06:24	6.1
WT150-REV	0.1308100	71.3	01Jan2011, 06:08	5.5
Paint Brush Hills Pond...	0.2753400	110.4	01Jan2011, 06:15	11.6
W34B2-REV	0.0935900	49.1	01Jan2011, 06:08	3.7
Paint Brush Hills Pond...	0.3689300	20.1	01Jan2011, 07:15	13.8
JWT150	0.3689300	20.1	01Jan2011, 07:15	13.8
RWT160	0.3689300	20.0	01Jan2011, 07:24	13.8
WT160-REV	0.0734800	36.3	01Jan2011, 06:07	2.6
JWT160	0.4424100	37.3	01Jan2011, 06:07	16.4
RWT174	0.4424100	36.9	01Jan2011, 06:20	16.3
WT170-REV	0.1060150	24.0	01Jan2011, 06:21	2.9
W34-CY-REV	0.0465469	10.7	01Jan2011, 06:18	1.2
JWT172	2.3783280	181.3	01Jan2011, 07:17	62.6
RWT176	2.3783280	181.2	01Jan2011, 07:18	62.6
Sub Regional Pond SR2	2.3783280	171.7	01Jan2011, 07:30	59.3
JWT174	2.3783280	171.7	01Jan2011, 07:30	59.3
RWT180	2.3783280	171.6	01Jan2011, 07:45	59.0
WT180-REV	0.0409400	7.6	01Jan2011, 06:21	1.0
JWT180	2.4192680	172.6	01Jan2011, 07:45	59.9
RWT202	2.4192680	172.6	01Jan2011, 08:03	59.5
WT200	0.3017100	52.2	01Jan2011, 06:33	8.3
WT190	0.0574561	22.5	01Jan2011, 06:06	1.6
The Meadows Pond #1	0.0574561	0.6	01Jan2011, 10:18	0.9
JWT190	0.0574561	0.6	01Jan2011, 10:18	0.9
RWT204	0.0574561	0.6	01Jan2011, 10:56	0.8
JWT200	2.7784341	182.8	01Jan2011, 08:02	68.6
RWT210	2.7784341	182.7	01Jan2011, 08:10	68.3
WT210	0.2654600	59.7	01Jan2011, 06:38	9.8
JWT210	3.0438941	194.3	01Jan2011, 08:09	78.2
RWT232	3.0438941	194.3	01Jan2011, 08:16	77.9
WT220	0.1895300	84.8	01Jan2011, 06:13	7.8
JWT220	0.1895300	84.8	01Jan2011, 06:13	7.8
RWT234	0.1895300	84.4	01Jan2011, 06:25	7.7
JWT232	3.2334241	200.7	01Jan2011, 08:16	85.7



FUTURE 5-YEAR STORM

Hydrologic Element	Drainage Area (MI <sup>2</sup> )	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
RWT236	3.2334241	200.7	01Jan2011, 08:16	85.7
WT230	0.1981800	124.0	01Jan2011, 06:06	8.5
JWT234	3.4316041	205.6	01Jan2011, 08:15	94.2
RWT240	3.4316041	205.4	01Jan2011, 08:21	94.0
WT240	0.0761461	61.0	01Jan2011, 06:02	3.4
Regional Pond WU No...	3.5077502	206.4	01Jan2011, 08:23	96.3
Regional Pond WU Di...	3.5077502	169.3	01Jan2011, 08:23	64.8
Old Meridian	0.0335900	38.2	01Jan2011, 06:09	2.8
RWT-OM	0.0335900	37.8	01Jan2011, 06:14	2.8
Regional Pond WU So...	3.5413402	165.5	01Jan2011, 08:33	61.2
RWT240_Diversion R...	0.0000000	37.1	01Jan2011, 08:29	31.4
JWT240	3.5413402	202.6	01Jan2011, 08:33	92.6
RWT250	3.5413402	202.5	01Jan2011, 08:34	92.6
WT250	0.1469500	107.5	01Jan2011, 06:03	6.3
JWT250	3.6882902	205.1	01Jan2011, 08:34	98.9
RWT260	3.6882902	204.9	01Jan2011, 08:49	98.4
WT260	0.1388002	21.0	01Jan2011, 06:36	3.6
JWT260	3.8270904	207.6	01Jan2011, 08:49	102.0
RWT291	3.8270904	207.5	01Jan2011, 08:53	101.8
WT270	0.0324738	20.0	01Jan2011, 06:04	1.3
JWT270	0.0324738	20.0	01Jan2011, 06:04	1.3
RWT292	0.0324738	19.9	01Jan2011, 06:10	1.3
JWT292	3.8595642	208.0	01Jan2011, 08:53	103.1
RWT295	3.8595642	208.0	01Jan2011, 08:54	103.0
WT280	0.2669500	70.1	01Jan2011, 06:14	6.9
JWT280	0.2669500	70.1	01Jan2011, 06:14	6.9
RWT294	0.2669500	70.0	01Jan2011, 06:17	6.9
JWT294	4.1265142	211.4	01Jan2011, 08:54	110.0
RWT296	4.1265142	211.2	01Jan2011, 09:02	109.5
MT040	0.3084200	163.5	01Jan2011, 06:12	14.5
MT030	0.1566300	73.4	01Jan2011, 06:06	5.1
MT020	0.0902033	47.3	01Jan2011, 06:05	3.1
JMT020	0.0902033	47.3	01Jan2011, 06:05	3.1
RMT030	0.0902033	46.8	01Jan2011, 06:21	3.1
JMT030	0.2468333	93.6	01Jan2011, 06:07	8.1
RMT040	0.2468333	92.8	01Jan2011, 06:12	8.1
Woodmen Hills Pond H	0.5552533	242.5	01Jan2011, 06:16	22.5
JMT040	0.5552533	242.5	01Jan2011, 06:16	22.5

FUTURE 5-YEAR STORM

Hydrologic Element	Drainage Area (MI <sup>2</sup> )	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
RMT050	0.5552533	242.2	01Jan2011, 06:19	22.5
MT010	0.2898900	36.7	01Jan2011, 06:26	5.2
The Meadows Pond #2	0.2898900	2.1	01Jan2011, 10:49	1.8
JMT010	0.2898900	2.1	01Jan2011, 10:49	1.8
RMT062	0.2898900	2.1	01Jan2011, 11:26	1.7
MT060a	0.0311000	15.6	01Jan2011, 06:03	1.0
School Site	0.3209900	1.1	01Jan2011, 22:03	1.1
JMT060a	0.3209900	1.1	01Jan2011, 22:03	1.1
RMT060a	0.3209900	1.1	01Jan2011, 22:16	1.1
MT050	0.1186100	33.2	01Jan2011, 06:20	3.8
JMT050	0.9948533	275.5	01Jan2011, 06:19	27.4
RMT064	0.9948533	273.3	01Jan2011, 06:29	27.3
MT060	0.1588000	60.1	01Jan2011, 06:09	4.8
Sub Regional Pond SR4	1.1536533	24.2	01Jan2011, 08:43	22.7
JMT060	1.1536533	24.2	01Jan2011, 08:43	22.7
RMT070	1.1536533	24.2	01Jan2011, 08:52	22.5
MT070	0.1994800	51.6	01Jan2011, 06:24	6.6
JMT070	1.3531333	55.6	01Jan2011, 06:25	29.1
RMT080	1.3531333	55.6	01Jan2011, 06:28	29.1
MT080	0.0638371	91.5	01Jan2011, 06:00	5.0
Regional Pond MN	1.4169704	62.4	01Jan2011, 06:32	31.6
JMT080	1.4169704	62.4	01Jan2011, 06:32	31.6
RMT102	1.4169704	62.2	01Jan2011, 06:41	31.4
MT090	0.0435103	59.3	01Jan2011, 06:00	3.2
Woodmen Hills Pond #5	0.0435103	2.2	01Jan2011, 08:01	2.3
JMT090	0.0435103	2.2	01Jan2011, 08:01	2.3
RMT090	0.0435103	2.2	01Jan2011, 08:01	2.3
JMT104	0.0435103	2.2	01Jan2011, 08:01	2.3
RMT104	0.0435103	2.2	01Jan2011, 08:07	2.3
JMT102	1.4604807	64.3	01Jan2011, 06:41	33.7
RMT106	1.4604807	64.0	01Jan2011, 06:43	33.6
MT100	0.0557682	29.8	01Jan2011, 06:06	2.1
JMT106	1.5162489	67.8	01Jan2011, 06:42	35.7
RMT112	1.5162489	66.0	01Jan2011, 07:16	34.8
MT110	0.1163900	36.3	01Jan2011, 06:18	3.9
JMT110	1.6326389	72.0	01Jan2011, 07:16	38.8
RMT114	1.6326389	71.2	01Jan2011, 07:25	38.5
WT290	0.1037800	31.2	01Jan2011, 06:10	2.7

FUTURE 5-YEAR STORM

Hydrologic Element	Drainage Area (MI <sup>2</sup> )	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
Regional Pond R1	5.8629331	241.7	01Jan2011, 09:13	143.7
JWT296	5.8629331	241.7	01Jan2011, 09:13	143.7
RWT314	5.8629331	241.7	01Jan2011, 09:20	143.0
WT300	0.0970199	25.5	01Jan2011, 06:14	2.5
JWT300	0.0970199	25.5	01Jan2011, 06:14	2.5
RWT312	0.0970199	25.4	01Jan2011, 06:34	2.5
WT310	0.2774200	67.1	01Jan2011, 06:14	6.9
JWT310	6.2373730	246.2	01Jan2011, 09:20	152.4
RWT320	6.2373730	246.0	01Jan2011, 09:28	151.6
WT320	0.2061400	56.1	01Jan2011, 06:13	5.4
JWT320	6.4435130	248.5	01Jan2011, 09:28	157.0
RWT352	6.4435130	248.3	01Jan2011, 09:37	156.2
ET020	0.2131700	128.1	01Jan2011, 06:07	9.2
ET010	0.1451300	67.4	01Jan2011, 06:12	5.9
Paint Brush Hills Pond...	0.1451300	48.8	01Jan2011, 06:22	5.9
JET010	0.1451300	48.8	01Jan2011, 06:22	5.9
RET020	0.1451300	48.7	01Jan2011, 06:37	5.9
Sub Regional Pond SR6	0.3583000	19.9	01Jan2011, 07:26	13.5
JET020	0.3583000	19.9	01Jan2011, 07:26	13.5
RET030	0.3583000	19.7	01Jan2011, 08:14	13.1
ET030	0.2042800	81.2	01Jan2011, 06:17	8.4
JET030	0.5625800	81.2	01Jan2011, 06:17	21.5
RET040	0.5625800	80.9	01Jan2011, 06:28	21.4
Woodmen Hills Pond ...	0.7117200	103.5	01Jan2011, 06:35	26.6
ET040	0.1491400	52.6	01Jan2011, 06:15	5.3
Woodmen Hills Pond ...	0.7117200	32.8	01Jan2011, 07:14	21.7
JET040	0.7117200	32.8	01Jan2011, 07:14	21.7
RET050	0.7117200	32.8	01Jan2011, 07:22	21.6
ET050	0.1171900	66.6	01Jan2011, 06:03	4.0
Woodmen Hills Pond #2	0.8289100	29.6	01Jan2011, 08:07	23.9
JET050	0.8289100	29.6	01Jan2011, 08:07	23.9
RET060	0.8289100	29.6	01Jan2011, 08:19	23.7
ET060	0.2854300	185.5	01Jan2011, 06:02	10.2
Woodmen Hills Pond #3	1.1143400	82.1	01Jan2011, 06:08	31.5
JET060	1.1143400	82.1	01Jan2011, 06:08	31.5
RET070	1.1143400	81.0	01Jan2011, 06:18	31.2
ET070	0.2497500	164.1	01Jan2011, 06:03	9.8
JET070	1.3640900	164.5	01Jan2011, 06:03	41.0

FUTURE 5-YEAR STORM

Hydrologic Element	Drainage Area (MI <sup>2</sup> )	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
RET080	1.3640900	123.5	01Jan2011, 06:29	40.2
ET080	0.2916400	192.2	01Jan2011, 06:08	14.3
Woodmen Hills Pond #4	1.6557300	26.7	01Jan2011, 14:58	26.8
JET080	1.6557300	26.7	01Jan2011, 14:58	26.8
RET090	1.6557300	26.7	01Jan2011, 15:03	26.6
ET090	0.1242400	46.0	01Jan2011, 06:23	5.6
JET090	1.7799700	50.6	01Jan2011, 06:24	32.2
RET100	1.7799700	50.6	01Jan2011, 06:28	32.1
ET100	0.0480615	22.3	01Jan2011, 06:02	1.3
JET100	1.8280315	53.2	01Jan2011, 06:28	33.3
RET110	1.8280315	53.1	01Jan2011, 06:35	33.1
ET110	0.2260300	52.7	01Jan2011, 06:13	5.3
JET110	2.0540615	86.0	01Jan2011, 06:13	38.4
RET120	2.0540615	85.1	01Jan2011, 06:19	38.1
ET120	0.1091300	23.5	01Jan2011, 06:16	2.5
JET120	2.1631915	107.9	01Jan2011, 06:19	40.7
RET152	2.1631915	107.7	01Jan2011, 06:25	40.4
ET130	0.1348100	23.2	01Jan2011, 06:30	3.5
JET130	0.1348100	23.2	01Jan2011, 06:30	3.5
RET140	0.1348100	23.1	01Jan2011, 07:00	3.5
ET140	0.2675900	33.4	01Jan2011, 06:49	6.9
JET140	0.4024000	55.3	01Jan2011, 06:56	10.4
RET154	0.4024000	55.2	01Jan2011, 07:19	10.3
JET152	2.5655915	108.6	01Jan2011, 06:26	50.8
RET156	2.5655915	108.3	01Jan2011, 06:30	50.6
ET150	0.1777300	36.6	01Jan2011, 06:20	4.4
JET154	2.7433215	138.8	01Jan2011, 06:29	55.0
RET162	2.7433215	135.5	01Jan2011, 06:54	54.2
ET160	0.1889200	38.5	01Jan2011, 06:25	5.2
JET160	2.9322415	154.7	01Jan2011, 06:53	59.4
RET164	2.9322415	154.3	01Jan2011, 06:58	59.2
WT350	0.3037700	78.7	01Jan2011, 06:16	8.4
JWT352	9.6795245	342.0	01Jan2011, 08:07	223.7
RWT354	9.6795245	341.9	01Jan2011, 08:07	223.7
WT330	0.3266800	68.2	01Jan2011, 06:21	8.5
JWT330	0.3266800	68.2	01Jan2011, 06:21	8.5
RWT344	0.3266800	67.9	01Jan2011, 06:30	8.5
WT340	0.2780000	40.0	01Jan2011, 06:39	7.2



FUTURE 5-YEAR STORM

Hydrologic Element	Drainage Area (MI <sup>2</sup> )	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
JWT354	10.2842045	359.4	01Jan2011, 08:07	239.3
RWT372	10.2842045	359.2	01Jan2011, 08:11	238.7
WT360	0.0656830	14.8	01Jan2011, 06:17	1.6
JWT360	0.0656830	14.8	01Jan2011, 06:17	1.6
RWT374	0.0656830	14.7	01Jan2011, 06:32	1.6
Regional Pond R2	10.3498875	360.4	01Jan2011, 08:12	237.1
JWT372	10.3498875	360.4	01Jan2011, 08:12	237.1
RWT376	10.3498875	359.9	01Jan2011, 08:21	235.9
WT370	0.2147600	23.4	01Jan2011, 06:15	2.8
JWT374_OUTLET	10.5646475	362.2	01Jan2011, 08:21	238.7
FS010	0.1220000	16.6	01Jan2011, 06:18	2.1
JFS010_OUTLET	0.1220000	16.6	01Jan2011, 06:18	2.1

Project: Aug15\_Working\_Falcon\_DBPS\_S  
Simulation Run: FU 5-yr Reservoir: School Site

Start of Run:	01Jan2011, 00:00	Basin Model:	Falcon_DBPS_Future
End of Run:	02Jan2011, 00:00	Meteorologic Model:	5-yr
Compute Time:	29Apr2021, 20:04:22	Control Specifications:	24-hr Storm

Volume Units: AC-FT

#### Computed Results

Peak Inflow :	15.6 (CFS)	Date/Time of Peak Inflow :	01Jan2011, 06:03
Peak Outflow :	1.1 (CFS)	Date/Time of Peak Outflow :	01Jan2011, 22:03
Total Inflow :	2.7 (AC-FT)	Peak Storage :	1.6 (AC-FT)
Total Outflow :	1.1 (AC-FT)	Peak Elevation :	6955.0 (FT)

Project: Aug15\_Working\_Falcon\_DBPS\_S  
Simulation Run: FU 5-yr Reservoir: Sub Regional Pond SR4

Start of Run:	01Jan2011, 00:00	Basin Model:	Falcon_DBPS_Future
End of Run:	02Jan2011, 00:00	Meteorologic Model:	5-yr
Compute Time:	29Apr2021, 20:04:22	Control Specifications:	24-hr Storm

Volume Units: AC-FT

#### Computed Results

Peak Inflow :	293.0 (CFS)	Date/Time of Peak Inflow :	01Jan2011, 06:29
Peak Outflow :	24.2 (CFS)	Date/Time of Peak Outflow :	01Jan2011, 08:43
Total Inflow :	32.1 (AC-FT)	Peak Storage :	16.2 (AC-FT)
Total Outflow :	22.7 (AC-FT)	Peak Elevation :	6893.9 (FT)

Project: Aug15\_Working\_Falcon\_DBPS\_S  
Simulation Run: FU 5-yr Reservoir: Regional Pond MN

Start of Run:	01Jan2011, 00:00	Basin Model:	Falcon_DBPS_Future
End of Run:	02Jan2011, 00:00	Meteorologic Model:	5-yr
Compute Time:	29Apr2021, 20:04:22	Control Specifications:	24-hr Storm

Volume Units: AC-FT

#### Computed Results

Peak Inflow :	99.9 (CFS)	Date/Time of Peak Inflow :	01Jan2011, 06:01
Peak Outflow :	62.4 (CFS)	Date/Time of Peak Outflow :	01Jan2011, 06:32
Total Inflow :	34.1 (AC-FT)	Peak Storage :	2.8 (AC-FT)
Total Outflow :	31.6 (AC-FT)	Peak Elevation :	6851.6 (FT)

FUTURE 2-YEAR STORM

Hydrologic Element	Drainage Area (MI <sup>2</sup> )	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
WT020	0.0671383	4.4	01Jan2011, 06:25	0.7
JWT020	0.0671383	4.4	01Jan2011, 06:25	0.7
RWT030	0.0671383	4.4	01Jan2011, 06:39	0.7
WT030	0.0764732	8.6	01Jan2011, 06:09	0.8
JWT030	0.1436115	8.7	01Jan2011, 06:09	1.5
RWT042	0.1436115	8.7	01Jan2011, 06:20	1.5
WT010	0.1353300	8.8	01Jan2011, 06:21	1.3
JWT010	0.1353300	8.8	01Jan2011, 06:21	1.3
RWT044	0.1353300	8.8	01Jan2011, 06:33	1.3
JWT042	0.2789415	15.1	01Jan2011, 06:26	2.8
RWT046	0.2789415	15.1	01Jan2011, 06:40	2.8
WT040	0.1850600	9.1	01Jan2011, 06:34	1.8
JWT044	0.4640015	23.9	01Jan2011, 06:39	4.5
RWT054	0.4640015	23.8	01Jan2011, 06:50	4.5
WT060	0.1956300	13.6	01Jan2011, 06:30	2.3
WT050	0.1899300	17.3	01Jan2011, 06:23	2.4
JWT050	0.8495615	42.8	01Jan2011, 06:47	9.3
RWT092	0.8495615	42.7	01Jan2011, 06:49	9.3
WT070	0.1711000	13.6	01Jan2011, 06:15	1.6
JWT070	0.1711000	13.6	01Jan2011, 06:15	1.6
RWT080	0.1711000	13.6	01Jan2011, 06:34	1.6
WT080	0.0691596	8.7	01Jan2011, 06:13	0.9
Sub Regional Pond SR1	1.0898211	41.9	01Jan2011, 07:03	10.4
JWT080	1.0898211	41.9	01Jan2011, 07:03	10.4
RWT094	1.0898211	41.9	01Jan2011, 07:14	10.3
WT100-REV	0.1292700	37.0	01Jan2011, 06:05	2.5
W26-REV	0.0720000	18.4	01Jan2011, 06:04	1.2
WS3-1	0.0720000	18.1	01Jan2011, 06:15	1.2
Paint Brush Hills Pond C	0.2012700	10.4	01Jan2011, 06:34	3.7
WT090	0.1533300	22.1	01Jan2011, 06:11	2.1
JWT090	1.4444211	54.5	01Jan2011, 07:12	16.1
RWT122	1.4444211	54.5	01Jan2011, 07:17	16.1
WT110	0.1942800	22.3	01Jan2011, 06:17	2.7
JWT110	1.6387011	58.6	01Jan2011, 07:16	18.7
RWT124	1.6387011	58.6	01Jan2011, 07:26	18.7
WT130-REV	0.1016250	24.0	01Jan2011, 06:13	2.3
Paint Brush Hills Pond A	0.1016250	4.8	01Jan2011, 06:53	2.3
WT120-REV	0.0430300	7.2	01Jan2011, 06:09	0.6

FUTURE 2-YEAR STORM

Hydrologic Element	Drainage Area (MI <sup>2</sup> )	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
JWT120	1.7833561	63.9	01Jan2011, 07:26	21.6
RWT172	1.7833561	63.8	01Jan2011, 07:38	21.5
WT140-REV	0.1445300	35.7	01Jan2011, 06:14	3.6
JWT140	0.1445300	35.7	01Jan2011, 06:14	3.6
RWT150	0.1445300	35.5	01Jan2011, 06:25	3.6
WT150-REV	0.1308100	40.8	01Jan2011, 06:09	3.3
Paint Brush Hills Pond...	0.2753400	58.7	01Jan2011, 06:19	6.8
W34B2-REV	0.0935900	27.9	01Jan2011, 06:08	2.2
Paint Brush Hills Pond...	0.3689300	9.8	01Jan2011, 07:30	8.0
JWT150	0.3689300	9.8	01Jan2011, 07:30	8.0
RWT160	0.3689300	9.8	01Jan2011, 07:40	8.0
WT160-REV	0.0734800	19.7	01Jan2011, 06:07	1.5
JWT160	0.4424100	20.1	01Jan2011, 06:07	9.5
RWT174	0.4424100	19.8	01Jan2011, 06:23	9.4
WT170-REV	0.1060150	11.6	01Jan2011, 06:22	1.6
W34-CY-REV	0.0465469	5.2	01Jan2011, 06:19	0.6
JWT172	2.3783280	81.2	01Jan2011, 06:39	33.1
RWT176	2.3783280	81.1	01Jan2011, 06:40	33.1
Sub Regional Pond SR2	2.3783280	66.8	01Jan2011, 08:06	30.0
JWT174	2.3783280	66.8	01Jan2011, 08:06	30.0
RWT180	2.3783280	66.8	01Jan2011, 08:25	29.7
WT180-REV	0.0409400	3.4	01Jan2011, 06:22	0.5
JWT180	2.4192680	67.2	01Jan2011, 08:25	30.2
RWT202	2.4192680	67.1	01Jan2011, 08:51	29.9
WT200	0.3017100	25.3	01Jan2011, 06:34	4.4
WT190	0.0574561	11.3	01Jan2011, 06:07	0.9
The Meadows Pond #1	0.0574561	0.3	01Jan2011, 13:19	0.4
JWT190	0.0574561	0.3	01Jan2011, 13:19	0.4
RWT204	0.0574561	0.3	01Jan2011, 14:16	0.4
JWT200	2.7784341	70.6	01Jan2011, 08:50	34.8
RWT210	2.7784341	70.6	01Jan2011, 09:00	34.6
WT210	0.2654600	31.9	01Jan2011, 06:39	5.6
JWT210	3.0438941	74.5	01Jan2011, 08:59	40.2
RWT232	3.0438941	74.5	01Jan2011, 09:08	40.0
WT220	0.1895300	47.1	01Jan2011, 06:14	4.5
JWT220	0.1895300	47.1	01Jan2011, 06:14	4.5
RWT234	0.1895300	46.9	01Jan2011, 06:26	4.5
JWT232	3.2334241	76.6	01Jan2011, 09:08	44.5

FUTURE 2-YEAR STORM

Hydrologic Element	Drainage Area (MI <sup>2</sup> )	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
RWT236	3.2334241	76.6	01Jan2011, 09:09	44.5
WT230	0.1981800	71.3	01Jan2011, 06:06	5.0
JWT234	3.4316041	84.5	01Jan2011, 06:43	49.5
RWT240	3.4316041	84.0	01Jan2011, 06:48	49.4
WT240	0.0761461	36.4	01Jan2011, 06:02	2.1
Regional Pond WU No...	3.5077502	89.8	01Jan2011, 06:10	50.3
Regional Pond WU Di...	3.5077502	62.4	01Jan2011, 06:10	27.5
Old Meridian	0.0335900	24.6	01Jan2011, 06:09	1.9
RWT-OM	0.0335900	24.3	01Jan2011, 06:16	1.8
Regional Pond WU So...	3.5413402	45.0	01Jan2011, 09:51	23.1
RWT240_Diversion R...	0.0000000	27.1	01Jan2011, 06:16	22.8
JWT240	3.5413402	68.8	01Jan2011, 09:44	45.9
RWT250	3.5413402	68.8	01Jan2011, 09:46	45.8
WT250	0.1469500	63.0	01Jan2011, 06:03	3.7
JWT250	3.6882902	70.5	01Jan2011, 09:46	49.5
RWT260	3.6882902	70.5	01Jan2011, 10:06	49.2
WT260	0.1388002	9.9	01Jan2011, 06:38	1.9
JWT260	3.8270904	71.5	01Jan2011, 10:06	51.1
RWT291	3.8270904	71.5	01Jan2011, 10:10	51.0
WT270	0.0324738	11.3	01Jan2011, 06:05	0.7
JWT270	0.0324738	11.3	01Jan2011, 06:05	0.7
RWT292	0.0324738	11.2	01Jan2011, 06:11	0.7
JWT292	3.8595642	71.9	01Jan2011, 06:29	51.7
RWT295	3.8595642	71.8	01Jan2011, 10:12	51.7
WT280	0.2669500	33.4	01Jan2011, 06:15	3.7
JWT280	0.2669500	33.4	01Jan2011, 06:15	3.7
RWT294	0.2669500	33.4	01Jan2011, 06:18	3.7
JWT294	4.1265142	94.0	01Jan2011, 06:30	55.3
RWT296	4.1265142	91.9	01Jan2011, 06:40	55.0
MT040	0.3084200	94.6	01Jan2011, 06:13	8.8
MT030	0.1566300	39.0	01Jan2011, 06:06	2.8
MT020	0.0902033	25.8	01Jan2011, 06:05	1.7
JMT020	0.0902033	25.8	01Jan2011, 06:05	1.7
RMT030	0.0902033	25.4	01Jan2011, 06:20	1.7
JMT030	0.2468333	50.1	01Jan2011, 06:10	4.5
RMT040	0.2468333	49.3	01Jan2011, 06:16	4.5
Woodmen Hills Pond H	0.5552533	107.8	01Jan2011, 06:25	13.2
JMT040	0.5552533	107.8	01Jan2011, 06:25	13.2

FUTURE 2-YEAR STORM

Hydrologic Element	Drainage Area (MI <sup>2</sup> )	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
RMT050	0.5552533	107.4	01Jan2011, 06:28	13.2
MT010	0.2898900	17.3	01Jan2011, 06:28	2.7
The Meadows Pond #2	0.2898900	0.0	01Jan2011, 00:00	0.0
JMT010	0.2898900	0.0	01Jan2011, 00:00	0.0
RMT062	0.2898900	0.0	01Jan2011, 00:00	0.0
MT060a	0.0311000	8.3	01Jan2011, 06:04	0.5
School Site	0.3209900	0.2	01Jan2011, 13:06	0.3
JMT060a	0.3209900	0.2	01Jan2011, 13:06	0.3
RMT060a	0.3209900	0.2	01Jan2011, 13:30	0.3
MT050	0.1186100	17.0	01Jan2011, 06:21	2.1
JMT050	0.9948533	123.2	01Jan2011, 06:27	15.6
RMT064	0.9948533	121.3	01Jan2011, 06:40	15.5
MT060	0.1588000	30.7	01Jan2011, 06:10	2.7
Sub Regional Pond SR4	1.1536533	11.2	01Jan2011, 09:37	13.7
JMT060	1.1536533	11.2	01Jan2011, 09:37	13.7
RMT070	1.1536533	11.2	01Jan2011, 09:48	13.5
MT070	0.1994800	26.4	01Jan2011, 06:25	3.7
JMT070	1.3531333	29.0	01Jan2011, 06:26	17.2
RMT080	1.3531333	29.0	01Jan2011, 06:29	17.2
MT080	0.0638371	62.4	01Jan2011, 06:00	3.4
Regional Pond MN	1.4169704	30.9	01Jan2011, 06:37	18.0
JMT080	1.4169704	30.9	01Jan2011, 06:37	18.0
RMT102	1.4169704	30.8	01Jan2011, 06:48	17.9
MT090	0.0435103	39.9	01Jan2011, 06:00	2.1
Woodmen Hills Pond #5	0.0435103	1.4	01Jan2011, 08:02	1.5
JMT090	0.0435103	1.4	01Jan2011, 08:02	1.5
RMT090	0.0435103	1.4	01Jan2011, 08:02	1.5
JMT104	0.0435103	1.4	01Jan2011, 08:02	1.5
RMT104	0.0435103	1.4	01Jan2011, 08:09	1.5
JMT102	1.4604807	32.1	01Jan2011, 06:48	19.4
RMT106	1.4604807	31.8	01Jan2011, 06:51	19.4
MT100	0.0557682	16.5	01Jan2011, 06:06	1.2
JMT106	1.5162489	33.6	01Jan2011, 06:51	20.6
RMT112	1.5162489	33.0	01Jan2011, 07:29	19.9
MT110	0.1163900	18.9	01Jan2011, 06:19	2.2
JMT110	1.6326389	35.8	01Jan2011, 07:29	22.1
RMT114	1.6326389	35.7	01Jan2011, 07:40	21.9
WT290	0.1037800	15.0	01Jan2011, 06:11	1.4



FUTURE 2-YEAR STORM

Hydrologic Element	Drainage Area (MI <sup>2</sup> )	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
Regional Pond R1	5.8629331	91.0	01Jan2011, 10:31	71.5
JWT296	5.8629331	91.0	01Jan2011, 10:31	71.5
RWT314	5.8629331	91.0	01Jan2011, 10:41	70.9
WT300	0.0970199	12.2	01Jan2011, 06:15	1.3
JWT300	0.0970199	12.2	01Jan2011, 06:15	1.3
RWT312	0.0970199	12.1	01Jan2011, 06:39	1.3
WT310	0.2774200	31.3	01Jan2011, 06:16	3.6
JWT310	6.2373730	93.2	01Jan2011, 10:41	75.8
RWT320	6.2373730	93.2	01Jan2011, 10:50	75.3
WT320	0.2061400	26.8	01Jan2011, 06:14	2.8
JWT320	6.4435130	94.3	01Jan2011, 10:50	78.1
RWT352	6.4435130	94.3	01Jan2011, 11:02	77.4
ET020	0.2131700	73.4	01Jan2011, 06:07	5.4
ET010	0.1451300	37.5	01Jan2011, 06:12	3.5
Paint Brush Hills Pond...	0.1451300	29.4	01Jan2011, 06:21	3.5
JET010	0.1451300	29.4	01Jan2011, 06:21	3.5
RET020	0.1451300	29.3	01Jan2011, 06:37	3.5
Sub Regional Pond SR6	0.3583000	9.3	01Jan2011, 07:43	7.9
JET020	0.3583000	9.3	01Jan2011, 07:43	7.9
RET030	0.3583000	9.3	01Jan2011, 08:37	7.6
ET030	0.2042800	44.9	01Jan2011, 06:17	4.9
JET030	0.5625800	44.9	01Jan2011, 06:17	12.5
RET040	0.5625800	44.6	01Jan2011, 06:30	12.4
Woodmen Hills Pond ...	0.7117200	60.8	01Jan2011, 06:33	15.4
ET040	0.1491400	27.9	01Jan2011, 06:16	3.0
Woodmen Hills Pond ...	0.7117200	9.6	01Jan2011, 12:57	12.0
JET040	0.7117200	9.6	01Jan2011, 12:57	12.0
RET050	0.7117200	9.6	01Jan2011, 13:08	11.8
ET050	0.1171900	36.5	01Jan2011, 06:03	2.2
Woodmen Hills Pond #2	0.8289100	10.4	01Jan2011, 13:06	12.5
JET050	0.8289100	10.4	01Jan2011, 13:06	12.5
RET060	0.8289100	10.4	01Jan2011, 13:21	12.3
ET060	0.2854300	105.0	01Jan2011, 06:02	5.8
Woodmen Hills Pond #3	1.1143400	12.6	01Jan2011, 13:03	15.7
JET060	1.1143400	12.6	01Jan2011, 13:03	15.7
RET070	1.1143400	12.6	01Jan2011, 13:18	15.5
ET070	0.2497500	93.5	01Jan2011, 06:03	5.7
JET070	1.3640900	93.6	01Jan2011, 06:03	21.2

FUTURE 2-YEAR STORM

Hydrologic Element	Drainage Area (MI <sup>2</sup> )	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
RET080	1.3640900	64.9	01Jan2011, 06:31	20.7
ET080	0.2916400	113.3	01Jan2011, 06:08	8.7
Woodmen Hills Pond #4	1.6557300	9.8	02Jan2011, 00:00	12.0
JET080	1.6557300	9.8	02Jan2011, 00:00	12.0
RET090	1.6557300	9.8	02Jan2011, 00:00	11.9
ET090	0.1242400	26.0	01Jan2011, 06:24	3.3
JET090	1.7799700	29.2	01Jan2011, 06:25	15.3
RET100	1.7799700	29.1	01Jan2011, 06:30	15.2
ET100	0.0480615	11.4	01Jan2011, 06:02	0.7
JET100	1.8280315	30.6	01Jan2011, 06:30	15.8
RET110	1.8280315	30.6	01Jan2011, 06:38	15.7
ET110	0.2260300	24.0	01Jan2011, 06:15	2.7
JET110	2.0540615	41.4	01Jan2011, 06:32	18.4
RET120	2.0540615	41.4	01Jan2011, 06:39	18.2
ET120	0.1091300	10.7	01Jan2011, 06:17	1.3
JET120	2.1631915	49.7	01Jan2011, 06:21	19.5
RET152	2.1631915	49.5	01Jan2011, 06:29	19.4
ET130	0.1348100	10.9	01Jan2011, 06:31	1.8
JET130	0.1348100	10.9	01Jan2011, 06:31	1.8
RET140	0.1348100	10.9	01Jan2011, 07:06	1.8
ET140	0.2675900	15.9	01Jan2011, 06:51	3.6
JET140	0.4024000	25.8	01Jan2011, 07:01	5.5
RET154	0.4024000	25.7	01Jan2011, 07:27	5.4
JET152	2.5655915	53.7	01Jan2011, 07:01	24.8
RET156	2.5655915	53.5	01Jan2011, 07:06	24.7
ET150	0.1777300	17.0	01Jan2011, 06:21	2.3
JET154	2.7433215	62.3	01Jan2011, 06:34	27.0
RET162	2.7433215	59.6	01Jan2011, 07:07	26.4
ET160	0.1889200	18.6	01Jan2011, 06:26	2.8
JET160	2.9322415	66.8	01Jan2011, 07:06	29.2
RET164	2.9322415	66.5	01Jan2011, 07:12	29.1
WT350	0.3037700	38.3	01Jan2011, 06:17	4.5
JWT352	9.6795245	134.9	01Jan2011, 08:21	111.0
RWT354	9.6795245	134.9	01Jan2011, 08:21	111.0
WT330	0.3266800	32.2	01Jan2011, 06:23	4.5
JWT330	0.3266800	32.2	01Jan2011, 06:23	4.5
RWT344	0.3266800	32.0	01Jan2011, 06:34	4.5
WT340	0.2780000	18.9	01Jan2011, 06:42	3.8

FUTURE 2-YEAR STORM

Hydrologic Element	Drainage Area (MI <sup>2</sup> )	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
JWT354	10.2842045	143.7	01Jan2011, 08:20	119.3
RWT372	10.2842045	143.6	01Jan2011, 08:26	118.8
WT360	0.0656830	6.9	01Jan2011, 06:18	0.8
JWT360	0.0656830	6.9	01Jan2011, 06:18	0.8
RWT374	0.0656830	6.9	01Jan2011, 06:36	0.8
Regional Pond R2	10.3498875	144.3	01Jan2011, 08:27	116.5
JWT372	10.3498875	144.3	01Jan2011, 08:27	116.5
RWT376	10.3498875	144.0	01Jan2011, 08:37	115.7
WT370	0.2147600	7.2	01Jan2011, 06:17	1.2
JWT374_OUTLET	10.5646475	144.8	01Jan2011, 08:37	116.9
FS010	0.1220000	6.3	01Jan2011, 06:20	1.0
JFS010_OUTLET	0.1220000	6.3	01Jan2011, 06:20	1.0

Project: Aug15\_Working\_Falcon\_DBPS\_S  
Simulation Run: FU 2-yr Reservoir: School Site

Start of Run:	01Jan2011, 00:00	Basin Model:	Falcon_DBPS_Future
End of Run:	02Jan2011, 00:00	Meteorologic Model:	2-yr
Compute Time:	29Apr2021, 20:01:55	Control Specifications:	24-hr Storm

Volume Units: AC-FT

#### Computed Results

Peak Inflow :	8.3 (CFS)	Date/Time of Peak Inflow :	01Jan2011, 06:04
Peak Outflow :	0.2 (CFS)	Date/Time of Peak Outflow :	01Jan2011, 13:06
Total Inflow :	0.5 (AC-FT)	Peak Storage :	0.3 (AC-FT)
Total Outflow :	0.3 (AC-FT)	Peak Elevation :	6954.2 (FT)

Project: Aug15\_Working\_Falcon\_DBPS\_S  
Simulation Run: FU 2-yr Reservoir: Sub Regional Pond SR4

Start of Run:	01Jan2011, 00:00	Basin Model:	Falcon_DBPS_Future
End of Run:	02Jan2011, 00:00	Meteorologic Model:	2-yr
Compute Time:	29Apr2021, 20:01:55	Control Specifications:	24-hr Storm

Volume Units: AC-FT

#### Computed Results

Peak Inflow :	128.3 (CFS)	Date/Time of Peak Inflow :	01Jan2011, 06:40
Peak Outflow :	11.2 (CFS)	Date/Time of Peak Outflow :	01Jan2011, 09:37
Total Inflow :	18.2 (AC-FT)	Peak Storage :	9.0 (AC-FT)
Total Outflow :	13.7 (AC-FT)	Peak Elevation :	6891.4 (FT)

Project: Aug15\_Working\_Falcon\_DBPS\_S  
Simulation Run: FU 2-yr Reservoir: Regional Pond MN

Start of Run:	01Jan2011, 00:00	Basin Model:	Falcon_DBPS_Future
End of Run:	02Jan2011, 00:00	Meteorologic Model:	2-yr
Compute Time:	29Apr2021, 20:01:55	Control Specifications:	24-hr Storm

Volume Units: AC-FT

#### Computed Results

Peak Inflow :	64.9 (CFS)	Date/Time of Peak Inflow :	01Jan2011, 06:01
Peak Outflow :	30.9 (CFS)	Date/Time of Peak Outflow :	01Jan2011, 06:37
Total Inflow :	20.5 (AC-FT)	Peak Storage :	2.6 (AC-FT)
Total Outflow :	18.0 (AC-FT)	Peak Elevation :	6851.5 (FT)

## Historic Rational Calculations

## COMPOSITE RUNOFF COEFFICIENT CALCULATIONS (EXISTING/HISTORIC CONDITIONS)

Subdivision: Bent Grass  
Location: CO, Colorado Springs

Bent Grass  
CLH017.20  
TJE  
CMD  
12/2/20

Basin ID	Total Area (ac)	Hydrologic Soils Group	Paved Roads			Lawns			Roofs			Composite C <sub>5</sub>	Composite C <sub>100</sub>
			C <sub>5</sub>	C <sub>100</sub>	Area (ac)	C <sub>5</sub>	C <sub>100</sub>	Area (ac)	C <sub>5</sub>	C <sub>100</sub>	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
H5	11.30	A	0.90	0.96	0.00	0.09	0.36	5.81	0.73	0.81	0.00	0.05	0.19
OS-22	4.42	A	0.90	0.96	0.00	0.09	0.36	4.42	0.73	0.81	0.00	0.09	0.36
OS-23	10.24	A	0.90	0.96	0.00	0.09	0.36	10.24	0.73	0.81	0.00	0.09	0.36
BENT GRASS EAST COMMERCIAL & FILING NO. 1 BASINS*													
C1	2.07	A										0.75	0.81
C2	2.15	A										0.76	0.82
D1	5.22	A										0.55	0.65
D2	1.40	A										0.55	0.65
H1	3.00	A										0.25	0.27
H2	1.22	A										0.25	0.27
F	1.37	A										0.40	0.55
G	1.70	A										0.40	0.50
H3	1.54	A										0.55	0.65
H4	0.42	A										0.55	0.65
I1	3.00	A										0.55	0.65
I2	1.70	A										0.55	0.65
J	1.64	A										0.40	0.55
K	1.00	A										0.40	0.55
L	5.90	A										0.78	0.83
M1	1.56	A										0.85	0.90
M2	0.44	A										0.85	0.90
N	1.32	A										0.85	0.90
D	0.41	A										0.82	0.83
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



Basin ID	Total Area (ac)	Hydrologic Soils Group	Paved Roads			Lawns			Roofs			Composite C <sub>5</sub>	Composite C <sub>100</sub>
			C <sub>5</sub>	C <sub>100</sub>	Area (ac)	C <sub>5</sub>	C <sub>100</sub>	Area (ac)	C <sub>5</sub>	C <sub>100</sub>	Area (ac)		
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
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
<b>MERIDIAN ROAD BASIN</b>													
P-1	2.03	A	0.90	0.96	1.29	0.09	0.36	0.00	0.73	0.81	0.00	0.57	0.61

\*FROM FDR BG RES FILING 1 & BG EAST COMMERCIAL FILING NO. 1

## COMPOSITE % IMPERVIOUS CALCULATIONS (EXISTING/HISTORIC CONDITIONS)

**Subdivision:** Bent Grass

**Location:** CO, Colorado Springs

Bent Grass

CLH017.20

TJE

CMD

12/2/20

Basin ID	Total Area (ac)	Paved Roads			Lawns			Roofs			Basins Total
		% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	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
H5	11.30	100	0.00	0.0	2	5.81	1.0	90	0.00	0.0	1.0
OS-22	4.42	100	0.00	0.0	2	4.42	2.0	90	0.00	0.0	2.0
OS-23	10.24	100	0.00	0.0	2	10.24	2.0	90	0.00	0.0	2.0
BENT GRASS EAST COMMERCIAL & FILING NO. 1 BASINS											
C1	2.07										80.0
C2	2.15										95.0
D1	5.22										95.0
D2	1.40										75.0
H1	3.00										30.0
H2	1.22										30.0
F	1.37										40.0
G	1.70										40.0
H3	1.54										75.0
H4	0.42										75.0
I1	3.00										75.0
I2	1.70										75.0
J	1.64										55.0
K	1.00										55.0
L	5.90										90.0
M1	1.56										95.0
M2	0.44										95.0
N	1.32										95.0
D	0.41										90.0
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

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.	
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
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
<b>MERIDIAN ROAD BASIN</b>											
P-1	2.03	100	1.29	63.5	2	0.74	0.7	90	0.00	0.0	64.2

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

Subdivision: Bent Grass  
Location: CO, Colorado Springs

Project Name: Bent Grass  
Project No.: CLH017.20  
Calculated By: TJE  
Checked By: CMD  
Date: 12/2/20

SUB-BASIN						INITIAL/OVERLAND			TRAVEL TIME					T <sub>c</sub> CHECK				FINAL
DATA						(T <sub>i</sub> )			(T <sub>t</sub> )					(URBANIZED BASINS)				
BASIN ID	D.A. (AC)	Hydrologic Soils Group	Impervious (%)	C5	C <sub>100</sub>	L (FT)	S (%)	T <sub>i</sub> (MIN)	L (FT)	S (%)	C <sub>v</sub>	VEL. (FPS)	T <sub>t</sub> (MIN)	COMP. T <sub>c</sub> (MIN)	TOTAL LENGTH (FT)	Urbanized T <sub>c</sub> (MIN)	T <sub>c</sub> (MIN)	
<b>OFFSITE BASINS</b>																		
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	
H5	11.30	A	1.00	0.05	0.19	100	6.0	10.6	1460	2.0	15.0	2.1	11.5	22.1	1560.0	18.7	18.7	
OS-22	4.42	A	2.00	0.09	0.36	100	1.0	18.5	650	1.0	10.0	1.0	10.8	29.3	750.0	14.2	14.2	
OS-23	10.24	A	2.00	0.09	0.36	100	1.0	18.5	600	1.0	10.0	1.0	10.0	28.5	700.0	13.9	13.9	
<b>BENT GRASS EAST COMMERCIAL &amp; FILING NO. 1 BASINS*</b>																		
C1	2.07	A	80.00	0.75	0.81	5	2.0	1.1	400	1.0	20.0	2.0	3.3	4.5	405.0	12.3	5.0	
C2	2.15	A	95.00	0.76	0.82	10	2.0	1.6	310	2.0	20.0	2.8	1.8	3.4	320.0	11.8	5.0	
D1	5.22	A	95.00	0.55	0.65	50	2.0	5.7	310	2.0	20.0	2.8	1.8	7.5	360.0	12.0	7.5	
D2	1.40	A	75.00	0.55	0.65	5	2.0	1.8	400	1.0	20.0	2.0	3.3	5.1	405.0	12.3	5.1	
H1	3.00	A	30.00	0.25	0.27	10	2.0	3.9	310	2.0	20.0	2.8	1.8	5.7	320.0	11.8	5.7	
H2	1.22	A	30.00	0.25	0.27	50	2.0	8.7	310	2.0	20.0	2.8	1.8	10.6	360.0	12.0	10.6	
F	1.37	A	40.00	0.40	0.55	80	4.5	6.9						6.9	80.0	10.4	6.9	
G	1.70	A	40.00	0.40	0.50	240	1.5	17.3						17.3	240.0	11.3	11.3	
H3	1.54	A	75.00	0.55	0.65	100	0.5	12.6	350	2.0		4.9	1.2	13.8	450.0	12.5	12.5	
H4	0.42	A	75.00	0.55	0.65	50	0.5	8.9	150	2.0		4.9	0.5	9.4	200.0	11.1	9.4	
I1	3.00	A	75.00	0.55	0.65	50	0.5	8.9	550	2.0		4.9	1.9	10.7	600.0	13.3	10.7	
I2	1.70	A	75.00	0.55	0.65	50	0.5	8.9	300	2.0		4.9	1.0	9.9	350.0	11.9	9.9	
J	1.64	A	55.00	0.40	0.55	75	2.8	7.9						7.9	75.0	10.4	7.9	
K	1.00	A	55.00	0.40	0.55	65	2.4	7.7						7.7	65.0	10.4	7.7	
L	5.90	A	90.00	0.78	0.83	50	0.2	6.9	800	1.0		3.5	3.8	10.7	850.0	14.7	10.7	
M1	1.56	A	95.00	0.85	0.90	50	0.1	6.9	300	1.0		3.5	1.4	8.3	350.0	11.9	8.3	
M2	0.44	A	95.00	0.85	0.90									0.0	0.0	10.0	5.0	
N	1.32	A	95.00	0.85	0.90	40	0.1	5.7	330	2.0		4.9	1.1	6.8	370.0	12.1	6.8	
D	0.41	A	90.00	0.82	0.83	50	2.0	2.9						2.9	50.0	10.3	5.0	
<b>BENT GRASS FILING NO. 2 &amp; BENT GRASS WEST BASINS</b>																		
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	
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	

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

**Subdivision:** Bent Grass  
**Location:** CO, Colorado Springs

**Project Name:** Bent Grass  
**Project No.:** CLH017.20  
**Calculated By:** TJE  
**Checked By:** CMD  
**Date:** 12/2/20

SUB-BASIN						INITIAL/OVERLAND			TRAVEL TIME					T <sub>c</sub> CHECK			FINAL
DATA						(T <sub>i</sub> )			(T <sub>t</sub> )					(URBANIZED BASINS)			
BASIN	D.A.	Hydrologic	Impervious	C5	C <sub>100</sub>	L	S	T <sub>i</sub>	L	S	C <sub>v</sub>	VEL.	T <sub>t</sub>	COMP. T <sub>c</sub>	TOTAL	Urbanized T <sub>c</sub>	
PROPOSED:																	
P-1	2.03	A	64.20	0.57	0.61	100	6.0	5.3	1230	1.7	15.0	2.0	10.5	15.8	1330.0	17.4	15.8

\*FROM FDR BG RES FILING 1 & BG EAST COMMERCIAL FILING NO. 1

**NOTES:**

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

$$T_i = L / 60V$$

$$\text{Velocity } V = C_v * S^{0.5}, \text{ S in ft/ft}$$

$$T_c \text{ Check} = 10 + L / 180$$

For Urbanized basins a minimum T<sub>c</sub> of 5.0 minutes is required.

For non-urbanized basins a minimum T<sub>c</sub> 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: Bent Grass  
Location: CO, Colorado Springs  
Design Storm: 5-Year

Project Name: Bent Grass  
Project No.: CLH017.20  
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)	
		RWT202	1574.40						46.6	120.88	1.82	220.0								From Falcon DBPS by Matrix
		RWT204	38.40						11.4	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
		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												
		H5	11.30	0.05	18.7	0.57	3.19	1.8												
		OS-22	4.42	0.09	14.2	0.40	3.61	1.4												
		OS-23	10.24	0.09	13.9	0.92	3.64	3.3												
		C1	2.07	0.75	5.0	1.55	5.17	8.0												
		C2	2.15	0.76	5.0	1.63	5.17	8.4												
		D1	5.22	0.55	7.5	2.87	4.56	13.1												
		D2	1.40	0.55	5.1	0.77	5.13	4.0												
		H1	3.00	0.25	5.7	0.75	4.96	3.7												
		H2	1.22	0.25	10.6	0.31	4.05	1.3												
		F	1.37	0.40	6.9	0.55	4.68	2.6												
		G	1.70	0.40	11.3	0.68	3.94	2.7												
		H3	1.54	0.55	12.5	0.85	3.79	3.2												
		H4	0.42	0.55	9.4	0.23	4.23	1.0												
		I1	3.00	0.55	10.7	1.65	4.02	6.6												
		I2	1.70	0.55	9.9	0.94	4.15	3.9												
		J	1.64	0.40	7.9	0.66	4.48	3.0												
		K	1.00	0.40	7.7	0.40	4.52	1.8												
		L	5.90	0.78	10.7	4.60	4.03	18.5												
		M1	1.56	0.85	8.3	1.33	4.41	5.9												

STANDARD FORM SF-3  
STORM DRAINAGE SYSTEM DESIGN (EXISTING/HISTORIC CONDITIONS)  
(RATIONAL METHOD PROCEDURE)

Subdivision: Bent Grass  
Location: CO, Colorado Springs  
Design Storm: 5-Year

Project Name: Bent Grass  
Project No.: CLH017.20  
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)	
		M2	0.44	0.85	5.0	0.37	5.17	1.9													
		N	1.32	0.85	6.8	1.12	4.70	5.3													
		D	0.41	0.82	5.0	0.34	5.17	1.8													
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													
		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													
MERIDIAN ROAD BASIN																					
		P-1	2.03	0.61	15.8	1.24	3.44	4.3													

**STANDARD FORM SF-3**  
**STORM DRAINAGE SYSTEM DESIGN (EXISTING/HISTORIC CONDITIONS)**  
(RATIONAL METHOD PROCEDURE)

Subdivision: Bent Grass  
Location: CO, Colorado Springs  
Design Storm: 100-Year

Project Name: Bent Grass  
Project No.: CLH017.20  
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	327.87	3.05	1000.0									From Falcon DBPS by Matrix
		RWT204	38.40						11.4	6.51	6.61	43.0									From Falcon DBPS by Matrix
		WT200	192.00						37.8	53.07	3.58	190.0									From Falcon DBPS by Matrix
		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													
		H5	11.30	0.19	18.7	2.15	5.36	11.5													
		OS-22	4.42	0.36	14.2	1.59	6.05	9.6													
		OS-23	10.24	0.36	13.9	3.69	6.10	22.5													
		C1	2.07	0.81	5.0	1.68	8.68	14.6													
		C2	2.15	0.82	5.0	1.76	8.68	15.3													
		D1	5.22	0.65	7.5	3.39	7.66	26.0													
		D2	1.40	0.65	5.1	0.91	8.62	7.8													
		H1	3.00	0.27	5.7	0.81	8.33	6.7													
		H2	1.22	0.27	10.6	0.33	6.79	2.2													
		F	1.37	0.55	6.9	0.75	7.85	5.9													
		G	1.70	0.50	11.3	0.85	6.62	5.6													
		H3	1.54	0.65	12.5	1.00	6.37	6.4													
		H4	0.42	0.65	9.4	0.27	7.10	1.9													
		I1	3.00	0.65	10.7	1.95	6.76	13.2													
		I2	1.70	0.65	9.9	1.11	6.96	7.7													
		J	1.64	0.55	7.9	0.90	7.52	6.8													
		K	1.00	0.55	7.7	0.55	7.59	4.2													
		L	5.90	0.83	10.7	4.90	6.77	33.2													
		M1	1.56	0.90	8.3	1.40	7.41	10.4													
		M2	0.44	0.90	5.0	0.40	8.68	3.5													
		N	1.32	0.90	6.8	1.19	7.89	9.4													
		D	0.41	0.83	5.0	0.34	8.68	3.0													



STANDARD FORM SF-3  
STORM DRAINAGE SYSTEM DESIGN (EXISTING/HISTORIC CONDITIONS)  
(RATIONAL METHOD PROCEDURE)

Subdivision: Bent Grass  
Location: CO, Colorado Springs  
Design Storm: 100-Year

Project Name: Bent Grass  
Project No.: CLH017.20  
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)
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													
		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													
MERIDIAN ROAD BASIN																					
		P-1	2.03	0.61	15.8	1.24	5.78	7.2													

## BENT GRASS/MERIDIAN ROAD - MDDP

### SURFACE ROUTING - EXISTING/HISTORIC CONDITIONS

DESIGN POINT	CONTRIBUTING BASINS	CA (equivalent)		Tc (min.)	INTENSITY		TOTAL FLOWS		NOTES		
		CA(5)	CA(100)		I(5) (in/hr)	I(100) (in/hr)	Q(5) (cfs)	Q(100) (cfs)			
30	Release rate from Meadows Pond 2	0.30	27.16	15.0	3.4	5.9	1.0	160.0	Flows from Meadows Filing No. 3 Pond 2 (Approved DBPS by Matrix)		
		TRAVEL TIME									
		0.30	27.16	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)			
1	OS-1 A-1	2.22	5.49	19.6	2.9	5.2	8.3	38.9			
		0.60	2.06	TRAVEL TIME							
		2.82	7.55	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)			
31	OS-25 DP 30	1.55	5.23	33.3	2.2	3.8	4.0	123.3			
		0.30	27.16	TRAVEL TIME							
		1.85	32.39	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)			
32	OS-26 DP 1 DP 31	0.52	2.09	37.7	2.0	3.5	10.5	148.0			
		2.82	7.55	TRAVEL TIME							
		1.85	32.39	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)			
14	C1 H5 OS-22 OS-23 DP 32	1.55	1.68	43.9	1.8	3.2	15.8	163.6			
		0.57	2.15	TRAVEL TIME							
		0.40	1.59	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)			
BG1	D1	2.87	3.39	7.5	4.5	7.9	13.0	26.9	Existing Sump Inlet		
		2.87	3.39	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)			
					2.5	0.0	7.5				
BG2	D2	0.77	0.91	5.1	5.2	9.0	4.0	8.2	Existing Sump Inlet		
		0.77	0.91	TRAVEL TIME							
				Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)			
BG4	H1	0.75	0.81	5.7	5.0	8.7	3.7	7.0	Existing Sump Inlet		
		0.75	0.81	TRAVEL TIME							
				Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)			
BG5	H2	0.31	0.33	10.6	4.0	6.9	1.2	2.3	Existing Sump Inlet		
		0.31	0.33	TRAVEL TIME							
				Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)			
BG POND	G DP BG1 DP BG2 DP BG4 DP BG5	0.68	0.85	10.6	4.0	6.9	21.3	43.5	Flows into existing Pond at Bent Grass Filing No. 1		
		2.87	3.39	TRAVEL TIME							
		0.77	0.91	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)			
BG POND 1	BG Pond 1 Release Flows	0.06	0.32	5.0	5.2	9.1	0.3	2.9	Release flows from Bent Grass Res 1 Pond 1		
		0.06	0.32	TRAVEL TIME							
				Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)			

DESIGN POINT	CONTRIBUTING BASINS	CA (equivalent)		Tc (min.)	INTENSITY		TOTAL FLOWS		NOTES	
		CA(5)	CA(100)		I(5) (in/hr)	I(100) (in/hr)	Q(5) (cfs)	Q(100) (cfs)		
50		111.34	193.50	26.1	2.5	4.4	280.0	850.0	Flow from Falcon DBPS at Meridian Rd & BGMD Intersection	
		TRAVEL TIME								
		111.34	193.50	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)		
20	DP 50 DP 14	111.34	193.50	45.2	1.8	3.1	200.6	608.4		
		0.31	0.33	TRAVEL TIME						
		111.65	193.83	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)		
			Culverts	125	11.2	0.2	45.4			
15	C2 DP 20	1.63	1.76	45.4	1.8	3.1	203.0	612.3		
		111.65	193.83	TRAVEL TIME						
		113.28	195.59	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)		
BG32	F	0.55	0.75	6.9	4.7	8.1	2.6	6.1		
		TRAVEL TIME								
		0.55	0.75	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)		
BG33	J	0.66	0.90	7.9	4.4	7.8	2.9	7.0		
		TRAVEL TIME								
		0.66	0.90	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)		
BG 7	H3	0.85	1.00	12.5	3.7	6.4	3.1	6.4	Ex 4' Sump Inlet	
		TRAVEL TIME								
		0.85	1.00	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)		
BG 8	H4	0.23	0.27	9.4	4.2	7.3	1.0	2.0	Ex 4' Sump Inlet	
		TRAVEL TIME								
		0.23	0.27	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)		
BG 9	I1	1.65	1.95	10.7	3.9	6.9	6.5	13.4	Ex 6' Sump Inlet	
		TRAVEL TIME								
		1.65	1.95	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)		
BG 10	I2	0.94	1.11	9.9	4.1	7.1	3.8	7.9	Ex 4' Sump Inlet	
		TRAVEL TIME								
		0.94	1.11	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)		
BG 11	DP BG 7 DP BG 8 DP BG 9 DP BG 10	0.85	1.00	12.5	3.7	6.4	13.5	27.8	Inflow to BG Pond 2 West storm sewer	
		0.23	0.27							
		1.65	1.95							
		0.94	1.11	TRAVEL TIME						
BG 12	M1	1.33	1.40	8.3	4.4	7.6	5.8	10.7	Ex 6' Sump Inlet	
		TRAVEL TIME								
		1.33	1.40	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)		
BG 13	M2 N	0.37	0.40	6.8	4.7	8.2	7.0	13.0	Ex 6' Sump Inlet	
		1.12	1.19	TRAVEL TIME						
		1.49	1.59	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)		
BG 14	BG DP 12 BG DP 13	1.33	1.40	8.3	4.4	7.6	12.3	22.8	Ex 6' Sump Inlet	
		1.49	1.59	TRAVEL TIME						
		2.82	2.99	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)		
						2.5	0.0	8.3		

DESIGN POINT	CONTRIBUTING BASINS	CA (equivalent)		Tc (min.)	INTENSITY		TOTAL FLOWS		NOTES
		CA(5)	CA(100)		I(5) (in/hr)	I(100) (in/hr)	Q(5) (cfs)	Q(100) (cfs)	
BG 15	K L DP BG 11 DP BG 14	0.40	0.55	12.5	3.7	6.4	42.2	82.0	Total inflo to BG Pond 2
		4.60	4.90						
		3.67	4.33						
		2.82	2.99	T R A V E L T I M E					
		11.49	12.77	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
					2.0	0.0	12.5		
BG POND 2	BG Pond 2 Release Flows	0.08	1.10	5.0	5.2	9.1	0.4	10.0	Release flows from Bent Grass Res 1 Pond 2
				T R A V E L T I M E					
		0.08	1.10	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
					2.8	0.0	5.0		
BG 30	PLD RELEASE RATE	0.58	0.55	5.0	5.2	9.1	3.0	5.0	Released flows from existing PLD on 7-11 site
				T R A V E L T I M E					
		0.58	0.55	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
					2.8	0.0	5.0		
BG31	D	0.34	0.34	5.0	5.2	9.1	1.8	3.1	Future lot for development in Bent Grass East Commercial Filing No. 1
				T R A V E L T I M E					
		0.34	0.34	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
					2.5	0.0	5.0		
25	P-1 DP 15 BG 30 BG 31 BG POND2	1.24	1.24	45.4	1.8	3.1	205.2	616.2	
		113.28	195.59						
		2.82	2.99						
		0.34	0.34						
		0.08	1.10	T R A V E L T I M E					
		114.52	196.83	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
					2.5	0.0	45.4		
9	RWT202	124.80	324.77	46.6	1.8	3.1	220.0	1000.0	
				T R A V E L T I M E					
		124.80	324.77	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
			CHANNEL	1560	5.0	5.2	51.8		
	RWT204	1.83	6.43	11.4	3.8	6.7	7.0	43.0	
				T R A V E L T I M E					
		1.83	6.43	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
					5.0	0.0	11.4		
	WT200	25.81	54.00	37.8	2.0	3.5	52.0	190.0	
				T R A V E L T I M E					
		25.81	54.00	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
					5.1	0.0	37.8		
8	RWT204 WT200	1.83	6.43	37.8	2.0	3.5	55.7	212.6	
		25.81	54.00						
				T R A V E L T I M E					
		27.64	60.43	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
			CHANNEL	850	4.0	3.5	41.3		
1	A-1	0.60	2.06	14.3	3.5	6.0	2.1	12.4	
				T R A V E L T I M E					
		0.60	2.06	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
					5.0	0.0	14.3		
2	A-2	1.62	6.48	17.9	3.1	5.4	5.0	34.9	
				T R A V E L T I M E					
		1.62	6.48	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
					5.0	0.0	17.9		
3	A-3 DP 2 DP 8 DP 9	1.76	7.05	51.8	1.6	2.9	256.3	1145.4	
		1.62	6.48						
		27.64	60.43						
		124.80	324.77	T R A V E L T I M E					
		155.82	398.73	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
			CHANNEL	900	5.0	3.0	54.8		

DESIGN POINT	CONTRIBUTING BASINS	CA (equivalent)		Tc (min.)	INTENSITY		TOTAL FLOWS		NOTES
		CA(5)	CA(100)		I(5) (in/hr)	I(100) (in/hr)	Q(5) (cfs)	Q(100) (cfs)	
4	OS-4 A-4	4.60	12.28	26.1	2.5	4.4	18.2	93.7	Flows offsite to Latigo Business Center Filing No. 1
		2.62	9.05	T R A V E L   T I M E					
		7.22	21.33	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
					5.0	0.0	26.1		
5	B-1	2.93	11.71	17.8	3.1	5.4	9.1	63.4	Flows offsite at south property line
				T R A V E L   T I M E					
		2.93	11.71	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
					5.0	0.0	17.8		
6	B-2  DP 3	0.41	1.62	54.8	1.6	2.8	247.5	1107.8	
				T R A V E L   T I M E					
		155.82	398.73	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
		156.23	400.35	CHANNEL	365	5.0	1.2	56.0	
7	B-3 DP 6	2.27	6.47	56.0	1.6	2.7	247.4	1109.3	Flows exiting site at channel
		156.23	400.35	T R A V E L   T I M E					
				Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
		158.50	406.82			5.0	0.0	56.0	

TABLES ON PLAN SHEETS HAVE BEEN UPDATED

Plan doesn't match this and this is higher than the model. The model flows need to be labeled.

## Current Rational Calculations

COMPOSITE % IMPERVIOUS CALCULATIONS (CURRENT CONDITIONS)

Subdivision:	Bent Grass	Falcon Meadows at Bent Grass
Location:	CO, Colorado Springs	CLH017.20
		TJE
		CMD
		3/23/20

Basin ID	Total Area (ac)	Paved Roads			Lawns			Roofs			Residential - 1/8 Acre			Residential - 1/4 Acre			Residential - 1/3 Acre			Residential - 1/2 Acre			Residential - 1 Acre			Basins Total
		% 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.	% Imp.	Area (ac)	Weighted % Imp.	Weighted % Imp.
OFFSITE BASINS																										
WT200	192.00																									10.0
OS-2	20.08	80	0.90	3.6	2	18.62	1.9	90	0.56	2.5	65	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	10.62	80	0.48	3.6	2	9.84	1.9	90	0.30	2.5	65	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-24	2.64	100	0.00	0.0	2	2.64	2.0	90	0.00	0.0	65	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
OS-25	14.13	100	0.17	1.2	2	13.71	1.9	90	0.22	1.4	65	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	4.5
OS-26	5.81	100	0.00	0.0	2	5.81	2.0	90	0.00	0.0	65	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
H5	11.30	100	0.00	0.0	2	5.81	1.0	90	0.00	0.0	65	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	1.0
OS-22	4.42	100	0.00	0.0	2	4.42	2.0	90	0.00	0.0	65	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
OS-23	10.24	100	0.00	0.0	2	10.24	2.0	90	0.00	0.0	65	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
BENT GRASS EAST COMMERCIAL & FILING NO. 1 BASINS																										
C1a	0.48	100	0.36	75.0	2	0.12	0.5	90	0.00	0.0	65	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	75.5
C1b	0.88	100	0.68	77.3	2	0.20	0.5	90	0.00	0.0	65	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	77.7
C1c	1.09	100	0.88	80.7	2	0.21	0.4	90	0.00	0.0	65	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	81.1
D1a	0.56	100	0.33	58.9	2	0.23	0.8	90	0.00	0.0	65	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	59.8
D1b	0.68	100	0.17	25.0	2	0.21	0.6	90	0.30	39.7	65	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	65.3
D1c	1.20	100	0.19	15.8	2	0.34	0.6	90	0.67	50.3	65	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	66.7
D1d	2.79	100	0.50	17.9	2	0.76	0.5	90	1.53	49.4	65	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	67.8
C2a	1.26	100	0.74	58.7	2	0.52	0.8	90	0.00	0.0	65	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	59.6
C2b	0.99	100	0.92	92.9	2	0.07	0.1	90	0.00	0.0	65	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	93.1
D2a	1.00	100	0.19	19.0	2	0.65	1.3	90	0.16	14.4	65	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	34.7
D2b	0.41	100	0.11	26.8	2	0.20	1.0	90	0.10	22.0	65	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	49.8
H1a	0.40	100	0.16	40.0	2	0.20	1.0	90	0.04	9.0	65	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	50.0
H1b	2.52	100	0.40	15.9	2	1.22	1.0	90	0.86	30.7	65	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	47.6
H1c	0.16	100	0.05	31.3	2	0.09	1.1	90	0.02	11.3	65	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	43.6
H2a	1.09	100	0.30	27.5	2	0.63	1.2	90	0.16	13.2	65	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	41.9
H2b	0.15	100	0.05	33.3	2	0.10	1.3	90	0.00	0.0	65	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	34.7
F	1.37																									40.0
G	1.70																									40.0
H3	1.54																									75.0
H4	0.42																									75.0
I1	3.00																									75.0
I2	1.70																									75.0
J	1.64																									55.0
K	1.00																									55.0
L	5.90																									90.0
M1	1.56																									95.0
M2	0.44																									95.0
N	1.32																									95.0
D	0.41																									90.0
BENT GRASS FILING NO. 2 BASINS																										
OS-1	32.28	100	2.15	6.7	2	29.25	1.8	90	0.88	2.5	65	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-4	4.46	100	0.00	0.0	2	0.00	0.0	90	0.00	0.0	65	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	90	0.00	0.0	65	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	90	0.00	0.0	65	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
A-1	2.70	100	0.00	0.0	2	0.00	0.0	90	0.00	0.0	65	1.18	28.4	40	0.68	10.1	30	0.00	0.0	25	0.00	0.0	20	0.84	6.2	44.7
A-2	1.19	100	0.00	0.0	2	0.00	0.0	90	0.00	0.0	65	0.37	20.2	40	0.56	18.8	30	0.00	0.0	25	0.00	0.0	20	0.26	4.4	43.4
A-3	1.57	100	0.00	0.0	2	0.00	0.0	90	0.00	0.0	65	0.59	24.4	40	0.98	25.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	49.4
A-4	2.24	100	0.00	0.0	2	0.00	0.0	90	0.00	0.0	65	0.93	27.0	40	0.88	15.7	30	0.00	0.0	25	0.00	0.0	20	0.43	3.8	46.5
C-1	1.35	100	0.03	2.1	2	0.16	0.2	90	0.00	0.0	65	1.16	55.9	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	58.2
C-2	6.80	100	0.00	0.0	2	0.00	0.0	90	0.00	0.0	65	2.61	24.9	40	2.75	16.2	30	0.50	2.2	25	0.94	3.5	20	0.00	0.0	46.8
C-3	2.38	100	0.00	0.0	2	0.00	0.0	90	0.00	0.0	65	1.61	44.0	40	0.77	12.9	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	56.9
C-4	3.61	100	0.00	0.0	2	0.00	0.0	90	0.00	0.0	65	2.86	51.4	40	0.75	8.4	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	59.8

Basin ID	Total Area (ac)	Paved Roads			Lawns			Roofs			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.	% Imp.	Area (ac)	Weighted % Imp.	
C-5	7.86	100	0.00	0.0	2	0.00	0.0	90	0.00	0.0	65	6.53	54.0	40	1.33	6.8	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	60.8
C-6	5.54	100	0.00	0.0	2	0.00	0.0	90	0.00	0.0	65	3.14	36.8	40	1.60	11.6	30	0.80	4.3	25	0.00	0.0	20	0.00	0.0	52.7
C-7	0.89	100	0.00	0.0	2	0.89	2.0	90	0.00	0.0	65	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-8	0.42	100	0.00	0.0	2	0.42	2.0	90	0.00	0.0	65	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
E-1	1.71	100	0.78	45.6	2	0.23	0.3	90	0.00	0.0	65	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	90	0.00	0.0	65	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	90	0.00	0.0	65	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	90	0.00	0.0	65	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	90	0.00	0.0	65	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
F-1	0.44	100	0.00	0.0	2	0.00	0.0	90	0.00	0.0	65	0.00	0.0	40	0.41	37.3	30	0.00	0.0	25	0.00	0.0	20	0.03	1.4	38.7
F-2	0.55	100	0.21	38.2	2	0.11	0.4	90	0.00	0.0	65	0.23	27.2	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	65.8
G-1	1.47	100	0.00	0.0	2	0.64	0.9	90	0.00	0.0	65	0.25	11.1	40	0.08	2.2	30	0.20	4.1	25	0.30	5.1	20	0.00	0.0	23.4
H-1	0.52	100	0.00	0.0	2	0.52	2.0	90	0.00	0.0	65	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
I-1	0.31	100	0.22	71.0	2	0.09	0.6	90	0.00	0.0	65	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	71.6
BENT GRASS WEST BASINS																										
EX-1	1.19	100	0.00	0.0	2	1.19	2.0	2	0.00	0.0	65	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	1.56	100	0.00	0.0	2	1.56	2.0	90	0.00	0.0	65	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	0.62	100	0.00	0.0	2	0.62	2.0	1	0.00	0.0	65	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-4	12.49	100	0.00	0.0	2	12.49	2.0	90	0.00	0.0	65	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-5	5.15	100	0.00	0.0	2	5.15	2.0	10	0.00	0.0	65	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-6	9.53	100	0.00	0.0	2	9.53	2.0	90	0.00	0.0	65	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-7	9.16	100	0.00	0.0	2	9.16	2.0	18	0.00	0.0	65	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-8	21.30	100	0.00	0.0	2	21.30	2.0	90	0.00	0.0	65	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
MERIDIAN ROAD BASIN																										
P-1	2.03	100	1.29	63.6	2	0.74	0.7	90	0.00	0.0	65	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	64.3



COMPOSITE RUNOFF COEFFICIENT CALCULATIONS (CURRENT CONDITIONS)

Subdivision: Bent Grass

Location: CO, Colorado Springs

Project Name: Falcon Meadows at Bent Grass

Project No.: CLH017.20

Calculated By: TJE

Checked By: CMD

Date: 3/23/20

Basin ID	Total Area (ac)	Paved/Gravel Roads			Lawns/Undeveloped			Roofs			Residential - 1/8 Acre			Residential - 1/4 Acre			Residential - 1/3 Acre			Residential - 1/2 Acre			Residential - 1 Acre			Composite C <sub>5</sub>	Composite C <sub>100</sub>
		C <sub>5</sub>	C <sub>100</sub>	Area (ac)	C <sub>5</sub>	C <sub>100</sub>	Area (ac)	C <sub>5</sub>	C <sub>100</sub>	Area (ac)	C <sub>5</sub>	C <sub>100</sub>	Area (ac)	C <sub>5</sub>	C <sub>100</sub>	Area (ac)	C <sub>5</sub>	C <sub>100</sub>	Area (ac)	C <sub>5</sub>	C <sub>100</sub>	Area (ac)	C <sub>5</sub>	C <sub>100</sub>	Area (ac)		
OFFSITE BASINS																											
WT200	192.00																									0.20	0.44
OS-2	20.08	0.90	0.96	0.90	0.09	0.36	18.62	0.73	0.81	0.56	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	10.62	0.90	0.96	0.48	0.09	0.36	9.84	0.73	0.81	0.30	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-24	2.64	0.90	0.96	0.00	0.09	0.36	2.64	0.73	0.81	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	0.09	0.36
OS-25	14.13	0.90	0.96	0.17	0.09	0.36	13.71	0.73	0.81	0.22	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	0.11	0.37
OS-26	5.81	0.90	0.96	0.00	0.09	0.36	5.81	0.73	0.81	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	0.09	0.36
H5	11.30	0.90	0.96	0.00	0.09	0.36	5.81	0.73	0.81	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	0.05	0.19
OS-22	4.42	0.90	0.96	0.00	0.09	0.36	4.42	0.73	0.81	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	0.09	0.36
OS-23	10.24	0.90	0.96	0.00	0.09	0.36	10.24	0.73	0.81	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	0.09	0.36
BENT GRASS EAST COMMER FILING NO. 1 BASINS																											
C1a	0.48	0.90	0.96	0.36	0.09	0.36	0.12	0.73	0.81	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	0.70	0.81
C1b	0.88	0.90	0.96	0.68	0.09	0.36	0.20	0.73	0.81	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	0.72	0.82
C1c	1.09	0.90	0.96	0.88	0.09	0.36	0.21	0.73	0.81	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	0.74	0.84
D1a	0.56	0.90	0.96	0.33	0.09	0.36	0.23	0.73	0.81	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	0.57	0.71
D1b	0.68	0.90	0.96	0.17	0.09	0.36	0.21	0.73	0.81	0.30	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	0.57	0.71
D1c	1.20	0.90	0.96	0.19	0.09	0.36	0.34	0.73	0.81	0.67	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	0.58	0.71
D1d	2.79	0.90	0.96	0.50	0.09	0.36	0.76	0.73	0.81	1.53	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	0.59	0.71
C2a	1.26	0.90	0.96	0.74	0.09	0.36	0.52	0.73	0.81	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	0.57	0.71
C2b	0.99	0.90	0.96	0.92	0.09	0.36	0.07	0.73	0.81	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	0.84	0.92
D2a	1.00	0.90	0.96	0.19	0.09	0.36	0.65	0.73	0.81	0.16	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	0.35	0.55
D2b	0.41	0.90	0.96	0.11	0.09	0.36	0.20	0.73	0.81	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	0.46	0.63
H1a	0.40	0.90	0.96	0.16	0.09	0.36	0.20	0.73	0.81	0.04	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	0.48	0.65
H1b	2.52	0.90	0.96	0.40	0.09	0.36	1.22	0.73	0.81	0.86	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	0.44	0.60
H1c	0.16	0.90	0.96	0.05	0.09	0.36	0.09	0.73	0.81	0.02	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	0.42	0.60
H2a	1.09	0.90	0.96	0.30	0.09	0.36	0.63	0.73	0.81	0.16	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	0.41	0.59
H2b	0.15	0.90	0.96	0.05	0.09	0.36	0.10	0.73	0.81	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	0.36	0.56
F	1.37																									0.40	0.55
G	1.70																									0.40	0.50
H3	1.54																									0.55	0.65
H4	0.42																									0.55	0.65
I1	3.00																									0.55	0.65
I2	1.70																									0.55	0.65
J	1.64																									0.40	0.55
K	1.00																									0.40	0.55
L	5.90																									0.78	0.83
M1	1.56																									0.85	0.90
M2	0.44																									0.85	0.90
N	1.32																									0.85	0.90
D	0.41																									0.82	0.83
BENT GRASS FILING NO. 2 BASINS:																											
OS-1	32.28	0.90	0.96	2.15	0.09	0.36	29.25	0.73	0.81	0.88	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-4	4.46	0.90	0.96	0.00	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	2.28	0.30	0.5												

Basin ID	Total Area (ac)	Paved/Gravel Roads			Lawns/Undeveloped			Roofs			Residential - 1/8 Acre			Residential - 1/4 Acre			Residential - 1/3 Acre			Residential - 1/2 Acre			Residential - 1 Acre			Composite C <sub>5</sub>	Composite C <sub>100</sub>
		C <sub>5</sub>	C <sub>100</sub>	Area (ac)	C <sub>5</sub>	C <sub>100</sub>	Area (ac)	C <sub>5</sub>	C <sub>100</sub>	Area (ac)	C <sub>5</sub>	C <sub>100</sub>	Area (ac)	C <sub>5</sub>	C <sub>100</sub>	Area (ac)	C <sub>5</sub>	C <sub>100</sub>	Area (ac)	C <sub>5</sub>	C <sub>100</sub>	Area (ac)	C <sub>5</sub>	C <sub>100</sub>	Area (ac)		
E-5	0.89	0.90	0.96	0.79	0.09	0.36	0.10	0.73	0.81	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	0.81	0.89
F-1	0.44	0.90	0.96	0.00	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	0.00	0.30	0.50	0.41	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.03	0.29	0.50
F-2	0.55	0.90	0.96	0.21	0.09	0.36	0.11	0.73	0.81	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	0.55	0.69
G-1	1.47	0.90	0.96	0.00	0.09	0.36	0.64	0.73	0.81	0.00	0.45	0.59	0.25	0.30	0.50	0.08	0.25	0.47	0.20	0.22	0.46	0.30	0.20	0.44	0.00	0.21	0.44
H-1	0.52	0.90	0.96	0.00	0.09	0.36	0.52	0.73	0.81	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	0.09	0.36
I-1	0.31	0.90	0.96	0.22	0.09	0.36	0.09	0.73	0.81	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	0.66	0.79
BENT GRASS WEST BASINS:																											
EX-1	1.19	0.90	0.96	0.00	0.09	0.36	1.19	0.73	0.81	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	0.09	0.36
EX-2	1.56	0.90	0.96	0.00	0.09	0.36	1.56	0.73	0.81	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	0.09	0.36
EX-3	0.62	0.90	0.96	0.00	0.09	0.36	0.62	0.73	0.81	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	0.09	0.36
EX-4	12.49	0.90	0.96	0.00	0.09	0.36	12.49	0.73	0.81	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	0.09	0.36
EX-5	5.15	0.90	0.96	0.00	0.09	0.36	5.15	0.73	0.81	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	0.09	0.36
EX-6	9.53	0.90	0.96	0.00	0.09	0.36	9.53	0.73	0.81	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	0.09	0.36
EX-7	9.16	0.90	0.96	0.00	0.09	0.36	9.16	0.73	0.81	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	0.09	0.36
EX-8	21.30	0.90	0.96	0.00	0.09	0.36	21.30	0.73	0.81	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	0.09	0.36
PROPOSED:																											
P-1	2.03	0.90	0.96	1.29	0.09	0.36	0.74	0.73	0.81	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	0.60	0.74

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

# **STANDARD FORM SF-2 TIME OF CONCENTRATION CURRENT CONDITIONS**

**Subdivision:** Bent Grass  
**Location:** CO, Colorado Springs

**Project Name:** Falcon Meadows at Bent Grass

**Project No.:** CLH017.20

**Calculated By:** TJE

**Checked By:** CMD

**Date:** 3/23/20

SUB-BASIN						INITIAL/OVERLAND			TRAVEL TIME					Tc CHECK			FINAL	
DATA						(Ti)			(Ti)					(URBANIZED BASINS)				
BASIN ID	D.A. (AC)	Hydrologic Soils Group	Impervious (%)	C <sub>5</sub>	C100	L (FT)	S (%)	T <sub>i</sub> (MIN)	L (FT)	S (%)	Cv	VEL. (FPS)	T <sub>i</sub> (MIN)	COMP. T <sub>c</sub> (MIN)	TOTAL LENGTH (FT)	Urbanized T <sub>c</sub> (MIN)		T <sub>c</sub> (MIN)
OFFSITE BASINS																		
WT200	192.00	A	10.0	0.20	0.44	300	2.0	22.7	2060	2.0	15	2.1	16.2	38.8	2360.0	23.1	23.1	
OS-2	20.08	A	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	10.62	A	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	
OS-24	2.64	A	2.0	0.09	0.36	100	6.0	10.2	1460	2.0	15	2.1	11.5	21.7	1560.0	18.7	18.7	
OS-25	14.13	A	4.5	0.11	0.37	100	6.0	10.0	1230	1.7	15	2.0	10.5	20.5	1330.0	17.4	17.4	
OS-26	5.81	A	2.0	0.09	0.36	100	1.0	18.5	650	1.0	10	1.0	10.8	29.3	750.0	14.2	14.2	
H5	11.30	A	1.0	0.05	0.19	100	1.0	19.2	600	1.0	10	1.0	10.0	29.2	700.0	13.9	13.9	
OS-22	4.42	A	2.0	0.09	0.36	100	1.0	18.5	600	1.0	10	1.0	10.0	28.5	700.0	13.9	13.9	
OS-23	10.24	A	2.0	0.09	0.36	100	1.0	18.5	600	1.0	10	1.0	10.0	28.5	700.0	13.9	13.9	
BENT GRASS EAST COMMERCIAL & FILING NO. 1 BASINS																		
C1a	0.48	A	75.5	0.70	0.81	5	2.0	1.3	400	1.0	20	2.0	3.3	4.6	405.0	12.3	5.0	
C1b	0.88	A	77.7	0.72	0.82	10	2.0	1.7	310	2.0	20	2.8	1.8	3.6	320.0	11.8	5.0	
C1c	1.09	A	81.1	0.74	0.84	50	2.0	3.7	310	2.0	20	2.8	1.8	5.5	360.0	12.0	5.5	
D1a	0.56	A	59.8	0.57	0.71	5	2.0	1.7	400	1.0	20	2.0	3.3	5.1	405.0	12.3	5.1	
D1b	0.68	A	65.3	0.57	0.71	10	2.0	2.4	310	2.0	20	2.8	1.8	4.3	320.0	11.8	5.0	
D1c	1.20	A	66.7	0.58	0.71	50	2.0	5.3	310	2.0	20	2.8	1.8	7.2	360.0	12.0	7.2	
D1d	2.79	A	67.8	0.59	0.71	100	2.0	7.4	485	2.0	20	2.8	2.9	10.3	585.0	13.3	10.3	
C2a	1.26	A	59.6	0.57	0.71	12	2.0	2.7	965	1.0	20	2.0	8.0	10.7	977.0	15.4	10.7	
C2b	0.99	A	93.1	0.84	0.92	12	2.0	1.3	1190	1.0	20	2.0	9.9	11.2	1202.0	16.7	11.2	
D2a	1.00	A	34.7	0.35	0.55	5	2.0	2.4	310	2.0	20	2.8	1.8	4.3	315.0	11.8	5.0	
D2b	0.41	A	49.8	0.46	0.63	5	2.0	2.1	225	2.0	20	2.8	1.3	3.4	230.0	11.3	5.0	
H1a	0.40	A	50.0	0.48	0.65	10	2.0	2.8	310	2.0	20	2.8	1.8	4.7	320.0	11.8	5.0	
H1b	2.52	A	47.6	0.44	0.60	50	2.0	6.8	575	1.0	20	2.0	4.8	11.6	625.0	13.5	11.6	
H1c	0.16	A	43.6	0.42	0.60	5	2.0	2.2	100	1.0	20	2.0	0.8	3.0	105.0	10.6	5.0	
H2a	1.09	A	41.9	0.41	0.59	50	2.0	7.1	575	1.0	20	2.0	4.8	11.9	625.0	13.5	11.9	
H2b	0.15	A	34.7	0.36	0.56	5	2.0	2.4	100	1.0	20	2.0	0.8	3.2	105.0	10.6	5.0	
F	1.37	A	40.0	0.40	0.55	80	4.5	6.9						6.9	80.0	10.4	6.9	
G	1.70	A	40.0	0.40	0.50	240	1.5	17.3						17.3	240.0	11.3	11.3	
H3	1.54	A	75.0	0.55	0.65	100	0.5	12.6	350	2.0		4.9	1.2	13.8	450.0	12.5	12.5	
H4	0.42	A	75.0	0.55	0.65	50	0.5	8.9	150	2.0		4.9	0.5	9.4	200.0	11.1	9.4	
I1	3.00	A	75.0	0.55	0.65	50	0.5	8.9	550	2.0		4.9	1.9	10.7	600.0	13.3	10.7	
I2	1.70	A	75.0	0.55	0.65	50	0.5	8.9	300	2.0		4.9	1.0	9.9	350.0	11.9	9.9	
J	1.64	A	55.0	0.40	0.55	75	2.8	7.9						7.9	75.0	10.4	7.9	
K	1.00	A	55.0	0.40	0.55	65	2.4	7.7						7.7	65.0	10.4	7.7	
L	5.90	A	90.0	0.78	0.83	50	0.2	6.9	800	1.0		3.5	3.8	10.7	850.0	14.7	10.7	

# STANDARD FORM SF-2 TIME OF CONCENTRATION CURRENT CONDITIONS

Subdivision: Bent Grass  
Location: CO, Colorado Springs

Project Name: Falcon Meadows at Bent Grass

Project No.: CLH017.20

Calculated By: TJE

Checked By: CMD

Date: 3/23/20

SUB-BASIN						INITIAL/OVERLAND			TRAVEL TIME					Tc CHECK			FINAL
DATA						(T <sub>i</sub> )			(T <sub>i</sub> )					(URBANIZED BASINS)			
BASIN ID	D.A. (AC)	Hydrologic Soils Group	Impervious (%)	C <sub>5</sub>	C100	L (FT)	S (%)	T <sub>i</sub> (MIN)	L (FT)	S (%)	C <sub>v</sub>	VEL. (FPS)	T <sub>i</sub> (MIN)	COMP. T <sub>c</sub> (MIN)	TOTAL LENGTH (FT)	Urbanized T <sub>c</sub> (MIN)	
M1	1.56	A	95.0	0.85	0.90	50	0.1	6.9	300	1.0		3.5	1.4	8.3	350.0	11.9	8.3
M2	0.44	A	95.0	0.85	0.90									0.0	0.0	10.0	5.0
N	1.32	A	95.0	0.85	0.90	40	0.1	5.7	330	2.0		4.9	1.1	6.8	370.0	12.1	6.8
D	0.41	A	90.0	0.82	0.83	50	2.0	2.9						2.9	50.0	10.3	5.0
BENT GRASS FILING NO. 2 BASINS																	
OS-1	32.28	A	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-4	4.46	A	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	A	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	A	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
A-1	2.70	A	44.7	0.33	0.52	100	1.3	12.9	550	1.3	20	2.3	4.0	16.9	650.0	13.6	13.6
A-2	1.19	A	43.4	0.32	0.51	100	4.3	8.8	310	2.3	20	3.0	1.7	10.5	410.0	12.3	10.5
A-3	1.57	A	49.4	0.36	0.53	70	1.0	11.3	680	1.2	20	2.2	5.2	16.5	750.0	14.2	14.2
A-4	2.24	A	46.5	0.34	0.53	100	4.2	8.6	650	1.7	20	2.6	4.2	12.8	750.0	14.2	12.8
C-1	1.35	A	58.2	0.42	0.57	35	2.4	5.5	400	2.4	20	3.1	2.2	7.7	435.0	12.4	7.7
C-2	6.80	A	46.8	0.34	0.53	100	2.0	11.0	1770	1.5	20	2.4	12.0	23.1	1870.0	20.4	20.4
C-3	2.38	A	56.9	0.40	0.56	100	1.6	11.0	810	1.0	20	2.0	6.8	17.7	910.0	15.1	15.1
C-4	3.61	A	59.8	0.42	0.57	100	2.0	9.9	973	2.0	20	2.8	5.7	15.6	1073.0	16.0	15.6
C-5	7.86	A	60.8	0.42	0.57	100	2.0	9.9	1200	1.3	20	2.3	8.8	18.7	1300.0	17.2	17.2
C-6	5.54	A	52.7	0.38	0.55	100	3.0	9.1	1230	1.5	20	2.4	8.4	17.5	1330.0	17.4	17.4
C-7	0.89	A	2.0	0.09	0.36	80	2.5	12.2	150	2.0	15	2.1	1.2	13.4	230.0	11.3	11.3
C-8	0.42	A	2.0	0.09	0.36	100	2.5	13.6	170	2.5	15	2.4	1.2	14.8	270.0	11.5	11.5
E-1	1.71	A	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	A	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	A	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	A	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	A	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
F-1	0.44	A	38.7	0.29	0.50	66	2.5	8.9	1	1.0	15	1.5	0.0	8.9	67.0	10.4	8.9
F-2	0.55	A	65.8	0.55	0.69	25	2.0	4.0	464	4.0	20	4.0	1.9	5.9	489.0	12.7	5.9
G-1	1.47	A	23.4	0.21	0.44	20	2.0	5.8	700	3.5	15	2.8	4.2	9.9	720.0	14.0	9.9
H-1	0.52	A	2.0	0.09	0.36	25	2.0	7.3	135	2.0	20	2.8	0.8	8.1	160.0	10.9	8.1
I-1	0.31	A	71.6	0.66	0.79	25	2.0	3.2	135	2.0	20	2.8	0.8	4.0	160.0	10.9	5.0
BENT GRASS WEST BASINS																	
EX-1	1.19	A	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	1.56	A	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	0.62	A	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
EX-4	12.49	A	2.0	0.09	0.36	100	2.7	13.3	1180	2.7	15	2.5	8.0	21.3	1280.0	17.1	17.1

# STANDARD FORM SF-2 TIME OF CONCENTRATION CURRENT CONDITIONS

Subdivision: Bent Grass  
Location: CO, Colorado Springs

Project Name: Falcon Meadows at Bent Grass  
Project No.: CLH017.20  
Calculated By: TJE  
Checked By: CMD  
Date: 3/23/20

SUB-BASIN						INITIAL/OVERLAND			TRAVEL TIME					T <sub>c</sub> CHECK			FINAL
DATA						(T <sub>i</sub> )			(T <sub>i</sub> )					(URBANIZED BASINS)			
BASIN ID	D.A. (AC)	Hydrologic Soils Group	Impervious (%)	C <sub>5</sub>	C100	L (FT)	S (%)	T <sub>i</sub> (MIN)	L (FT)	S (%)	C <sub>v</sub>	VEL. (FPS)	T <sub>i</sub> (MIN)	COMP. T <sub>c</sub> (MIN)	TOTAL LENGTH (FT)	Urbanized T <sub>c</sub> (MIN)	
EX-5	5.15	A	2.0	0.09	0.36	100	2.7	13.3	1000	2.7	15	2.5	6.8	20.0	1100.0	16.1	16.1
EX-6	9.53	A	2.0	0.09	0.36	100	2.7	13.3	1700	2.7	15	2.5	11.5	24.8	1800.0	20.0	20.0
EX-7	9.16	A	2.0	0.09	0.36	90	2.7	12.6	1020	2.7	15	2.5	6.9	19.5	1110.0	16.2	16.2
EX-8	21.30	A	2.0	0.09	0.36	100	2.7	13.3	996	2.7	15	2.5	6.7	20.0	1096.0	16.1	16.1
PROPOSED:																	
P-1	2.03	A	64.3	0.60	0.74	100	6.0	5.0	1230	1.7	15	2.0	10.5	15.5	1330.0	17.4	15.5

## NOTES:

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

$T_i = L / 60V$

Velocity  $V = C_v * S^{0.5}$ , S in ft/ft

T<sub>c</sub> Check = 10+L/180

For Urbanized basins a minimum T<sub>c</sub> of 5.0 minutes is required.

For non-urbanized basins a minimum T<sub>c</sub> of 10.0 minutes is required

Type of Land Surface	C <sub>v</sub>
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 (CURRENT CONDITIONS)**  
(RATIONAL METHOD PROCEDURE)

Subdivision: Bent Grass  
Location: CO, Colorado Springs  
Design Storm: 5-Year

Project Name: Falcon Meadows at Bent Grass  
Project No.: CLH017.20  
Calculated By: TJE  
Checked By: CMD  
Date: 3/23/20

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)
OFFSITE BASINS																					
		RWT202	1574.40						46.6	120.88	1.82	220.0								From Falcon DBPS by Matrix	
		RWT204	38.40						11.4	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	
		OS-2	20.08	0.14	18.3	2.81	3.22	9.0													
		OS-3	10.62	0.14	18.9	1.49	3.18	4.7													
		OS-24	2.64	0.09	18.7	0.24	3.19	0.8													
		OS-25	14.13	0.11	17.4	1.55	3.30	5.1													
		OS-26	5.81	0.09	14.2	0.52	3.61	1.9													
		H5	11.30	0.05	13.9	0.57	3.64	2.1													
		OS-22	4.42	0.09	13.9	0.40	3.64	1.5													
		OS-23	10.24	0.09	13.9	0.92	3.64	3.3													
BENT GRASS EAST COMMERCIAL & FILING NO. 1 BASINS																					
		C1a	0.48	0.70	5.0	0.34	5.17	1.8													
		D1a	0.56	0.57	5.1	0.32	5.15	1.6													
		H1a	0.40	0.48	5.0	0.19	5.17	1.0													
		D1b	0.68	0.57	5.0	0.39	5.17	2.0													
		D1c	1.20	0.58	7.2	0.70	4.63	3.2													
		D1d	2.79	0.59	10.3	1.65	4.09	6.7													
		D2a	1.00	0.35	5.0	0.35	5.17	1.8													
		D2b	0.41	0.46	5.0	0.19	5.17	1.0													
		H1b	2.52	0.44	11.6	1.11	3.91	4.3													
		H1c	0.16	0.42	5.0	0.07	5.17	0.4													
		H2a	1.09	0.41	11.9	0.45	3.87	1.7													
		H2b	0.15	0.36	5.0	0.05	5.17	0.3													
		C1b	0.88	0.72	5.0	0.63	5.17	3.3													

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

Subdivision: Bent Grass  
Location: CO, Colorado Springs  
Design Storm: 5-Year

Project Name: Falcon Meadows at Bent Grass  
Project No.: CLH017.20  
Calculated By: TJE  
Checked By: CMD  
Date: 3/23/20

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)	
		C1c	1.09	0.74	5.5	0.81	5.02	4.1													
		C2a	1.26	0.57	10.7	0.72	4.03	2.9													
		C2b	0.99	0.84	11.2	0.83	3.96	3.3													
		F	1.37	0.40	6.9	0.55	4.68	2.6													
		G	1.70	0.40	11.3	0.68	3.94	2.7													
		H3	1.54	0.55	12.5	0.85	3.79	3.2													
		H4	0.42	0.55	9.4	0.23	4.23	1.0													
		I1	3.00	0.55	10.7	1.65	4.02	6.6													
		I2	1.70	0.55	9.9	0.94	4.15	3.9													
		J	1.64	0.40	7.9	0.66	4.48	3.0													
		K	1.00	0.40	7.7	0.40	4.52	1.8													
		L	5.90	0.78	10.7	4.60	4.03	18.5													
		M1	1.56	0.85	8.3	1.33	4.41	5.9													
		M2	0.44	0.85	5.0	0.37	5.17	1.9													
		N	1.32	0.85	6.8	1.12	4.70	5.3													
		D	0.41	0.82	5.0	0.34	5.17	1.8													
BENT GRASS FILING NO. 2 BASINS																					
		OS-1	32.28	0.16	22.2	5.16	2.93	15.1													
		OS-4	4.46	0.36	15.6	1.61	3.46	5.6													
		OS-5	0.46	0.45	5.2	0.21	5.10	1.1													
		OS-6	1.17	0.45	12.9	0.53	3.75	2.0													
		A-1	2.70	0.33	13.6	0.89	3.67	3.3													
		A-2	1.19	0.32	10.5	0.38	4.06	1.5													
		A-3	1.57	0.36	14.2	0.57	3.61	2.1													
		A-4	2.24	0.34	12.8	0.76	3.76	2.9													
		C-1	1.35	0.42	7.7	0.57	4.53	2.6													
		C-2	6.80	0.34	20.4	2.31	3.06	7.1													

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

Subdivision: Bent Grass  
Location: CO, Colorado Springs  
Design Storm: 5-Year

Project Name: Falcon Meadows at Bent Grass  
Project No.: CLH017.20  
Calculated By: TJE  
Checked By: CMD  
Date: 3/23/20

STREET	Design Point	DIRECT RUNOFF							TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			REMARKS
		Basin ID	Area (Ac)	Runoff Coef.	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)	
		C-3	2.38	0.40	15.1	0.95	3.52	3.3													
		C-4	3.61	0.42	15.6	1.52	3.46	5.3													
		C-5	7.86	0.42	17.2	3.30	3.31	10.9													
		C-6	5.54	0.38	17.4	2.11	3.30	7.0													
		C-7	0.89	0.09	11.3	0.08	3.95	0.3													
		C-8	0.42	0.09	11.5	0.04	3.92	0.2													
		E-1	1.71	0.55	11.8	0.94	3.88	3.6													
		E-2	0.68	0.76	6.9	0.52	4.70	2.4													
		E-3	0.78	0.81	7.4	0.63	4.59	2.9													
		E-4	0.91	0.74	8.0	0.67	4.46	3.0													
		E-5	0.89	0.81	7.3	0.72	4.60	3.3													
		F-1	0.44	0.29	8.9	0.13	4.31	0.6													
		F-2	0.55	0.55	5.9	0.30	4.91	1.5													
		G-1	1.47	0.21	9.9	0.31	4.14	1.3													
		H-1	0.52	0.09	8.1	0.05	4.44	0.2													
		I-1	0.31	0.66	5.0	0.20	5.17	1.0													
BENT GRASS WEST BASINS																					
		EX-1	1.19	0.09	15.5	0.11	3.47	0.4													
		EX-2	1.56	0.09	11.7	0.14	3.90	0.5													
		EX-3	0.62	0.09	10.7	0.06	4.02	0.2													
		EX-4	12.49	0.09	17.1	1.12	3.32	3.7													
		EX-5	5.15	0.09	16.1	0.46	3.41	1.6													
		EX-6	9.53	0.09	20.0	0.86	3.09	2.7													
		EX-7	9.16	0.09	16.2	0.82	3.41	2.8													
		EX-8	21.30	0.09	16.1	1.92	3.42	6.6													
MERIDIAN ROAD BASINS																					
		P-1	2.03	0.60	15.5	1.22	3.47	4.2													



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

Subdivision: Bent Grass  
Location: CO, Colorado Springs  
Design Storm: 100-Year

Project Name: Falcon Meadows at Bent Grass  
Project No.: CLH017.20  
Calculated By: TJE  
Checked By: CMD  
Date: 3/23/20

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)
OFFSITE BASINS																					
		RWT202	1574.40						46.6	327.87	3.05	1000.0									From Falcon DBPS by Matrix
		RWT204	38.40						11.4	6.51	6.61	43.0									From Falcon DBPS by Matrix
		WT200	192.00						37.8	53.07	3.58	190.0									From Falcon DBPS by Matrix
		OS-2	20.08	0.40	18.3	8.03	5.41	43.4													
		OS-3	10.62	0.40	18.9	4.25	5.33	22.7													
		OS-24	2.64	0.36	18.7	0.95	5.36	5.1													
		OS-25	14.13	0.37	17.4	5.23	5.54	29.0													
		OS-26	5.81	0.36	14.2	2.09	6.05	12.6													
		H5	11.30	0.19	13.9	2.15	6.10	13.1													
		OS-22	4.42	0.36	13.9	1.59	6.10	9.7													
		OS-23	10.24	0.36	13.9	3.69	6.10	22.5													
BENT GRASS EAST COMMERCIAL & FILING NO. 1 BASINS																					
		C1a	0.48	0.81	5.0	0.39	8.68	3.4													
		D1a	0.56	0.71	5.1	0.40	8.65	3.5													
		H1a	0.40	0.65	5.0	0.26	8.68	2.3													
		D1b	0.68	0.71	5.0	0.48	8.68	4.2													
		D1c	1.20	0.71	7.2	0.85	7.77	6.6													
		D1d	2.79	0.71	10.3	1.98	6.87	13.6													
		D2a	1.00	0.55	5.0	0.55	8.68	4.8													
		D2b	0.41	0.63	5.0	0.26	8.68	2.3													
		H1b	2.52	0.60	11.6	1.51	6.56	9.9													
		H1c	0.16	0.60	5.0	0.10	8.68	0.9													
		H2a	1.09	0.59	11.9	0.64	6.50	4.2													
		H2b	0.15	0.56	5.0	0.08	8.68	0.7													
		C1b	0.88	0.82	5.0	0.72	8.68	6.2													
		C1c	1.09	0.84	5.5	0.92	8.43	7.8													

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

Subdivision: Bent Grass  
Location: CO, Colorado Springs  
Design Storm: 100-Year

Project Name: Falcon Meadows at Bent Grass  
Project No.: CLH017.20  
Calculated By: TJE  
Checked By: CMD  
Date: 3/23/20

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)	
		C2a	1.26	0.71	10.7	0.89	6.76	6.0												
		C2b	0.99	0.92	11.2	0.91	6.64	6.0												
		F	1.37	0.55	6.9	0.75	7.85	5.9												
		G	1.70	0.50	11.3	0.85	6.62	5.6												
		H3	1.54	0.65	12.5	1.00	6.37	6.4												
		H4	0.42	0.65	9.4	0.27	7.10	1.9												
		I1	3.00	0.65	10.7	1.95	6.76	13.2												
		I2	1.70	0.65	9.9	1.11	6.96	7.7												
		J	1.64	0.55	7.9	0.90	7.52	6.8												
		K	1.00	0.55	7.7	0.55	7.59	4.2												
		L	5.90	0.83	10.7	4.90	6.77	33.2												
		M1	1.56	0.90	8.3	1.40	7.41	10.4												
		M2	0.44	0.90	5.0	0.40	8.68	3.5												
		N	1.32	0.90	6.8	1.19	7.89	9.4												
		D	0.41	0.83	5.0	0.34	8.68	3.0												
BENT GRASS FILING NO. 2 BASINS																				
		OS-1	32.28	0.41	22.2	13.23	4.92	65.1												
		OS-4	4.46	0.54	15.6	2.41	5.81	14.0												
		OS-5	0.46	0.59	5.2	0.27	8.56	2.3												
		OS-6	1.17	0.59	12.9	0.69	6.30	4.3												
		A-1	2.70	0.52	13.6	1.40	6.16	8.6												
		A-2	1.19	0.51	10.5	0.61	6.81	4.2												
		A-3	1.57	0.53	14.2	0.83	6.05	5.0												
		A-4	2.24	0.53	12.8	1.19	6.31	7.5												
		C-1	1.35	0.57	7.7	0.77	7.61	5.9												
		C-2	6.80	0.53	20.4	3.60	5.14	18.5												
		C-3	2.38	0.56	15.1	1.33	5.90	7.8												

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

Subdivision: Bent Grass  
Location: CO, Colorado Springs  
Design Storm: 100-Year

Project Name: Falcon Meadows at Bent Grass  
Project No.: CLH017.20  
Calculated By: TJE  
Checked By: CMD  
Date: 3/23/20

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)	
		C-4	3.61	0.57	15.6	2.06	5.81	12.0												
		C-5	7.86	0.57	17.2	4.48	5.56	24.9												
		C-6	5.54	0.55	17.4	3.05	5.54	16.9												
		C-7	0.89	0.36	11.3	0.32	6.63	2.1												
		C-8	0.42	0.36	11.5	0.15	6.58	1.0												
		E-1	1.71	0.69	11.8	1.18	6.51	7.7												
		E-2	0.68	0.85	6.9	0.58	7.89	4.6												
		E-3	0.78	0.89	7.4	0.69	7.70	5.3												
		E-4	0.91	0.84	8.0	0.76	7.50	5.7												
		E-5	0.89	0.89	7.3	0.79	7.73	6.1												
		F-1	0.44	0.50	8.9	0.22	7.23	1.6												
		F-2	0.55	0.69	5.9	0.38	8.25	3.1												
		G-1	1.47	0.44	9.9	0.65	6.95	4.5												
		H-1	0.52	0.36	8.1	0.19	7.45	1.4												
		I-1	0.31	0.79	5.0	0.24	8.68	2.1												
BENT GRASS WEST BASINS																				
		EX-1	1.19	0.36	15.5	0.43	5.83	2.5												
		EX-2	1.56	0.36	11.7	0.56	6.54	3.7												
		EX-3	0.62	0.36	10.7	0.22	6.76	1.5												
		EX-4	12.49	0.36	17.1	4.50	5.58	25.1												
		EX-5	5.15	0.36	16.1	1.85	5.73	10.6												
		EX-6	9.53	0.36	20.0	3.43	5.19	17.8												
		EX-7	9.16	0.36	16.2	3.30	5.72	18.9												
		EX-8	21.30	0.36	16.1	7.67	5.73	43.9												
MERIDIAN ROAD BASIN																				
		P-1	2.03	0.74	15.5	1.50	5.82	8.7												

## BENT GRASS/MERIDIAN ROAD - MDDP SURFACE ROUTING - CURRENT CONDITIONS

DESIGN POINT	CONTRIBUTING BASINS	CA (equivalent)		Tc (min.)	INTENSITY		TOTAL FLOWS		NOTES
		CA(5)	CA(100)		I(5) (in/hr)	I(100) (in/hr)	Q(5) (cfs)	Q(100) (cfs)	
FILING NO. 2:									
	RWT202	124.80	324.77	46.6	1.8	3.1	220.0	1000.0	
		TRAVEL TIME							
		124.80	324.77	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
					5.0	0.0	46.6		
	RWT204	1.83	6.43	11.4	3.8	6.7	7.0	43.0	
		TRAVEL TIME							
		1.83	6.43	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
					5.0	0.0	11.4		
	WT200	25.81	54.00	37.8	2.0	3.5	52.0	190.0	
		TRAVEL TIME							
		25.81	54.00	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
					5.0	0.0	37.8		
40	OS-1 RWT202 RWT204 WT200	5.16	13.23	46.6	1.8	3.1	277.8	1226.8	
		124.80	324.77						
		1.83	6.43						
		25.81	54.00						
		157.60	398.43	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
			CHANNEL	850	4.0	3.5	50.1		
1	A-1	0.89	1.40	13.6	3.5	6.2	3.1	8.6	
		TRAVEL TIME							
		0.89	1.40	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
			STREET	140	2.0	1.2	14.8		
2	A-2 DP 1	0.38	0.61	14.8	3.4	5.9	4.3	11.9	
		0.89	1.40						
		1.27	2.01	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
			STREET	275	2.4	1.9	16.7		
3	A-3 DP 2	0.57	0.83	16.7	3.2	5.6	5.9	15.9	
		1.27	2.01						
		1.84	2.84	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
			STREET	40	2.4	0.3	17.0		
4	A-4 DP 3	0.76	1.19	17.0	3.2	5.5	8.3	22.3	
		1.84	2.84						
		2.60	4.03	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
			STREET	780	2.0	6.5	23.5		
5	EX-5	0.46	1.85	16.1	3.3	5.7	1.5	10.5	@ GRADE INLET
		TRAVEL TIME							
		0.46	1.85	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
			STREET	80	2.0	0.7	16.8		
6	EX-4 FB DP 5	1.12	4.50	17.1	3.2	5.5	3.5	34.4	@ GRADE INLET
		0.00	1.74						
		1.12	6.24	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
			STREET	460	2.0	3.8	20.9		
7	E-3	0.63	0.69	7.4	4.6	8.0	2.9	5.5	SUMP INLET
		TRAVEL TIME							
		0.63	0.69	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
					2.6	0.0	7.4		
8	E-1 E-2 DP 4 FB DP 6	0.94	1.18	23.5	2.7	4.7	11.2	32.7	SUMP INLET
		0.52	0.58						
		2.60	4.03						
		0.15	1.22						
		4.21	7.01	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
					2.6	0.0	23.5		

DESIGN POINT	CONTRIBUTING BASINS	CA (equivalent)		Tc (min.)	INTENSITY		TOTAL FLOWS		NOTES		
		CA(5)	CA(100)		I(5) (in/hr)	I(100) (in/hr)	Q(5) (cfs)	Q(100) (cfs)			
9	OS-5	0.21	0.27	16.1	3.3	5.7	0.7	1.5			
		TRAVEL TIME									
		0.21	0.27	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)			
			SWALE	125	3.2	0.7	16.7				
10	EX-1 DP 9	0.11	0.43	16.7	3.2	5.6	1.0	3.9			
		0.21	0.27	TRAVEL TIME							
		0.32	0.70	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)			
			SWALE	295	6.2	0.8	17.5				
11	OS-4	1.61	2.41	15.6	3.3	5.8	5.3	13.9			
		TRAVEL TIME									
		1.61	2.41	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)			
					2.6	0.0	15.6				
12	OS-6	0.53	0.69	12.9	3.6	6.3	1.9	4.4			
		TRAVEL TIME									
		0.53	0.69	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)			
					2.6	0.0	12.9				
13	DP 11 DP 12	1.61	2.41	15.6	3.3	5.8	7.1	17.9			
		0.53	0.69	TRAVEL TIME							
		2.14	3.10	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)			
			SWALE	160	6.1	0.4	16.0				
14	EX-2 DP 10 DP 13	0.14	0.56	17.5	3.1	5.5	8.1	23.8			
		0.32	0.70	TRAVEL TIME							
		2.14	3.10	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)			
		2.60	4.36	SWALE	50	6.0	0.1	17.7			
15	EX-3 DP 8 DP 14	0.06	0.22	23.5	2.7	4.7	18.3	54.1			
		4.21	7.01	TRAVEL TIME							
		2.60	4.36	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)			
		6.87	11.59			2.6	0.0	23.5			
15A	NORTH POND RELEASE	2.35	4.08	5.0	5.2	9.1	12.2	37.0			
		TRAVEL TIME									
		2.35	4.08	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)			
					2.6	0.0	5.0				
AA	DP 40 DP 15A			50.1	1.7	2.9	268.8	1181.4			
		TRAVEL TIME									
		157.60	398.43	TRAVEL TIME							
		2.35	4.08	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)			
BB	DP AA DP 7	159.95	402.51	50.6	1.7	2.9	268.3	1176.5			
		0.63	0.69	TRAVEL TIME							
		160.58	403.20	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)			
			CHANNEL	800	5.0	2.7	53.3				
16	C-5	3.30	4.48	11.2	3.9	6.7	12.7	30.2	@ GRADE INLET		
		TRAVEL TIME									
		3.30	4.48	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)			
			STREET	115	2.0	1.0	12.2				
17	C-6	2.11	3.05	11.2	3.9	6.7	8.1	20.5	@ GRADE INLET		
		TRAVEL TIME									
		2.11	3.05	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)			
			STREET	115	2.0	1.0	12.2				
18	C-3 C-4 FB DP 16	0.95	1.33	11.2	3.9	6.7	10.6	32.2	SUMP INLET		
		1.52	2.06	TRAVEL TIME							
		0.29	1.40	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)			
		2.76	4.79			2.6	0.0	11.2			

DESIGN POINT	CONTRIBUTING BASINS	CA (equivalent)		Tc (min.)	INTENSITY		TOTAL FLOWS		NOTES
		CA(5)	CA(100)		I(5) (in/hr)	I(100) (in/hr)	Q(5) (cfs)	Q(100) (cfs)	
19	C-1 C-2 FB DP 17	0.57	0.77	20.4	2.9	5.0	9.5	29.7	SUMP INLET
		2.31	3.60						
		0.42	1.53	T R A V E L T I M E					
		3.30	5.90	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
						2.6	0.0	20.4	
20	G-1	0.31	0.65	9.9	4.1	7.1	1.3	4.6	
				T R A V E L T I M E					
		0.31	0.65	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
						2.6	0.0	9.9	
20A	C-7 DP 18 DP 19 DP 20	0.08	0.32	20.4	2.9	5.0	18.6	58.7	
		2.76	4.79						
		3.30	5.90	T R A V E L T I M E					
		0.31	0.65	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
		6.44	11.65			2.6	0.0	20.4	
20B	SOUTH POND RELEASE	4.11	7.28	5.0	5.2	9.1	21.3	66.0	
				T R A V E L T I M E					
		4.11	7.28	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
						2.6	0.0	5.0	
28	OS-2	2.81	8.03	18.3	3.1	5.3	8.6	42.8	
				T R A V E L T I M E					
		2.81	8.03	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
			SWALE	640	4.0	2.7	21.0		
29	OS-3 DP 28	1.49	4.25	21.0	2.8	5.0	12.2	60.9	
		2.81	8.03	T R A V E L T I M E					
		4.30	12.28	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
			SWALE	475	3.5	2.3	23.3		
21	EX-7	0.82	3.30	16.2	3.3	5.7	2.7	18.7	@ GRADE INLET
				T R A V E L T I M E					
		0.82	3.30	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
			STREET	60	2.0	0.5	16.7		
22	EX-6 FB DP 21	0.86	3.43	20.0	2.9	5.1	2.5	29.6	@ GRADE INLET
		0.00	2.38	T R A V E L T I M E					
		0.86	5.81	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
			STREET	515	2.0	4.3	24.3		
23	DP 29			23.3	2.7	4.7	11.5	57.6	TYPE C INLET
		4.30	12.28	T R A V E L T I M E					
		4.30	12.28	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
			SWALE	190	3.5	0.9	24.2		
24	E-4 OS-24 FB DP 22	0.67	0.76	18.7	3.0	5.3	2.9	21.1	@ GRADE INLET
		0.24	0.95						
		0.07	2.29	T R A V E L T I M E					
		0.98	4.00	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
						2.6	0.0	18.7	
25	E-5 FB DP 24	0.72	0.79	7.3	4.6	8.0	3.3	10.7	@ GRADE INLET
		0.00	0.55	T R A V E L T I M E					
		0.72	1.34	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
						2.6	0.0	7.3	
26	DP 23 DP 24 DP 25	4.30	12.28	24.2	2.6	4.6	15.8	80.9	
		0.98	4.00						
		0.72	1.34	T R A V E L T I M E					
		6.00	17.62	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
27A	EX-8			16.1	3.3	5.7	6.3	43.7	
				T R A V E L T I M E					
		1.92	7.67	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
						2.6	0.0	16.1	

DESIGN POINT	CONTRIBUTING BASINS	CA (equivalent)		Tc (min.)	INTENSITY		TOTAL FLOWS		NOTES
		CA(5)	CA(100)		I(5) (in/hr)	I(100) (in/hr)	Q(5) (cfs)	Q(100) (cfs)	
27B	C-8	0.04	0.15	11.2	3.9	6.7	0.2	1.0	
		T R A V E L   T I M E							
		0.04	0.15	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
					2.6	0.0	11.2		
CC	DP 27A	1.92	7.67	53.3	1.6	2.8	278.8	1229.4	EXITS SITE
	DP 27B	0.04	0.15						
	DP 20B	4.11	7.28						
	DP 26	6.00	17.62						
	BB	160.58	403.20						
	T R A V E L   T I M E								
		172.64	435.93	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
					2.6	0.0	53.3		
EAST OF FILING NO. 2:									
30	Release rate from Meadows Pond 2	0.80	10.76	15.0	3.4	5.9	2.7	63.4	Flows from Meadows Filing No. 3 Pond 2 - Updated HEC HMS model
		T R A V E L   T I M E							
		0.80	10.76	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
		Sheet	2300	2.1	18.3	33.3			
31	OS-25 DP 30	1.55	5.23	33.3	2.2	3.8	5.1	60.9	
		0.80	10.76	T R A V E L   T I M E					
		2.35	15.99	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
		Sheet	700	2.6	4.5	37.7			
32	OS-26 C1a DP 31	0.52	2.09	37.7	2.0	3.5	6.5	65.0	
		0.34	0.39						
		2.35	15.99	T R A V E L   T I M E					
		3.21	18.47	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
				2.0	0.0	37.7			
32-N	DP-32	3.21	9.44	37.7	2.0	3.5	6.5	33.2	Flows remaining in north half of BGMD & continuing east (Max gutter flow allowed 5 Yr=9.4, 100 Yr=33.2)
		T R A V E L   T I M E							
		3.21	9.44	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
		Street	905	2.0	7.5	45.3			
32-S	DP BG 1a OT from DP 32-N	0.32	0.40	37.7	2.0	3.5	0.6	33.2	Flows remaining in south half of BGMD & continuing east (Max gutter flow allowed 5 Yr=9.4 & 100 Yr=33.2)
		0.00	9.04						
		0.32	9.44	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
				2.5	0.0	37.7			
BG 1a-Os		0.00	-0.01	37.7	2.0	3.5	0.0	0.0	Overtopping Flows from DP 32 which will head south through Bent Grass Filing No. 1 in Sea Oats Drive (Sea Oats Dr can carry 2.2 & 11.6 cfs per side)
		T R A V E L   T I M E							
		0.00	-0.01	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
BG 1a-Ose		0.00	0.00	37.7	2.0	3.5	0.0	0.0	Overtopping Flows from DP 1a-Os which will flow in east half of Sea Oats Drive
		T R A V E L   T I M E							
		0.00	0.00	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
BG 1a-Osw		0.00	0.00	37.7	2.0	3.5	0.0	0.0	Overtopping Flows from DP 1a-Os which will flow in west half of Sea Oats Drive
		T R A V E L   T I M E							
		0.00	0.00	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
BG 4a	H1a DP BG 1a-Ose	0.19	0.26	37.7	2.0	3.5	0.4	0.9	Flows to west side of Inlet 4
		0.00	0.00	T R A V E L   T I M E					
		0.19	0.26	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
BG .1b	D1b DP BG 1a-Osw	0.39	0.48	37.7	2.0	3.5	0.8	1.7	
		0.00	0.00	T R A V E L   T I M E					
		0.39	0.48	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
BG 1c	D1c DP BG 1b	0.70	0.85	41.2	1.9	3.3	2.1	4.4	Flows in Aveno Rd to east side of Inlet 1 (Max gutter allowed 1.6 & 8.6 cfs per side)
		0.39	0.48	T R A V E L   T I M E					
		1.09	1.33	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
						2.5	0.0	41.2	

DESIGN POINT	CONTRIBUTING BASINS	CA (equivalent)		Tc (min.)	INTENSITY		TOTAL FLOWS		NOTES	
		CA(5)	CA(100)		I(5) (in/hr)	I(100) (in/hr)	Q(5) (cfs)	Q(100) (cfs)		
BG 1	D1d DP 1c	1.65	1.98	41.2	1.9	3.3	5.2	11.0	Existing 10' Sump Inlet - Total flow to Inlet 1	
		1.09	1.33	T R A V E L T I M E						
		2.74	3.31	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)		
		SUMP		5.0	0.0	41.2				
BG 2e	D2a	0.35	0.55	5.0	5.2	9.1	1.8	5.0	Flows in Aveno Rd to east side of Inlet 2 (Max gutter allowed 1.6 & 8.6 cfs per side)	
				T R A V E L T I M E						
		0.35	0.55	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)		
				5.0	0.0	5.0				
BG 2w	D2b	0.19	0.26	5.0	5.2	9.1	1.0	2.4	Flows in Aveno Rd to west side of Inlet 2 (Max gutter allowed 2.2 & 11.4 cfs per side)	
				T R A V E L T I M E						
		0.19	0.26	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)		
				5.0	0.0	5.0				
BG 2	DP BG 2e DP BG 2w	0.35	0.55	5.0	5.2	9.1	2.8	7.3	Existing 4' Sump Inlet - Total flow to Inlet 2	
		0.19	0.26	T R A V E L T I M E						
		0.54	0.81	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)		
		SUMP		5.0	0.0	5.0				
BG 4e	H1c	0.07	0.10	5.0	5.2	9.1	0.4	0.9	Flows in Aveno Rd to east side of Inlet 4 (Max gutter allowed 1.8 & 9.8 cfs per side)	
				T R A V E L T I M E						
		0.07	0.10	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)		
				5.0	0.0	5.0				
BG 4w	H1b DP BG 4a	1.11	1.51	42.7	1.9	3.3	2.4	5.7	Flows in Aveno Rd to west side of Inlet 4 (Max gutter allowed 2.1 & 11.3 cfs per side)	
		0.19	0.26	T R A V E L T I M E						
		1.30	1.77	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)		
				5.0	0.0	42.7				
BG 4	DP BG 4e DP BG 4w	0.07	0.10	42.7	1.9	3.3	2.6	6.1	Existing 4' Sump Inlet	
		1.30	1.77	T R A V E L T I M E						
		1.37	1.87	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)		
		SUMP		5.0	0.0	42.7				
BG 5e	H2b	0.05	0.08	5.0	5.2	9.1	0.3	0.7	Flows in Aveno Rd to east side of Inlet 5 (Max gutter allowed 1.8 & 9.8 cfs per side)	
				T R A V E L T I M E						
		0.05	0.08	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)		
				5.0	0.0	5.0				
BG 5w	H2a	0.45	0.64	11.9	3.8	6.6	1.7	4.2	Flows in Aveno Rd to west side of Inlet 5 (Max gutter allowed 2.1 & 11.3 cfs per side)	
				T R A V E L T I M E						
		0.45	0.64	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)		
				5.0	0.0	11.9				
BG 5	DP BG 5e DP BG 5w	0.05	0.08	11.9	3.8	6.6	1.9	4.7	Existing 4' Sump Inlet	
		0.45	0.64	T R A V E L T I M E						
		0.50	0.72	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)		
		SUMP		5.0	0.0	11.9				
BG 3	G DP BG 1 DP BG 2	0.68	0.85	41.2	1.9	3.3	7.6	16.6	Flows into BG Pond 1 from West side	
		2.74	3.31	T R A V E L T I M E						
		0.54	0.81	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)		
		3.96	4.97			2.8	0.0	41.2		
BG 6	DP BG 4 DP BG 5	1.37	1.87	42.7	1.9	3.3	3.5	8.4	Flows into BG Pond 1 from East Side	
		0.50	0.72	T R A V E L T I M E						
		1.87	2.59	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)		
				5.0	0.0	42.7				
	DP BG 3 DP BG 6	3.96	4.97	42.7	1.9	3.3	10.9	24.6	Total flows into BG Pond 1	
		1.87	2.59	T R A V E L T I M E						
		5.83	7.55	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)		
		SUMP		5.0	0.0	42.7				
BG POND1	BG POND 1 RELEASE	0.10	2.43	5.0	5.2	9.1	0.5	22.0		
				T R A V E L T I M E						
		0.10	2.43	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)		
				2.6	0.0	5.0				



DESIGN POINT	CONTRIBUTING BASINS	CA (equivalent)		Tc (min.)	INTENSITY		TOTAL FLOWS		NOTES	
		CA(5)	CA(100)		I(5) (in/hr)	I(100) (in/hr)	Q(5) (cfs)	Q(100) (cfs)		
BG 14n	OS-2 H5 C1b DP 32-N	2.81	8.03	45.3	1.8	3.1	13.0	63.8	Flow continuing in North half of BGMD	
		0.57	2.15							
		0.63	0.72							
		3.21	9.44	T R A V E L T I M E						
		7.22	20.34	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)		
			Street	300	2.8	1.8	47.1			
BG 15n	OS-3 D1c DP BG 14n	1.49	4.25	47.1	1.8	3.1	12.6	62.2	Flow continuing in North half of BGMD	
		0.70	0.85							
		7.22	20.34	T R A V E L T I M E						
		9.41	25.44	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)		
						5.0	0.0	47.1		
BG 50		111.34	193.50	26.1	2.5	4.4	280.0	850.0	Flow from Falcon DBPS at Meridian Rd & BGMD Intersection	
		T R A V E L T I M E								
				Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)		
						5.0	0.0	26.1		
BG 20	DP BG 15n DP BG 50	9.41	25.44	26.1	2.5	4.4	303.7	961.8	Combined flow at Culvert Crossing - North side of BGMD	
		111.34	193.50	T R A V E L T I M E						
		120.75	218.94	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)		
			Culverts	125	11.2	0.2	26.3			
BG 14s	C2a DP 32-S	0.72	0.89	37.7	2.0	3.5	1.5	36.4	Flow continuing in South half of BGMD	
			9.44	T R A V E L T I M E						
		0.72	10.33	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)		
			Street	300	2.8	1.8	39.5			
BG 15s	C2b DP BG 14s	0.83	0.91	39.5	2.0	3.4	3.0	38.5	Flow continuing in South half of BGMD	
		0.72	10.33	T R A V E L T I M E						
		1.55	11.24	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)		
						5.0	0.0	39.5		
BG 21	DP 20 DP BG 15s	120.75	218.94	26.3	2.5	4.4	306.3	1007.0	Combined flow at Culvert Crossing - South side of BGMD	
		1.55	11.24	T R A V E L T I M E						
		122.30	230.18	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)		
			Channel	1250	2.0	10.4	36.7			
BG 32	F	0.55	0.75	6.9	4.7	8.1	2.6	6.1		
		T R A V E L T I M E								
		0.55	0.75	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)		
						5.0	0.0	6.9		
BG 33	J	0.66	0.90	7.9	4.4	7.8	2.9	7.0		
		T R A V E L T I M E								
		0.66	0.90	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)		
						5.0	0.0	7.9		
BG 7	H3	0.85	1.00	12.5	3.7	6.4	3.1	6.4	Ex 4' Sump Inlet	
		T R A V E L T I M E								
		0.85	1.00	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)		
						5.0	0.0	12.5		
BG 8	H4	0.23	0.27	9.4	4.2	7.3	1.0	2.0	Ex 4' Sump Inlet	
		T R A V E L T I M E								
		0.23	0.27	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)		
						5.0	0.0	9.4		
BG 9	I1	1.65	1.95	10.7	3.9	6.9	6.5	13.4	Ex 6' Sump Inlet	
		T R A V E L T I M E								
		1.65	1.95	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)		
						5.0	0.0	10.7		
BG 10	I2	0.94	1.11	9.9	4.1	7.1	3.8	7.9	Ex 4' Sump Inlet	
		T R A V E L T I M E								
		0.94	1.11	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)		
						5.0	0.0	9.9		

DESIGN POINT	CONTRIBUTING BASINS	CA (equivalent)		Tc (min.)	INTENSITY		TOTAL FLOWS		NOTES
		CA(5)	CA(100)		I(5) (in/hr)	I(100) (in/hr)	Q(5) (cfs)	Q(100) (cfs)	
BG 11	DP BG 7	0.85	1.00	12.5	3.7	6.4	13.5	27.8	Inflow to BG Pond 2 West Storm Sewer
	DP BG 8	0.23	0.27						
	DP BG 9	1.65	1.95						
	DP BG 10	0.94	1.11	T R A V E L T I M E					
		3.67	4.33	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
BG 12	M1	1.33	1.40	8.3	4.4	7.6	5.8	10.7	Ex 6' Sump Inlet
		T R A V E L T I M E							
		1.33	1.40	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
							5.0	0.0	
							0.0	8.3	
BG 13	M2 N	0.37	0.40	6.8	4.7	8.2	7.0	13.0	Ex 6' Sump Inlet
		1.12	1.19	T R A V E L T I M E					
		1.49	1.59	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
							5.0	0.0	
							0.0	6.8	
BG 14	DP BG 12 DP BG 13	1.33	1.40	8.3	4.4	7.6	12.3	22.8	Inflow to BG Pond 2 East Storm Sewer
		1.49	1.59	T R A V E L T I M E					
		2.82	2.99	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
							5.0	0.0	
							0.0	8.3	
BG 15	K L DP BG 11 DP BG 14	0.40	0.55	12.5	3.7	6.4	42.2	82.0	Total Inflow to BG Pond 2
		4.60	4.90						
		3.67	4.33						
		2.82	2.99	T R A V E L T I M E					
		11.49	12.77	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
BG POND2	BG POND 2 RELEASE	0.08	1.10	5.0	5.2	9.1	0.4	10.0	
		T R A V E L T I M E							
		0.08	1.10	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
							2.6	0.0	
							0.0	5.0	
BG 30	PLD RELEASE RATE	0.58	0.55	5.0	5.2	9.1	3.0	5.0	Released flows from existing PLD on 7-11 site
		T R A V E L T I M E							
		0.58	0.55	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
							2.6	0.0	
							0.0	5.0	
BG 31	D	0.34	0.34	5.0	5.2	9.1	1.8	3.1	Future lot for development in Bent Grass East Commercial Filing No. 1
		T R A V E L T I M E							
		0.34	0.34	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
							5.0	0.0	
							0.0	5.0	
BG 25	P-1 DP BG 21 BG 30 BG 31 BG POND 2	1.22	1.50	36.7	2.1	3.6	255.5	837.4	Flow @ Existing Culvert, north side of Owl Place
		122.30	230.18						
		0.58	0.55						
		0.34	0.34	T R A V E L T I M E					
		0.08	1.10	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
		124.51	233.68						
							5.0	0.0	

## **Future Rational Calculations**

COMPOSITE % IMPERVIOUS CALCULATIONS (FUTURE CONDITIONS)

Subdivision: Bent Grass	Falcon Meadows at Bent Grass
Location: CO, Colorado Springs	CLH017.20
	TJE
	CMD
	3/23/20

Basin ID	Total Area (ac)	Paved Roads			Lawns			Roofs			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.	% Imp.	Area (ac)	Weighted % Imp.	
OFFSITE BASINS																										
WT200	192.00																								10.0	
OS-2	20.08	80	0.90	3.6	2	18.62	1.9	90	0.56	2.5	65	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	10.62	80	0.48	3.6	2	9.84	1.9	90	0.30	2.5	65	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-25	18.74	100	0.23	1.2	2	18.18	1.9	90	0.29	1.4	65	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	4.6
OS-26	5.81	100	0.00	0.0	2	5.81	2.0	90	0.00	0.0	65	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
H5	6.37	100	0.00	0.0	2	5.00	1.6	90	0.00	0.0	65	0.00	0.0	40	1.37	8.6	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	10.2
OS-22	4.42	100	0.00	0.0	2	4.42	2.0	90	0.00	0.0	65	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
OS-23	10.24	100	0.00	0.0	2	10.24	2.0	90	0.00	0.0	65	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
BENT GRASS EAST COMMERCIAL & FILING NO. 1 BASINS																										
C1a	0.48	100	0.36	75.0	2	0.12	0.5	90	0.00	0.0	65	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	75.5
C1b	0.88	100	0.68	77.3	2	0.20	0.5	90	0.00	0.0	65	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	77.7
C1c	1.09	100	0.88	80.7	2	0.21	0.4	90	0.00	0.0	65	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	81.1
D1a	0.56	100	0.33	58.9	2	0.23	0.8	90	0.00	0.0	65	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	59.8
D1b	0.68	100	0.17	25.0	2	0.21	0.6	90	0.30	39.7	65	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	65.3
D1c	1.20	100	0.19	15.8	2	0.34	0.6	90	0.67	50.3	65	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	66.7
D1d	2.79	100	0.50	17.9	2	0.76	0.5	90	1.53	49.4	65	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	67.8
C2a	1.26	100	0.74	58.7	2	0.52	0.8	90	0.00	0.0	65	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	59.6
C2b	0.99	100	0.92	92.9	2	0.07	0.1	90	0.00	0.0	65	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	93.1
D2a	1.00	100	0.19	19.0	2	0.65	1.3	90	0.16	14.4	65	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	34.7
D2b	0.41	100	0.11	26.8	2	0.20	1.0	90	0.10	22.0	65	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	49.8
H1a	0.40	100	0.16	40.0	2	0.20	1.0	90	0.04	9.0	65	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	50.0
H1b	2.52	100	0.40	15.9	2	1.22	1.0	90	0.86	30.7	65	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	47.6
H1c	0.16	100	0.05	31.3	2	0.09	1.1	90	0.02	11.3	65	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	43.6
H2a	1.09	100	0.30	27.5	2	0.63	1.2	90	0.16	13.2	65	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	41.9
H2b	0.15	100	0.05	33.3	2	0.10	1.3	90	0.00	0.0	65	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	34.7
F	1.37																								40.0	
G	1.70																								40.0	
H3	1.54																								75.0	
H4	0.42																								75.0	
I1	3.00																								75.0	
I2	1.70																								75.0	
J	1.64																								55.0	
K	1.00																								55.0	
L	5.90																								90.0	
M1	1.56																								95.0	
M2	0.44																								95.0	
N	1.32																								95.0	
D	0.41																								90.0	
BENT GRASS FILING NO. 2 BASINS																										
OS-1	33.07	100	2.20	6.7	2	29.97	1.8	90	0.90	2.4	65	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	10.9
OS-4	4.46	100	0.00	0.0	2	0.00	0.0	90	0.00	0.0	65	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	90	0.00	0.0	65	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	90	0.00	0.0	65	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
A-1	2.70	100	0.00	0.0	2	0.00	0.0	90	0.00	0.0	65	1.18	28.4	40	0.68	10.1	30	0.00	0.0	25	0.00	0.0	20	0.84	6.2	44.7
A-2	1.19	100	0.00	0.0	2	0.00	0.0	90	0.00	0.0	65	0.37	20.2	40	0.56	18.8	30	0.00	0.0	25	0.00	0.0	20	0.26	4.4	43.4
A-3	1.57	100	0.00	0.0	2	0.00	0.0	90	0.00	0.0	65	0.59	24.4	40	0.98	25.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	49.4
A-4	2.24	100	0.00	0.0	2	0.00	0.0	90	0.00	0.0.																

Basin ID	Total Area (ac)	Paved Roads			Lawns			Roofs			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.	% Imp.	Area (ac)	Weighted % Imp.	
F-1	0.44	100	0.00	0.0	2	0.00	0.0	90	0.00	0.0	65	0.00	0.0	40	0.41	37.3	30	0.00	0.0	25	0.00	0.0	20	0.03	1.4	38.7
F-2	0.55	100	0.21	38.2	2	0.11	0.4	90	0.00	0.0	65	0.23	27.2	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	65.8
G-1	1.47	100	0.00	0.0	2	0.64	0.9	90	0.00	0.0	65	0.25	11.1	40	0.08	2.2	30	0.20	4.1	25	0.30	5.1	20	0.00	0.0	23.4
H-1	0.52	100	0.00	0.0	2	0.52	2.0	90	0.00	0.0	65	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
I-1	0.31	100	0.22	71.0	2	0.09	0.6	90	0.00	0.0	65	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	71.6
BENT GRASS WEST BASINS																										
AA-1	2.57	100	0.52	20.2	2	0.20	0.2	90	0.00	0.0	65.0	0.79	20.0	40	0.00	0.0	30	0.31	3.6	25	0.00	0.0	20	0.75	5.8	49.8
AA-2	2.28	100	0.40	17.5	2	0.46	0.4	90	0.00	0.0	65.0	1.43	40.8	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	58.7
B-1	5.25	100	0.00	0.0	2	4.55	1.7	90	0.00	0.0	65.0	0.88	10.9	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	12.6
B-2	4.16	100	0.00	0.0	2	4.41	2.1	90	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	2.1
CC-1	9.07	100	2.14	23.6	2	0.33	0.1	90	0.00	0.0	65.0	4.56	32.7	40	1.70	7.5	30	0.34	1.1	25	0.00	0.0	20	0.00	0.0	65.0
CC-2	1.53	100	0.44	28.8	2	0.19	0.2	90	0.00	0.0	65.0	0.90	38.2	40	0.00	0.0	30	0.25	4.9	25	0.00	0.0	20	0.00	0.0	72.1
CC-3	1.88	100	1.12	59.6	2	0.00	0.0	90	0.00	0.0	65.0	0.76	26.3	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	85.9
CC-4	4.34	100	0.00	0.0	2	1.85	0.9	90	0.00	0.0	65.0	2.49	37.3	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	38.2
CC-5	0.45	100	0.00	0.0	2	0.45	2.0	90	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	2.0
D-1	9.07	100	1.52	16.8	2	0.69	0.2	90	0.00	0.0	65.0	2.35	16.8	40	1.86	8.2	30	1.53	5.1	25	1.12	3.1	20	0.00	0.0	50.2
D-2	7.42	100	2.31	31.1	2	0.76	0.2	90	0.00	0.0	65.0	4.35	38.1	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	69.4
D-3	2.03	100	0.00	0.0	2	0.28	0.3	90	0.00	0.0	65.0	0.36	11.5	40	0.17	3.3	30	0.12	1.8	25	0.00	0.0	20	0.00	0.0	16.9
D-4	4.38	100	1.21	27.6	2	0.63	0.3	90	0.00	0.0	65.0	2.53	37.5	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	65.4
D-5	1.08	100	0.22	20.4	2	0.11	0.2	90	0.00	0.0	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-6	4.01	100	0.91	22.7	2	0.09	0.0	90	0.00	0.0	65.0	3.01	48.8	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	71.5
D-7	6.39	100	0.00	0.0	2	5.59	1.7	90	0.00	0.0	65.0	0.80	8.1	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	9.8
D-8	1.69	100	0.00	0.0	2	1.13	1.3	90	0.00	0.0	65.0	0.56	21.5	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	22.8
MERIDIAN ROAD BASIN																										
P-1	2.03	100	1.29	63.6	2	0.74	0.7	90	0.00	0.0	65	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	64.3

COMPOSITE RUNOFF COEFFICIENT CALCULATIONS (FUTURE CONDITIONS)

Subdivision: Bent Grass	Falcon Meadows at Bent Grass
Location: CO, Colorado Springs	CLH017.20
	TJE
	CMD
	3/23/20

Basin ID	Total Area (ac)	Paved Roads			Lawns			Roofs			Residential - 1/8 Acre			Residential - 1/4 Acre			Residential - 1/3 Acre			Residential - 1/2 Acre			Residential - 1 Acre			Composite C <sub>5</sub>	Composite C <sub>100</sub>	
		C <sub>5</sub>	C <sub>100</sub>	Area (ac)	C <sub>5</sub>	C <sub>100</sub>	Area (ac)	C <sub>5</sub>	C <sub>100</sub>	Area (ac)	C <sub>5</sub>	C <sub>100</sub>	Area (ac)	C <sub>5</sub>	C <sub>100</sub>	Area (ac)	C <sub>5</sub>	C <sub>100</sub>	Area (ac)	C <sub>5</sub>	C <sub>100</sub>	Area (ac)	C <sub>5</sub>	C <sub>100</sub>	Area (ac)			
OFFSITE BASINS																												
WT200	192.00																									0.20	0.44	
OS-2	20.08	0.90	0.96	0.90	0.09	0.36	18.62	0.73	0.81	0.56	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	10.62	0.90	0.96	0.48	0.09	0.36	9.84	0.73	0.81	0.30	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-25	18.74	0.90	0.96	0.23	0.09	0.36	18.18	0.73	0.81	0.29	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	0.11	0.37	
OS-26	5.81	0.90	0.96	0.00	0.09	0.36	5.81	0.73	0.81	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	0.09	0.36	
H5	6.37	0.90	0.96	0.00	0.09	0.36	5.00	0.73	0.81	0.00	0.45	0.59	0.00	0.30	0.50	1.37	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.14	0.39	
OS-22	4.42	0.90	0.96	0.00	0.09	0.36	4.42	0.73	0.81	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	0.09	0.36	
OS-23	10.24	0.90	0.96	0.00	0.09	0.36	10.24	0.73	0.81	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	0.09	0.36	
BENT GRASS EAST COMMERCIAL & FILING NO. 1 BASINS																												
C1a	0.48	0.90	0.96	0.36	0.09	0.36	0.12	0.73	0.81	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	0.70	0.81	
C1b	0.88	0.90	0.96	0.68	0.09	0.36	0.20	0.73	0.81	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	0.72	0.82	
C1c	1.09	0.90	0.96	0.88	0.09	0.36	0.21	0.73	0.81	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	0.74	0.84	
D1a	0.56	0.90	0.96	0.33	0.09	0.36	0.23	0.73	0.81	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	0.57	0.71	
D1b	0.68	0.90	0.96	0.17	0.09	0.36	0.21	0.73	0.81	0.30	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	0.57	0.71	
D1c	1.20	0.90	0.96	0.19	0.09	0.36	0.34	0.73	0.81	0.67	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	0.58	0.71	
D1d	2.79	0.90	0.96	0.50	0.09	0.36	0.76	0.73	0.81	1.53	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	0.59	0.71	
C2a	1.26	0.90	0.96	0.74	0.09	0.36	0.52	0.73	0.81	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	0.57	0.71	
C2b	0.99	0.90	0.96	0.92	0.09	0.36	0.07	0.73	0.81	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	0.84	0.92	
D2a	1.00	0.90	0.96	0.19	0.09	0.36	0.65	0.73	0.81	0.16	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	0.35	0.55	
D2b	0.41	0.90	0.96	0.11	0.09	0.36	0.20	0.73	0.81	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	0.46	0.63	
H1a	0.40	0.90	0.96	0.16	0.09	0.36	0.20	0.73	0.81	0.04	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	0.48	0.65	
H1b	2.52	0.90	0.96	0.40	0.09	0.36	1.22	0.73	0.81	0.86	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	0.44	0.60	
H1c	0.16	0.90	0.96	0.05	0.09	0.36	0.09	0.73	0.81	0.02	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	0.42	0.60	
H2a	1.09	0.90	0.96	0.30	0.09	0.36	0.63	0.73	0.81	0.16	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	0.41	0.59	
H2b	0.15	0.90	0.96	0.05	0.09	0.36	0.10	0.73	0.81	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	0.36	0.56	
F	1.37																									0.40	0.55	
G	1.70																									0.40	0.50	
H3	1.54																									0.55	0.65	
H4	0.42																									0.55	0.65	
I1	3.00																									0.55	0.65	
I2	1.70																									0.55	0.65	
J	1.64																									0.40	0.55	
K	1.00																									0.40	0.55	
L	5.90																									0.78	0.83	
M1	1.56																									0.85	0.90	
M2	0.44																									0.85	0.90	
N	1.32																									0.85	0.90	
D	0.41																									0.82	0.83	
BENT GRASS FILING NO. 2 BASINS:																												
OS-1	33.07	0.90	0.96	2.20	0.09	0.36	29.97	0.73	0.81	0.90	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-4	4.46	0.90	0.96	0.00	0.09	0.36	0.00	0.73	0.81	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	0.73	0.81	0.00	0.45	0.59																

Basin ID	Total Area (ac)	Paved Roads			Lawns			Roofs			Residential - 1/8 Acre			Residential - 1/4 Acre			Residential - 1/3 Acre			Residential - 1/2 Acre			Residential - 1 Acre			Composite C <sub>5</sub>	Composite C <sub>100</sub>	
		C <sub>5</sub>	C <sub>100</sub>	Area (ac)	C <sub>5</sub>	C <sub>100</sub>	Area (ac)	C <sub>5</sub>	C <sub>100</sub>	Area (ac)	C <sub>5</sub>	C <sub>100</sub>	Area (ac)	C <sub>5</sub>	C <sub>100</sub>	Area (ac)	C <sub>5</sub>	C <sub>100</sub>	Area (ac)	C <sub>5</sub>	C <sub>100</sub>	Area (ac)	C <sub>5</sub>	C <sub>100</sub>	Area (ac)			
E-4	0.91	0.90	0.96	0.73	0.09	0.36	0.18	0.73	0.81	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	0.74	0.84	
E-5	0.89	0.90	0.96	0.79	0.09	0.36	0.10	0.73	0.81	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	0.81	0.89	
F-1	0.44	0.90	0.96	0.00	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	0.00	0.30	0.50	0.41	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.03	0.29	0.50	
F-2	0.55	0.90	0.96	0.21	0.09	0.36	0.11	0.73	0.81	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	0.55	0.69	
G-1	1.47	0.90	0.96	0.00	0.09	0.36	0.64	0.73	0.81	0.00	0.45	0.59	0.25	0.30	0.50	0.08	0.25	0.47	0.20	0.22	0.46	0.30	0.20	0.44	0.00	0.21	0.44	
H-1	0.52	0.90	0.96	0.00	0.09	0.36	0.52	0.73	0.81	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	0.09	0.36	
I-1	0.31	0.90	0.96	0.22	0.09	0.36	0.09	0.73	0.81	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	0.66	0.79	
BENT GRASS WEST BASINS:																												
AA-1	2.57	0.90	0.96	0.52	0.09	0.36	0.20	0.73	0.81	0.00	0.45	0.59	0.79	0.30	0.50	0.00	0.25	0.47	0.31	0.22	0.46	0.00	0.20	0.44	0.75	0.42	0.59	
AA-2	2.28	0.90	0.96	0.40	0.09	0.36	0.46	0.73	0.81	0.00	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	0.46	0.61	
B-1	5.25	0.90	0.96	0.00	0.09	0.36	4.55	0.73	0.81	0.00	0.45	0.59	0.88	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.15	0.41	
B-2	4.16	0.90	0.96	0.00	0.09	0.36	4.41	0.73	0.81	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	0.10	0.38	
CC-1	9.07	0.90	0.96	2.14	0.09	0.36	0.33	0.73	0.81	0.00	0.45	0.59	4.56	0.30	0.50	1.70	0.25	0.47	0.34	0.22	0.46	0.00	0.20	0.44	0.00	0.51	0.65	
CC-2	1.53	0.90	0.96	0.44	0.09	0.36	0.19	0.73	0.81	0.00	0.45	0.59	0.90	0.30	0.50	0.00	0.25	0.47	0.25	0.22	0.46	0.00	0.20	0.44	0.00	0.58	0.74	
CC-3	1.88	0.90	0.96	1.12	0.09	0.36	0.00	0.73	0.81	0.00	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	0.72	0.81	
CC-4	4.34	0.90	0.96	0.00	0.09	0.36	1.85	0.73	0.81	0.00	0.45	0.59	2.49	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.30	0.49	
CC-5	0.45	0.90	0.96	0.00	0.09	0.36	0.45	0.73	0.81	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	0.09	0.36	
D-1	9.07	0.90	0.96	1.52	0.09	0.36	0.69	0.73	0.81	0.00	0.45	0.59	2.35	0.30	0.50	1.86	0.25	0.47	1.53	0.22	0.46	1.12	0.20	0.44	0.00	0.41	0.58	
D-2	7.42	0.90	0.96	2.31	0.09	0.36	0.76	0.73	0.81	0.00	0.45	0.59	4.35	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	0.68	
D-3	2.03	0.90	0.96	0.00	0.09	0.36	0.28	0.73	0.81	0.00	0.45	0.59	0.36	0.30	0.50	0.17	0.25	0.47	0.12	0.22	0.46	0.00	0.20	0.44	0.00	0.13	0.22	
D-4	4.38	0.90	0.96	1.21	0.09	0.36	0.63	0.73	0.81	0.00	0.45	0.59	2.53	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.52	0.66	
D-5	1.08	0.90	0.96	0.22	0.09	0.36	0.11	0.73	0.81	0.00	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-6	4.01	0.90	0.96	0.91	0.09	0.36	0.09	0.73	0.81	0.00	0.45	0.59	3.01	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	
D-7	6.39	0.90	0.96	0.00	0.09	0.36	5.59	0.73	0.81	0.00	0.45	0.59	0.80	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	0.39	
D-8	1.69	0.90	0.96	0.00	0.09	0.36	1.13	0.73	0.81	0.00	0.45	0.59	0.56	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.21	0.44	
PROPOSED:																												
P-1	2.03	0.90	0.96	1.29	0.09	0.36	0.74	0.73	0.81	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	0.60	0.74	

# **STANDARD FORM SF-2 TIME OF CONCENTRATION (FUTURE CONDITIONS)**

**Subdivision:** Bent Grass  
**Location:** CO, Colorado Springs

**Project Name:** Falcon Meadows at Bent Grass  
**Project No.:** CLH017.20  
**Calculated By:** TJE  
**Checked By:** CMD  
**Date:** 3/23/20

SUB-BASIN						INITIAL/OVERLAND			TRAVEL TIME					T <sub>c</sub> CHECK			FINAL	
DATA						(T <sub>i</sub> )			(T <sub>t</sub> )					(URBANIZED BASINS)				
BASIN ID	D.A. (AC)	Hydrologic Soils Group	Impervious (%)	C <sub>5</sub>	C100	L (FT)	S (%)	T <sub>i</sub> (MIN)	L (FT)	S (%)	C <sub>v</sub>	VEL. (FPS)	T <sub>t</sub> (MIN)	COMP. T <sub>c</sub> (MIN)	TOTAL LENGTH (FT)	Urbanized T <sub>c</sub> (MIN)		T <sub>c</sub> (MIN)
OFFSITE BASINS																		
WT200	192.00	A	0.0	0.20	0.44	300	2.0	22.7	2060	2.0	15	2.1	16.2	38.8	2360.0	23.1	23.1	
OS-2	20.08	A	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	10.62	A	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	
OS-25	18.74	A	4.6	0.11	0.37	100	1.7	15.2	1730	1.7	15	2.0	14.7	29.9	1830.0	20.2	20.2	
OS-26	5.81	A	2.0	0.09	0.36	100	1.0	18.5	650	1.0	10	1.0	10.8	29.3	750.0	14.2	14.2	
H5	6.37	A	10.2	0.14	0.39	100	1.0	17.6	600	7.0	10	2.6	3.8	21.4	700.0	13.9	13.9	
OS-22	4.42	A	2.0	0.09	0.36	100	1.0	18.5	600	1.0	10	1.0	10.0	28.5	700.0	13.9	13.9	
OS-23	10.24	A	2.0	0.09	0.36	100	1.0	18.5	600	1.0	10	1.0	10.0	28.5	700.0	13.9	13.9	
BENT GRASS EAST COMMERCIAL & FILING NO. 1 BASINS																		
C1a	0.48	A	75.5	0.70	0.81	5	2.0	1.3	400	1.0	20	2.0	3.3	4.6	405.0	12.3	5.0	
C1b	0.88	A	77.7	0.72	0.82	10	2.0	1.7	310	2.0	20	2.8	1.8	3.6	320.0	11.8	5.0	
C1c	1.09	A	81.1	0.74	0.84	50	2.0	3.7	310	2.0	20	2.8	1.8	5.5	360.0	12.0	5.5	
D1a	0.56	A	59.8	0.57	0.71	5	2.0	1.7	400	1.0	20	2.0	3.3	5.1	405.0	12.3	5.1	
D1b	0.68	A	65.3	0.57	0.71	10	2.0	2.4	310	2.0	20	2.8	1.8	4.3	320.0	11.8	5.0	
D1c	1.20	A	66.7	0.58	0.71	50	2.0	5.3	310	2.0	20	2.8	1.8	7.2	360.0	12.0	7.2	
D1d	2.79	A	67.8	0.59	0.71	100	2.0	7.4	485	2.0	20	2.8	2.9	10.3	585.0	13.3	10.3	
C2a	1.26	A	59.6	0.57	0.71	12	2.0	2.7	965	1.0	20	2.0	8.0	10.7	977.0	15.4	10.7	
C2b	0.99	A	93.1	0.84	0.92	12	2.0	1.3	1190	1.0	20	2.0	9.9	11.2	1202.0	16.7	11.2	
D2a	1.00	A	34.7	0.35	0.55	5	2.0	2.4	310	2.0	20	2.8	1.8	4.3	315.0	11.8	5.0	
D2b	0.41	A	49.8	0.46	0.63	5	2.0	2.1	225	2.0	20	2.8	1.3	3.4	230.0	11.3	5.0	
H1a	0.40	A	50.0	0.48	0.65	10	2.0	2.8	310	2.0	20	2.8	1.8	4.7	320.0	11.8	5.0	
H1b	2.52	A	47.6	0.44	0.60	50	2.0	6.8	575	1.0	20	2.0	4.8	11.6	625.0	13.5	11.6	
H1c	0.16	A	43.6	0.42	0.60	5	2.0	2.2	100	1.0	20	2.0	0.8	3.0	105.0	10.6	5.0	
H2a	1.09	A	41.9	0.41	0.59	50	2.0	7.1	575	1.0	20	2.0	4.8	11.9	625.0	13.5	11.9	
H2b	0.15	A	34.7	0.36	0.56	5	2.0	2.4	100	1.0	20	2.0	0.8	3.2	105.0	10.6	5.0	
F	1.37	A	40.0	0.40	0.55	80	4.5	6.9						6.9	80.0	10.4	6.9	
G	1.70	A	40.0	0.40	0.50	240	1.5	17.3						17.3	240.0	11.3	11.3	
H3	1.54	A	75.0	0.55	0.65	100	0.5	12.6	350	2.0		4.9	1.2	13.8	450.0	12.5	12.5	
H4	0.42	A	75.0	0.55	0.65	50	0.5	8.9	150	2.0		4.9	0.5	9.4	200.0	11.1	9.4	
I1	3.00	A	75.0	0.55	0.65	50	0.5	8.9	550	2.0		4.9	1.9	10.7	600.0	13.3	10.7	
I2	1.70	A	75.0	0.55	0.65	50	0.5	8.9	300	2.0		4.9	1.0	9.9	350.0	11.9	9.9	
J	1.64	A	55.0	0.40	0.55	75	2.8	7.9						7.9	75.0	10.4	7.9	
K	1.00	A	55.0	0.40	0.55	65	2.4	7.7						7.7	65.0	10.4	7.7	
L	5.90	A	90.0	0.78	0.83	50	0.2	6.9	800	1.0		3.5	3.8	10.7	850.0	14.7	10.7	
M1	1.56	A	95.0	0.85	0.90	50	0.1	6.9	300	1.0		3.5	1.4	8.3	350.0	11.9	8.3	
M2	0.44	A	95.0	0.85	0.90									0.0	0.0	10.0	5.0	
N	1.32	A	95.0	0.85	0.90	40	0.1	5.7	330	2.0		4.9	1.1	6.8	370.0	12.1	6.8	



# **STANDARD FORM SF-2 TIME OF CONCENTRATION (FUTURE CONDITIONS)**

**Subdivision:** Bent Grass  
**Location:** CO, Colorado Springs

**Project Name:** Falcon Meadows at Bent Grass  
**Project No.:** CLH017.20  
**Calculated By:** TJE  
**Checked By:** CMD  
**Date:** 3/23/20

SUB-BASIN						INITIAL/OVERLAND			TRAVEL TIME					Tc CHECK			FINAL
DATA						(T <sub>i</sub> )			(T <sub>t</sub> )					(URBANIZED BASINS)			
BASIN	D.A.	Hydrologic	Impervious	C <sub>s</sub>	C100	L	S	T <sub>i</sub>	L	S	C <sub>v</sub>	VEL.	T <sub>t</sub>	COMP. T <sub>c</sub>	TOTAL	Urbanized T <sub>c</sub>	
D	0.41	A	90.0	0.82	0.83	50	2.0	2.9						2.9	50.0	10.3	5.0
BENT GRASS FILING NO. 2 BASINS																	
OS-1	33.07	A	10.9	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-4	4.46	A	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	A	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	A	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
A-1	2.70	A	44.7	0.33	0.52	100	1.3	12.9	550	1.3	20	2.3	4.0	16.9	650.0	13.6	13.6
A-2	1.19	A	43.4	0.32	0.51	100	4.3	8.8	310	2.3	20	3.0	1.7	10.5	410.0	12.3	10.5
A-3	1.57	A	49.4	0.36	0.53	70	1.0	11.3	680	1.2	20	2.2	5.2	16.5	750.0	14.2	14.2
A-4	2.24	A	46.5	0.34	0.53	100	4.2	8.6	650	1.7	20	2.6	4.2	12.8	750.0	14.2	12.8
C-1	1.35	A	58.2	0.42	0.57	35	2.4	5.5	400	2.4	20	3.1	2.2	7.7	435.0	12.4	7.7
C-2	6.80	A	46.8	0.34	0.53	100	2.0	11.0	1770	1.5	20	2.4	12.0	23.1	1870.0	20.4	20.4
C-3	2.38	A	56.9	0.40	0.56	100	1.6	11.0	810	1.0	20	2.0	6.8	17.7	910.0	15.1	15.1
C-4	3.61	A	59.8	0.42	0.57	100	2.0	9.9	973	2.0	20	2.8	5.7	15.6	1073.0	16.0	15.6
C-5	7.86	A	60.8	0.42	0.57	100	2.0	9.9	1200	1.3	20	2.3	8.8	18.7	1300.0	17.2	17.2
C-6	5.54	A	52.7	0.38	0.55	100	3.0	9.1	1230	1.5	20	2.4	8.4	17.5	1330.0	17.4	17.4
C-7	0.89	A	2.0	0.09	0.36	80	2.5	12.2	150	2.0	15	2.1	1.2	13.4	230.0	11.3	11.3
E-1	1.71	A	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	A	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	A	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	A	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	A	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
F-1	0.44	A	38.7	0.29	0.50	66	2.5	8.9	1	1.0	15	1.5	0.0	8.9	67.0	10.4	8.9
F-2	0.55	A	65.8	0.55	0.69	25	2.0	4.0	464	4.0	20	4.0	1.9	5.9	489.0	12.7	5.9
G-1	1.47	A	23.4	0.21	0.44	20	2.0	5.8	700	3.5	15	2.8	4.2	9.9	720.0	14.0	9.9
H-1	0.52	A	2.0	0.09	0.36	25	2.0	7.3	135	2.0	20	2.8	0.8	8.1	160.0	10.9	8.1
I-1	0.31	A	71.6	0.66	0.79	25	2.0	3.2	135	2.0	20	2.8	0.8	4.0	160.0	10.9	5.0
BENT GRASS WEST BASINS																	
AA-1	2.57	A	49.8	0.42	0.59	100	4.0	7.8	765	2.5	20	3.2	4.0	11.9	865.0	14.8	11.9
AA-2	2.28	A	58.7	0.46	0.61	60	2.0	7.2	735	2.5	20	3.2	3.9	11.1	795.0	14.4	11.1
B-1	5.25	A	12.6	0.15	0.41	90	6.4	8.9	2000	1.7	15	2.0	17.0	25.9	2090.0	21.6	21.6
B-2	4.16	A	2.1	0.10	0.38	160	11.0	10.4	920	1.6	15	1.9	8.1	18.5	1080.0	16.0	16.0
CC-1	9.07	A	65.0	0.51	0.65	75	2.0	7.4	1160	2.3	20	3.0	6.4	13.9	1235.0	16.9	13.9
CC-2	1.53	A	72.1	0.58	0.74	10	2.0	2.4	380	4.0	20	4.0	1.6	4.0	390.0	12.2	5.0
CC-3	1.88	A	85.9	0.72	0.81	10	2.0	1.7	945	2.5	20	3.2	5.0	6.7	955.0	15.3	6.7
CC-4	4.34	A	38.2	0.30	0.49	5	2.0	2.6	575	2.5	20	3.2	3.0	5.6	580.0	13.2	5.6
CC-5	0.45	A	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
D-1	9.07	A	50.2	0.41	0.58	100	2.6	9.2	1900	1.3	20	2.3	13.9	23.1	2000.0	21.1	21.1
D-2	7.42	A	69.4	0.55	0.68	10	2.0	2.5	1355	1.3	20	2.3	9.9	12.4	1365.0	17.6	12.4

# STANDARD FORM SF-2 TIME OF CONCENTRATION (FUTURE CONDITIONS)

Subdivision: Bent Grass  
Location: CO, Colorado Springs

Project Name: Falcon Meadows at Bent Grass  
Project No.: CLH017.20  
Calculated By: TJE  
Checked By: CMD  
Date: 3/23/20

SUB-BASIN						INITIAL/OVERLAND			TRAVEL TIME					T <sub>c</sub> CHECK			FINAL
DATA						(T <sub>i</sub> )			(T <sub>t</sub> )					(URBANIZED BASINS)			
BASIN	D.A.	Hydrologic	Impervious	C <sub>5</sub>	C100	L	S	T <sub>i</sub>	L	S	C <sub>v</sub>	VEL.	T <sub>t</sub>	COMP. T <sub>c</sub>	TOTAL	Urbanized T <sub>c</sub>	
D-3	2.03	A	16.9	0.13	0.22	25	8.0	4.4	1960	1.0	15	1.5	21.8	26.2	1985.0	21.0	21.0
D-4	4.38	A	65.4	0.52	0.66	100	2.3	8.0	980	1.0	20	2.0	8.2	16.2	1080.0	16.0	16.0
D-5	1.08	A	65.7	0.51	0.64	100	2.0	8.6	300	1.1	20	2.1	2.4	11.0	400.0	12.2	11.0
D-6	4.01	A	71.5	0.54	0.67	45	2.0	5.5	835	1.0	20	2.0	7.0	12.4	880.0	14.9	12.4
D-7	6.39	A	9.8	0.14	0.39	200	7.5	12.7	665	1.0	15	1.5	7.4	20.1	865.0	14.8	14.8
D-8	1.69	A	22.8	0.21	0.44	125	3.7	11.8	600	1.0	15	1.5	6.7	18.4	725.0	14.0	14.0
PROPOSED:																	
P-1	2.03	A	64.3	0.60	0.74	100	6.0	5.0	1230	1.7	15	2.0	10.5	15.5	1330.0	17.4	15.5

## NOTES:

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

$T_t = L / 60V$

Velocity  $V = C_v * S^{0.5}$ , S in ft/ft

$T_c \text{ Check} = 10 + L / 180$

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	C <sub>v</sub>
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 (FUTURE CONDITIONS)**  
(RATIONAL METHOD PROCEDURE)

Subdivision: Bent Grass  
Location: CO, Colorado Springs  
Design Storm: 5-Year

Project Name: Falcon Meadows at Bent Grass  
Project No.: CLH017.20  
Calculated By: TJE  
Checked By: CMD  
Date: 3/23/20

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)	
OFFSITE BASINS																				
		RWT202	1574.40						46.6	120.88	1.82	220.0								From Falcon DBPS by Matrix
		RWT204	38.40						11.4	1.78	3.93	7.0								From Falcon DBPS by Matrix
		WT200	192.00						37.8	24.41	2.13	52.0								From Falcon DBPS by Matrix
		OS-2	20.08	0.14	18.3	2.81	3.22	9.0												
		OS-3	10.62	0.14	18.9	1.49	3.18	4.7												
		OS-25	18.74	0.11	20.2	2.06	3.08	6.3												
		OS-26	5.81	0.09	14.2	0.52	3.61	1.9												
		H5	6.37	0.14	13.9	0.89	3.64	3.2												
		OS-22	4.42	0.09	13.9	0.40	3.64	1.5												
		OS-23	10.24	0.09	13.9	0.92	3.64	3.3												
BENT GRASS EAST COMMERCIAL & FILING NO. 1 BASINS																				
		C1a	0.48	0.70	5.0	0.34	5.17	1.8												
		D1a	0.56	0.57	5.1	0.32	5.15	1.6												
		H1a	0.40	0.48	5.0	0.19	5.17	1.0												
		D1b	0.68	0.57	5.0	0.39	5.17	2.0												
		D1c	1.20	0.58	7.2	0.70	4.63	3.2												
		D1d	2.79	0.59	10.3	1.65	4.09	6.7												
		D2a	1.00	0.35	5.0	0.35	5.17	1.8												
		D2b	0.41	0.46	5.0	0.19	5.17	1.0												
		H1b	2.52	0.44	11.6	1.11	3.91	4.3												
		H1c	0.16	0.42	5.0	0.07	5.17	0.4												
		H2a	1.09	0.41	11.9	0.45	3.87	1.7												
		H2b	0.15	0.36	5.0	0.05	5.17	0.3												

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

Subdivision: Bent Grass  
Location: CO, Colorado Springs  
Design Storm: 5-Year

Project Name: Falcon Meadows at Bent Grass  
Project No.: CLH017.20  
Calculated By: TJE  
Checked By: CMD  
Date: 3/23/20

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)	
		C1b	0.88	0.72	5.0	0.63	5.17	3.3												
		C1c	1.09	0.74	5.5	0.81	5.02	4.1												
		C2a	1.26	0.57	10.7	0.72	4.03	2.9												
		C2b	0.99	0.84	11.2	0.83	3.96	3.3												
		F	1.37	0.40	6.9	0.55	4.68	2.6												
		G	1.70	0.40	11.3	0.68	3.94	2.7												
		H3	1.54	0.55	12.5	0.85	3.79	3.2												
		H4	0.42	0.55	9.4	0.23	4.23	1.0												
		I1	3.00	0.55	10.7	1.65	4.02	6.6												
		I2	1.70	0.55	9.9	0.94	4.15	3.9												
		J	1.64	0.40	7.9	0.66	4.48	3.0												
		K	1.00	0.40	7.7	0.40	4.52	1.8												
		L	5.90	0.78	10.7	4.60	4.03	18.5												
		M1	1.56	0.85	8.3	1.33	4.41	5.9												
		M2	0.44	0.85	5.0	0.37	5.17	1.9												
		N	1.32	0.85	6.8	1.12	4.70	5.3												
		D	0.41	0.82	5.0	0.34	5.17	1.8												
BENT GRASS FILING NO. 2 BASINS																				
		OS-1	33.07	0.16	22.2	5.29	2.93	15.5												
		OS-4	4.46	0.36	15.6	1.61	3.46	5.6												
		OS-5	0.46	0.45	5.2	0.21	5.10	1.1												
		OS-6	1.17	0.45	12.9	0.53	3.75	2.0												
		A-1	2.70	0.33	13.6	0.89	3.67	3.3												
		A-2	1.19	0.32	10.5	0.38	4.06	1.5												
		A-3	1.57	0.36	14.2	0.57	3.61	2.1												

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

Subdivision: Bent Grass  
Location: CO, Colorado Springs  
Design Storm: 5-Year

Project Name: Falcon Meadows at Bent Grass  
Project No.: CLH017.20  
Calculated By: TJE  
Checked By: CMD  
Date: 3/23/20

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)	
		A-4	2.24	0.34	12.8	0.76	3.76	2.9												
		C-1	1.35	0.42	7.7	0.57	4.53	2.6												
		C-2	6.80	0.34	20.4	2.31	3.06	7.1												
		C-3	2.38	0.40	15.1	0.95	3.52	3.3												
		C-4	3.61	0.42	15.6	1.52	3.46	5.3												
		C-5	7.86	0.42	17.2	3.30	3.31	10.9												
		C-6	5.54	0.38	17.4	2.11	3.30	7.0												
		C-7	0.89	0.09	11.3	0.08	3.95	0.3												
		E-1	1.71	0.55	11.8	0.94	3.88	3.6												
		E-2	0.68	0.76	6.9	0.52	4.70	2.4												
		E-3	0.78	0.81	7.4	0.63	4.59	2.9												
		E-4	0.91	0.74	8.0	0.67	4.46	3.0												
		E-5	0.89	0.81	7.3	0.72	4.60	3.3												
		F-1	0.44	0.29	8.9	0.13	4.31	0.6												
		F-2	0.55	0.55	5.9	0.30	4.91	1.5												
		G-1	1.47	0.21	9.9	0.31	4.14	1.3												
		H-1	0.52	0.09	8.1	0.05	4.44	0.2												
		I-1	0.31	0.66	5.0	0.20	5.17	1.0												
BENT GRASS WEST BASINS																				
		AA-1	2.57	0.42	11.9	1.08	3.87	4.2												
		AA-2	2.28	0.46	11.1	1.05	3.98	4.2												
		B-1	5.25	0.15	21.6	0.79	2.97	2.3												
		B-2	4.16	0.10	16.0	0.42	3.42	1.4												
		CC-1	9.07	0.51	13.9	4.63	3.64	16.9												
		CC-2	1.53	0.58	5.0	0.89	5.17	4.6												

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

Subdivision: Bent Grass  
Location: CO, Colorado Springs  
Design Storm: 5-Year

Project Name: Falcon Meadows at Bent Grass  
Project No.: CLH017.20  
Calculated By: TJE  
Checked By: CMD  
Date: 3/23/20

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)	
		CC-3	1.88	0.72	6.7	1.35	4.72	6.4													
		CC-4	4.34	0.30	5.6	1.30	4.99	6.5													
		CC-5	0.45	0.09	5.0	0.04	5.17	0.2													
		D-1	9.07	0.41	21.1	3.72	3.01	11.2													
		D-2	7.42	0.55	12.4	4.08	3.80	15.5													
		D-3	2.03	0.13	21.0	0.26	3.01	0.8													
		D-4	4.38	0.52	16.0	2.28	3.42	7.8													
		D-5	1.08	0.51	11.0	0.55	3.99	2.2													
		D-6	4.01	0.54	12.4	2.17	3.80	8.2													
		D-7	6.39	0.14	14.8	0.89	3.54	3.2													
		D-8	1.69	0.21	14.0	0.35	3.62	1.3													
MERIDIAN ROAD BASINS																					
		P-1	2.03	0.60	15.5	1.22	3.47	4.2													

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

Subdivision: Bent Grass  
Location: CO, Colorado Springs  
Design Storm: 100-Year

Project Name: Falcon Meadows at Bent Grass  
Project No.: CLH017.20  
Calculated By: TJE  
Checked By: CMD  
Date: 3/23/20

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)
OFFSITE BASINS																					
		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
		OS-2	20.08	0.40	18.3	8.03	5.41	43.4													
		OS-3	10.62	0.40	18.9	4.25	5.33	22.7													
		OS-25	18.74	0.37	20.2	6.93	5.16	35.8													
		OS-26	5.81	0.36	14.2	2.09	6.05	12.6													
		H5	6.37	0.39	13.9	2.48	6.10	15.1													
		OS-22	4.42	0.36	13.9	1.59	6.10	9.7													
		OS-23	10.24	0.36	13.9	3.69	6.10	22.5													
BENT GRASS EAST COMMERCIAL & FILING NO. 1 BASINS																					
		C1a	0.48	0.81	5.0	0.39	8.68	3.4													
		D1a	0.56	0.71	5.1	0.40	8.65	3.5													
		H1a	0.40	0.65	5.0	0.26	8.68	2.3													
		D1b	0.68	0.71	5.0	0.48	8.68	4.2													
		D1c	1.20	0.71	7.2	0.85	7.77	6.6													
		D1d	2.79	0.71	10.3	1.98	6.87	13.6													
		D2a	1.00	0.55	5.0	0.55	8.68	4.8													
		D2b	0.41	0.63	5.0	0.26	8.68	2.3													
		H1b	2.52	0.60	11.6	1.51	6.56	9.9													
		H1c	0.16	0.60	5.0	0.10	8.68	0.9													
		H2a	1.09	0.59	11.9	0.64	6.50	4.2													
		H2b	0.15	0.56	5.0	0.08	8.68	0.7													

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

Subdivision: Bent Grass  
Location: CO, Colorado Springs  
Design Storm: 100-Year

Project Name: Falcon Meadows at Bent Grass  
Project No.: CLH017.20  
Calculated By: TJE  
Checked By: CMD  
Date: 3/23/20

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)
		H3	1.54	0.65	12.5	1.00	6.37	6.4													
		C1b	0.88	0.82	5.0	0.72	8.68	6.2													
		C1c	1.09	0.84	5.5	0.92	8.43	7.8													
		C2a	1.26	0.71	10.7	0.89	6.76	6.0													
		C2b	0.99	0.92	11.2	0.91	6.64	6.0													
		F	1.37	0.55	6.9	0.75	7.85	5.9													
		G	1.70	0.50	11.3	0.85	6.62	5.6													
		H3	1.54	0.65	12.5	1.00	6.37	6.4													
		H4	0.42	0.65	9.4	0.27	7.10	1.9													
		I1	3.00	0.65	10.7	1.95	6.76	13.2													
		I2	1.70	0.65	9.9	1.11	6.96	7.7													
		J	1.64	0.55	7.9	0.90	7.52	6.8													
		K	1.00	0.55	7.7	0.55	7.59	4.2													
		L	5.90	0.83	10.7	4.90	6.77	33.2													
		M1	1.56	0.90	8.3	1.40	7.41	10.4													
		M2	0.44	0.90	5.0	0.40	8.68	3.5													
		N	1.32	0.90	6.8	1.19	7.89	9.4													
		D	0.41	0.83	5.0	0.34	8.68	3.0													
BENT GRASS FILING NO. 2 BASINS																					
		OS-1	33.07	0.41	22.2	13.56	4.92	66.7													
		OS-4	4.46	0.54	15.6	2.41	5.81	14.0													



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

Subdivision: Bent Grass  
Location: CO, Colorado Springs  
Design Storm: 100-Year

Project Name: Falcon Meadows at Bent Grass  
Project No.: CLH017.20  
Calculated By: TJE  
Checked By: CMD  
Date: 3/23/20

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)	
		OS-5	0.46	0.59	5.2	0.27	8.56	2.3												
		OS-6	1.17	0.59	12.9	0.69	6.30	4.3												
		A-1	2.70	0.52	13.6	1.40	6.16	8.6												
		A-2	1.19	0.51	10.5	0.61	6.81	4.2												
		A-3	1.57	0.53	14.2	0.83	6.05	5.0												
		A-4	2.24	0.53	12.8	1.19	6.31	7.5												
		C-1	1.35	0.57	7.7	0.77	7.61	5.9												
		C-2	6.80	0.53	20.4	3.60	5.14	18.5												
		C-3	2.38	0.56	15.1	1.33	5.90	7.8												
		C-4	3.61	0.57	15.6	2.06	5.81	12.0												
		C-5	7.86	0.57	17.2	4.48	5.56	24.9												
		C-6	5.54	0.55	17.4	3.05	5.54	16.9												
		C-7	0.89	0.36	11.3	0.32	6.63	2.1												
		E-1	1.71	0.69	11.8	1.18	6.51	7.7												
		E-2	0.68	0.85	6.9	0.58	7.89	4.6												
		E-3	0.78	0.89	7.4	0.69	7.70	5.3												
		E-4	0.91	0.84	8.0	0.76	7.50	5.7												
		E-5	0.89	0.89	7.3	0.79	7.73	6.1												
		F-1	0.44	0.50	8.9	0.22	7.23	1.6												
		F-2	0.55	0.69	5.9	0.38	8.25	3.1												
		G-1	1.47	0.44	9.9	0.65	6.95	4.5												
		H-1	0.52	0.36	8.1	0.19	7.45	1.4												
		I-1	0.31	0.79	5.0	0.24	8.68	2.1												

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

Subdivision: Bent Grass  
Location: CO, Colorado Springs  
Design Storm: 100-Year

Project Name: Falcon Meadows at Bent Grass  
Project No.: CLH017.20  
Calculated By: TJE  
Checked By: CMD  
Date: 3/23/20

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)
BENT GRASS WEST BASINS																					
		AA-1	2.57	0.59	11.9	1.52	6.50	9.9													
		AA-2	2.28	0.61	11.1	1.39	6.67	9.3													
		B-1	5.25	0.41	21.6	2.15	4.99	10.7													
		B-2	4.16	0.38	16.0	1.58	5.75	9.1													
		CC-1	9.07	0.65	13.9	5.90	6.11	36.0													
		CC-2	1.53	0.74	5.0	1.13	8.68	9.8													
		CC-3	1.88	0.81	6.7	1.52	7.93	12.1													
		CC-4	4.34	0.49	5.6	2.13	8.38	17.8													
		CC-5	0.45	0.36	5.0	0.16	8.68	1.4													
		D-1	9.07	0.58	21.1	5.26	5.05	26.6													
		D-2	7.42	0.68	12.4	5.05	6.38	32.2													
		D-3	2.03	0.22	21.0	0.45	5.06	2.3													
		D-4	4.38	0.66	16.0	2.89	5.75	16.6													
		D-5	1.08	0.64	11.0	0.69	6.70	4.6													
		D-6	4.01	0.67	12.4	2.69	6.39	17.2													
		D-7	6.39	0.39	14.8	2.49	5.94	14.8													
		D-8	1.69	0.44	14.0	0.74	6.08	4.5													
MERIDIAN ROAD BASINS																					
		P-1	2.03	0.74	15.5	1.50	5.82	8.7													

## BENT GRASS/MERIDIAN ROAD - MDDP SURFACE ROUTING - FUTURE CONDITIONS

DESIGN POINT	CONTRIBUTING BASINS	CA (equivalent)		Tc (min.)	INTENSITY		TOTAL FLOWS		NOTES
		CA(5)	CA(100)		I(5) (in/hr)	I(100) (in/hr)	Q(5) (cfs)	Q(100) (cfs)	
FILING NO. 2:									
	RWT202	124.80	324.77	46.6	1.8	3.1	220.0	1000.0	
		T R A V E L   T I M E							
		124.80	324.77	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
				5.0	0.0	46.6			
	RWT204	1.83	6.43	11.4	3.8	6.7	7.0	43.0	
		T R A V E L   T I M E							
		1.83	6.43	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
				5.0	0.0	11.4			
	WT200	25.81	54.00	37.8	2.0	3.5	52.0	190.0	
		T R A V E L   T I M E							
		25.81	54.00	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
				5.0	0.0	37.8			
40	OS-1 RWT202 RWT204 WT200	5.29	13.56	46.6	1.8	3.1	278.1	1227.8	
		124.80	324.77						
		1.83	6.43						
		25.81	54.00						
		157.73	398.76	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
				CHANNEL	850	4.0	3.5	50.1	
1	A-1	0.89	1.40	13.6	3.5	6.2	3.1	8.6	
		T R A V E L   T I M E							
		0.89	1.40	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
				STREET	140	2.0	1.2	14.8	
2	A-2 DP 1	0.38	0.61	14.8	3.4	5.9	4.3	11.9	
		0.89	1.40						
		1.27	2.01	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
				STREET	275	2.4	1.9	16.7	
3	A-3 DP 2	0.57	0.83	16.7	3.2	5.6	5.9	15.9	
		1.27	2.01						
		1.84	2.84	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
				STREET	40	2.4	0.3	17.0	
4	A-4 DP 3	0.76	1.19	17.0	3.2	5.5	8.3	22.3	
		1.84	2.84						
		2.60	4.03	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
				STREET	780	2.0	6.5	23.5	
9	OS-5	0.21	0.27	5.2	5.1	8.9	1.1	2.4	
		T R A V E L   T I M E							
		0.21	0.27	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
				STREET	315	3.2	1.6	6.9	
11	OS-4 DP 9	1.61	2.41	15.6	3.3	5.8	6.0	15.5	
		0.21	0.27						
		1.82	2.68	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
				STREET	150	3.2	0.8	16.4	
12	OS-6 DP 11	0.53	0.69	16.4	3.2	5.6	7.6	19.0	
		1.82	2.68						
		2.35	3.37	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
				STREET	120	3.2	0.6	17.0	
5	AA-1 DP 12	1.08	1.52	17.0	3.2	5.5	10.9	27.1	
		2.35	3.37						
		3.43	4.89	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
						2.4	0.0	17.0	
6	AA-2	1.05	1.39	11.1	3.9	6.8	4.1	9.4	
		T R A V E L   T I M E							
		1.05	1.39	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
						2.4	0.0	11.1	

DESIGN POINT	CONTRIBUTING BASINS	CA (equivalent)		Tc (min.)	INTENSITY		TOTAL FLOWS		NOTES
		CA(5)	CA(100)		I(5) (in/hr)	I(100) (in/hr)	Q(5) (cfs)	Q(100) (cfs)	
7	E-3	0.63	0.69	7.4	4.6	8.0	2.9	5.5	
				TRAVEL TIME					
		0.63	0.69	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
						2.4	0.0	7.4	
8	E-1 E-2 CC-3 CC-4 DP 4	0.94	1.18	11.8	3.8	6.6	25.3	62.1	
		0.52	0.58						
		1.35	1.52						
		1.30	2.13						
		2.60	4.03						
		6.71	9.44	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
13	CC-1 CC-2	4.63	5.90	13.9	3.5	6.1	19.3	43.0	
		0.89	1.13	TRAVEL TIME					
		5.52	7.03	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
				STREET	60	3.2	0.3	14.2	
10	CC-5 DP 13	0.04	0.16	14.2	3.5	6.1	19.3	43.5	TOTAL FLOWS INTO NORTH POND BENT GRASS WEST
		5.52	7.03	TRAVEL TIME					
		5.56	7.19	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
						2.4	0.0	14.2	
10A	BG NORTH POND RELEASE	1.16	2.42	5.0	5.2	9.1	6.0	21.9	
		TRAVEL TIME							
		1.16	2.42	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
						2.6	0.0	5.0	
15	DP 5 DP 6 DP 7 DP 8	3.43	4.89	17.0	3.2	5.5	37.5	90.8	TOTAL FLOWS INTO NORTH POND FILING NO. 2
		1.05	1.39						
		0.63	0.69						
		6.71	9.44						
		11.82	16.41	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
						2.4	0.0	17.0	
15A	F2 NORTH POND RELEASE	2.35	4.08	5.0	5.2	9.1	12.2	37.0	
		TRAVEL TIME							
		2.35	4.08	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
						2.6	0.0	5.0	
AA	B-1 DP 40 DP 15A	0.79	2.15	50.1	1.7	2.9	270.3	1188.7	
		157.73	398.76						
		2.35	4.08						
		160.87	404.99	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
				CULVERTS	135	5.1	0.4	50.6	
		BB	B-2 DP AA	0.42	1.58	50.6	1.7	2.9	
160.87	404.99			TRAVEL TIME					
161.29	406.57			Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
				CHANNEL	900	5.0	3.0	53.6	
16	C-5	3.30	4.48	5.5	5.0	8.8	16.6	39.4	@ GRADE INLET
		TRAVEL TIME							
		3.30	4.48	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
				STREET	115	2.0	1.0	6.5	
17	C-6	2.11	3.05	5.5	5.0	8.8	10.6	26.8	@ GRADE INLET
		TRAVEL TIME							
		2.11	3.05	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
				STREET	115	2.0	1.0	6.5	

DESIGN POINT	CONTRIBUTING BASINS	CA (equivalent)		Tc (min.)	INTENSITY		TOTAL FLOWS		NOTES
		CA(5)	CA(100)		I(5) (in/hr)	I(100) (in/hr)	Q(5) (cfs)	Q(100) (cfs)	
18	C-3 C-4 FB DP 16	0.95	1.33	5.5	5.0	8.8	13.5	39.2	SUMP INLET
		1.52	2.06						
		0.22	1.07	T R A V E L   T I M E					
		2.69	4.46	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
						2.6	0.0	5.5	
19	C-1 C-2 FB DP 17	0.57	0.77	20.4	2.9	5.0	9.5	29.7	SUMP INLET
		2.31	3.60						
		0.42	1.53	T R A V E L   T I M E					
		3.30	5.90	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
						2.6	0.0	20.4	
20	G-1	0.31	0.65	9.9	4.1	7.1	1.3	4.6	
				T R A V E L   T I M E					
		0.31	0.65	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
						2.6	0.0	9.9	
20A	C-7 DP 18 DP 19 DP 20	0.08	0.32	20.4	2.9	5.0	18.4	57.1	TOTAL FLOW INTO FILING NO. 2 SOUTH POND
		2.69	4.46						
		3.30	5.90						
		0.31	0.65	T R A V E L   T I M E					
		6.37	11.33	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
				2.6	0.0	20.4			
20B	F2 SOUTH POND RELEASE	4.11	7.28	5.0	5.2	9.1	21.3	66.0	
				T R A V E L   T I M E					
		4.11	7.28	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
						2.6	0.0	5.0	
28	OS-2	2.81	8.03	18.3	3.1	5.3	8.6	42.8	
				T R A V E L   T I M E					
		2.81	8.03	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
			SWALE	640	4.0	2.7	21.0		
29	OS-3 DP 28	1.49	4.25	21.0	2.8	5.0	12.2	60.9	
		2.81	8.03	T R A V E L   T I M E					
		4.30	12.28	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
			SWALE	475	3.5	2.3	23.3		
21	D-2	4.08	5.05	12.4	3.7	6.4	15.0	32.5	@ GRADE INLET
				T R A V E L   T I M E					
		4.08	5.05	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
						4.0	0.0	12.4	
22	D-1	3.72	5.26	21.1	2.8	4.9	10.5	26.0	@ GRADE INLET
				T R A V E L   T I M E					
		3.72	5.26	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
						3.5	0.0	21.1	
23	D-3 DP 29	0.26	0.45	23.3	2.7	4.7	12.2	59.7	TYPE C INLET
		4.30	12.28	T R A V E L   T I M E					
		4.56	12.73	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
						4.0	0.0	23.3	
24	E-4 FB DP 22	0.67	0.76	21.1	2.8	4.9	2.1	15.9	@ GRADE INLET
		0.07	2.45	T R A V E L   T I M E					
		0.74	3.21	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
						3.5	0.0	21.1	
25	E-5 FB DP 24	0.72	0.79	7.3	4.6	8.0	3.3	10.7	@ GRADE INLET
		0.00	0.55	T R A V E L   T I M E					
		0.72	1.34	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
						3.5	0.0	7.3	
26	D-7 DP 24 DP 25	0.89	2.49	14.8	3.4	5.9	8.0	41.7	
		0.74	3.21						
		0.72	1.34	T R A V E L   T I M E					
		2.35	7.04	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
						3.5	0.0	14.8	

DESIGN POINT	CONTRIBUTING BASINS	CA (equivalent)		Tc (min.)	INTENSITY		TOTAL FLOWS		NOTES		
		CA(5)	CA(100)		I(5) (in/hr)	I(100) (in/hr)	Q(5) (cfs)	Q(100) (cfs)			
42	D-4	2.28	2.89	16.0	3.3	5.7	7.5	16.5	SUMP INLET		
		T R A V E L   T I M E									
		2.28	2.89	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)			
					2.0	0.0	16.0				
43	D-5 D-6	0.55	0.69	12.4	3.7	6.4	10.0	21.8	SUMP INLET		
		2.17	2.69	T R A V E L   T I M E							
		2.72	3.38	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)			
					2.0	0.0	12.4				
44	D-8	0.35	0.74	14.0	3.5	6.1	1.2	4.5			
		T R A V E L   T I M E									
		0.35	0.74	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)			
					2.0	0.0	14.0				
45	DP 21 DP 22 DP 23 DP 26 DP 42 DP 43 DP 44	4.08	5.05	23.3	2.7	4.7	53.8	173.9	TOTAL FLOW INTO BENT GRASS WEST SOUTH POND		
		3.72	5.26								
		4.56	12.73								
		2.35	7.04								
		2.28	2.89								
		2.72	3.38								
		0.35	0.74	T R A V E L   T I M E							
		20.06	37.09	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)			
				2.6	0.0	23.3					
45A	BG SOUTH POND RELEASE	0.21	5.05	5.0	5.2	9.1	1.1	45.8			
		T R A V E L   T I M E									
		0.21	5.05	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)			
					2.6	0.0	5.0				
CC	DP BB DP 10A DP 20B DP 45A	161.29	406.57	53.6	1.6	2.8	268.2	1183.4	EXITS SITE		
		1.16	2.42								
		4.11	7.28								
		0.21	5.05	T R A V E L   T I M E							
		166.77	421.33	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)			
						3.5	0.0	53.6			
EAST OF FILING NO. 2:											
30	Release rate from Meadows Pond 2	0.62	10.78	15.0	3.4	5.9	2.1	63.5	Flows from Meadows Filing No. 3 Pond 2 - Updated HEC HMS model		
		T R A V E L   T I M E									
		0.62	10.78	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)			
				Sheet	2300	2.1	18.3	33.3			
31	OS-25 DP 30	2.06	6.93	33.3	2.2	3.8	5.8	67.4			
		0.62	10.78								
		2.68	17.71	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)			
				Sheet	700	2.6	4.5	37.7			
32	OS-6 DP 31	0.53	0.69	37.7	2.0	3.5	6.5	64.8	Flow into revised pond on "School Site"		
		2.68	17.71								
		3.21	18.40	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)			
				Sheet	700	2.6	4.5	42.2			
32A	Fut Pond Release C1a	1.11	5.46	15.0	3.4	5.9	4.9	34.5	Designed release rates from Future Pond are 3.8 & 32.2 cfs		
		0.34	0.39								
		T R A V E L   T I M E									
		1.45	5.85	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)			
					2.0	0.0	15.0				
32A-N	DP-32	1.45	5.64	15.0	3.4	5.9	4.9	33.2	Flows remaining in north half of BGMD & continuing east (Max gutter flow allowed 5 Yr=9.4, 100 Yr=33.2)		
		T R A V E L   T I M E									
		1.45	5.64	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)			
				Street	905	2.0	7.5	22.5			
32A-S	D1a OT from DP 32A-N	3.72	0.40	15.0	3.4	5.9	12.5	3.6	Flows remaining in south half of BGMD & continuing east (Max gutter flow allowed 5 Yr=9.4 & 100 Yr=33.2)		
		0.00	0.21								
		3.72	0.61	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)			
						2.5	0.0	15.0			
BG 1a-Os		0.00	0.00	15.0	3.4	5.9	0.0	0.0	Overtopping Flows from DP 32A which will head south through Bent Grass Filing No. 1 in Sea Oats Drive (Sea Oats Dr can carry 2.2 & 11.6 cfs per side)		
		T R A V E L   T I M E									
		0.00	0.00	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)			
						2.5	0.0	15.0			

DESIGN POINT	CONTRIBUTING BASINS	CA (equivalent)		Tc (min.)	INTENSITY		TOTAL FLOWS		NOTES
		CA(5)	CA(100)		I(5) (in/hr)	I(100) (in/hr)	Q(5) (cfs)	Q(100) (cfs)	
BG 1a-Ose		0.00	0.00	15.0	3.4	5.9	0.0	0.0	Overtopping Flows from DP 1a-Os which will flow in east half of Sea Oats Drive
				T R A V E L   T I M E					
		0.00	0.00	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
						2.5	0.0	15.0	
BG 1a-Osw		0.00	0.00	15.0	3.4	5.9	0.0	0.0	Overtopping Flows from DP 1a-Os which will flow in west half of Sea Oats Drive
				T R A V E L   T I M E					
		0.00	0.00	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
						2.5	0.0	15.0	
BG 4a	H1a DP BG 1a-Ose	0.19 0.00	0.26 0.00	15.0	3.4	5.9	0.6	1.5	Flows to west side of Inlet 4
				T R A V E L   T I M E					
		0.19	0.26	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
				Street	600	2.0	5.0	20.0	
BG 1b	D1b DP BG 1a-Osw	0.39 0.00	0.48 0.00	15.0	3.4	5.9	1.3	2.8	
				T R A V E L   T I M E					
		0.39	0.48	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
				Street	575	2.8	3.4	18.4	
BG 1c	D1c DP BG 1b	0.70 0.39	0.85 0.48	18.4	3.0	5.3	3.3	7.1	Flows in Aveno Rd to east side of Inlet 1 (Max gutter allowed 1.6 & 8.6 cfs per side)
				T R A V E L   T I M E					
		1.09	1.33	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
						2.5	0.0	18.4	
BG 1	D1d DP BG 1c	1.65 1.09	1.98 1.33	18.4	3.0	5.3	8.3	17.6	Existing 10' Sump Inlet - Total flow to Inlet 1
				T R A V E L   T I M E					
		2.74	3.31	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
				SUMP		5.0	0.0	18.4	
BG 2e	D2a	0.35	0.55	5.0	5.2	9.1	1.8	5.0	Flows in Aveno Rd to east side of Inlet 2 (Max gutter allowed 1.6 & 8.6 cfs per side)
				T R A V E L   T I M E					
		0.35	0.55	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
						5.0	0.0	5.0	
BG 2w	D2b	0.19	0.26	5.0	5.2	9.1	1.0	2.4	Flows in Aveno Rd to west side of Inlet 2 (Max gutter allowed 2.2 & 11.4 cfs per side)
				T R A V E L   T I M E					
		0.19	0.26	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
						5.0	0.0	5.0	
BG 2	DP BG 2e DP BG 2w	0.35 0.19	0.55 0.26	5.0	5.2	9.1	2.8	7.3	Existing 4' Sump Inlet - Total flow to
				T R A V E L   T I M E					
		0.54	0.81	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
				SUMP		5.0	0.0	5.0	
BG 4e	H1c	0.07	0.10	5.0	5.2	9.1	0.4	0.9	Flows in Aveno Rd to west side of Inlet 4 (Max gutter allowed 1.8 & 9.8 cfs per side)
				T R A V E L   T I M E					
		0.07	0.10	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
						5.0	0.0	5.0	
BG 4w	H1b DP BG 4a	1.11 0.19	1.51 0.26	20.0	2.9	5.1	3.8	9.0	Flows in Aveno Rd to east side of Inlet 4 (Max gutter allowed 2.1 & 11.3 cfs per side)
				T R A V E L   T I M E					
		1.30	1.77	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
						5.0	0.0	20.0	
BG 4	DP BG 4e DP BG 4w	0.07 1.30	0.10 1.77	20.0	2.9	5.1	4.0	9.5	Existing 4' Sump Inlet
				T R A V E L   T I M E					
		1.37	1.87	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
				SUMP		5.0	0.0	20.0	
BG 5e	H2b	0.05	0.08	5.0	5.2	9.1	0.3	0.7	Flows in Aveno Rd to west side of Inlet 5 (Max gutter allowed 1.8 & 9.8 cfs per side)
				T R A V E L   T I M E					
		0.05	0.08	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
						5.0	0.0	5.0	
BG 5w	H2a	0.45	0.64	11.9	3.8	6.6	1.7	4.2	Flows in Aveno Rd to east side of Inlet 5 (Max gutter allowed 2.1 & 11.3 cfs per side)
				T R A V E L   T I M E					
		0.45	0.64	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
						5.0	0.0	11.9	

DESIGN POINT	CONTRIBUTING BASINS	CA (equivalent)		Tc (min.)	INTENSITY		TOTAL FLOWS		NOTES	
		CA(5)	CA(100)		I(5) (in/hr)	I(100) (in/hr)	Q(5) (cfs)	Q(100) (cfs)		
BG 5	DP BG 5e DP BG 5w	0.05	0.08	11.9	3.8	6.6	1.9	4.7	Existing 4' Sump Inlet	
		0.45	0.64	T R A V E L   T I M E						
		0.50	0.72	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)		
		SUMP		5.0	0.0	11.9				
BG 3	G DP BG 1 DP BG 2	2.06	6.93	18.4	3.0	5.3	16.2	58.7	Flows into BG Pond 1 from West side	
		2.74	3.31	T R A V E L   T I M E						
		0.54	0.81	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)		
		5.34	11.05			2.8	0.0	18.4		
BG 6	DP BG 4 DP BG 5	1.37	1.87	20.0	2.9	5.1	5.4	13.2	Flows into BG Pond 1 from East side	
		0.50	0.72	T R A V E L   T I M E						
		1.87	2.59	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)		
				5.0	0.0	20.0				
	DP BG 3 DP BG 6	5.34	11.05	20.0	2.9	5.1	21.0	69.4	Total flows into BG Pond 1	
		1.87	2.59	T R A V E L   T I M E						
		7.21	13.64	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)		
				5.0	0.0	20.0				
BG POND1	BG POND 1 RELEASE	0.06	0.32	5.0	5.2	9.1	0.3	2.9		
				T R A V E L   T I M E						
		0.06	0.32	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)		
				2.6	0.0	5.0				
BG 14n	OS-22 H5 C1b DP BG 32A-N	0.40	1.59	22.5	2.7	4.8	9.2	42.7	Flow continuing in North half of BGMD	
		0.89	1.00	T R A V E L   T I M E						
		0.63	0.72	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)		
		1.45	5.64	Street	300	2.8	1.8	24.3		
		3.37	8.95			5.0	0.0	24.3		
BG 15n	OS-23 D1c DP BG 14n	0.92	3.69	24.3	2.6	4.6	8.8	40.9	Flow continuing in North half of BGMD	
		0.70	0.85	T R A V E L   T I M E						
		3.37	8.95	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)		
		4.99	13.49			5.0	0.0	24.3		
BG 50		111.34	193.50	26.1	2.5	4.4	280.0	850.0	Flow from Falcon DBPS at Meridian Rd & BGMD Intersection	
				T R A V E L   T I M E						
				Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)		
						5.0	0.0	26.1		
BG 20	DP BG 15n DP BG 50	4.99	13.49	26.1	2.5	4.4	292.5	909.3	Combined flow at Culvert Crossing - North side of BGMD	
		111.34	193.50	T R A V E L   T I M E						
		116.33	206.99	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)		
		Culverts	125	11.2	0.2	26.3				
BG 14s	C2a DP BG 12-S	0.72	0.71	15.0	3.4	5.9	15.0	7.8	Flow continuing in South half of BGMD	
		3.72	0.61	T R A V E L   T I M E						
		4.44	1.32	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)		
				Street	300	2.8	1.8	16.8		
BG 15s	C2b DP BG 14s	0.83	0.91	16.8	3.2	5.6	16.8	12.4	Flow continuing in South half of BGMD	
		4.44	1.32	T R A V E L   T I M E						
		5.27	2.23	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)		
						5.0	0.0	16.8		
BG 21	DP BG 20 DP BG 15s	116.33	206.99	26.3	2.5	4.4	304.6	915.3	Combined flow at Culvert Crossing - South side of BGMD	
		5.27	2.23	T R A V E L   T I M E						
		121.60	209.22	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)		
		Channel	1250	2.0	10.4	36.7				
BG 32	F	0.55	0.75	6.9	4.7	8.1	2.6	6.1		
				T R A V E L   T I M E						
		0.55	0.75	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)		
						5.0	0.0	6.9		
BG 33	J	0.66	0.90	7.9	4.4	7.8	2.9	7.0		
				T R A V E L   T I M E						
		0.66	0.90	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)		
						5.0	0.0	7.9		



DESIGN POINT	CONTRIBUTING BASINS	CA (equivalent)		Tc (min.)	INTENSITY		TOTAL FLOWS		NOTES
		CA(5)	CA(100)		I(5) (in/hr)	I(100) (in/hr)	Q(5) (cfs)	Q(100) (cfs)	
BG 7	H3	0.85	1.00	12.5	3.7	6.4	3.1	6.4	Ex 4' Sump Inlet
		TRAVEL TIME							
		0.85	1.00	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
BG 8	H4	0.23	0.27	9.4	4.2	7.3	1.0	2.0	Ex 4' Sump Inlet
		TRAVEL TIME							
		0.23	0.27	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
BG 9	I1	1.65	1.95	10.7	3.9	6.9	6.5	13.4	Ex 6' Sump Inlet
		TRAVEL TIME							
		1.65	1.95	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
BG 10	I2	0.94	1.11	9.9	4.1	7.1	3.8	7.9	Ex 4' Sump Inlet
		TRAVEL TIME							
		0.94	1.11	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
BG 11	DP BG 7 DP BG 8 DP BG 9 DP BG 10	0.85	1.00	12.5	3.7	6.4	13.5	27.8	Inflow to BG Pond 2 West storm sewer
		0.23	0.27						
		1.65	1.95						
		0.94	1.11	TRAVEL TIME					
		3.67	4.33	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
BG 12	M1	1.33	1.40	8.3	4.4	7.6	5.8	10.7	Ex 6' Sump Inlet
		TRAVEL TIME							
		1.33	1.40	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
BG 13	M2 N	0.37	0.40	6.8	4.7	8.2	7.0	13.0	Ex 6' Sump Inlet
		1.12	1.19	TRAVEL TIME					
		1.49	1.59	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
BG 14	DP BG 12 DP BG 13	1.33	1.40	8.3	4.4	7.6	12.3	22.8	Inflow to BG Pond 2 East Storm sewer
		1.49	1.59	TRAVEL TIME					
		2.82	2.99	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
BG 15	K L DP BG 11 DP BG 14	0.40	0.55	12.5	3.7	6.4	42.2	82.0	Total inflow to BG Pond 2
		4.60	4.90						
		3.67	4.33						
		2.82	2.99	TRAVEL TIME					
		11.49	12.77	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
BG POND2	BG POND 2 RELEASE	0.08	1.10	5.0	5.2	9.1	0.4	10.0	
		TRAVEL TIME							
		0.08	1.10	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
BG 30	PLD RELEASE RATE	0.58	0.55	5.0	5.2	9.1	3.0	5.0	Released flows from existing PLD on 7-11 site
		TRAVEL TIME							
		0.58	0.55	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
BG 31	D	0.34	0.34	5.0	5.2	9.1	1.8	3.1	Future lot for development in Bent Grass East Commercial Filing No. 1
		TRAVEL TIME							
		0.34	0.34	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
BG 25	P-1 DP BG 21 BG 30 BG 31 BG POND 2	1.22	0.45	36.7	2.1	3.6	252.0	751.4	Flow @ Existing Culvert, north side of Owl Place
		121.60	209.22						
		0.58	0.55						
		0.34	0.34	TRAVEL TIME					
		0.08	1.10						
		122.82	209.67	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
		TRAVEL TIME							

**APPENDIX C**  
**Hydraulic Computations**

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

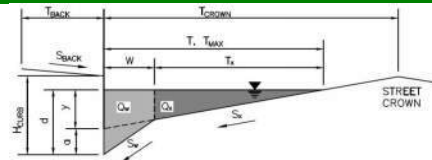
(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project:

Bent Grass Residential Filing No. 2

Inlet ID:

Street Capacity - 1/2 Street Section of Bent Grass Meadows Drive

**Gutter Geometry (Enter data in the blue cells)**

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

 $S_O = 0.010$  ft/ft

Manning's Roughness for Street Section (typically between 0.012 and 0.020)

 $n_{STREET} = 0.016$ 

Max. Allowable Spread for Minor &amp; Major Storm

	Minor Storm	Major Storm	
$T_{MAX} =$	16.0	26.0	ft
$d_{MAX} =$	6.0	8.3	inches

Max. Allowable Depth at Gutter Flowline for Minor &amp; Major Storm

Allow Flow Depth at Street Crown (leave blank for no)

☐ ☐ check = yes
**Maximum Capacity for 1/2 Street based On Allowable Spread**

Water Depth without Gutter Depression (Eq. ST-2)

	Minor Storm	Major Storm	
$y =$	3.84	6.24	inches
$d_c =$	2.0	2.0	inches
$a =$	1.51	1.51	inches
$d =$	5.35	7.75	inches
$T_X =$	14.0	24.0	ft
$E_O =$	0.372	0.225	
$Q_X =$	5.9	24.7	cfs
$Q_W =$	3.5	7.2	cfs
$Q_{BACK} =$	0.0	1.3	cfs
$Q_T =$	9.4	33.2	cfs
$V =$	4.8	6.4	fps
$V*d =$	2.1	4.1	

Vertical Depth between Gutter Lip and Gutter Flowline (usually 2")

Gutter Depression ( $d_c - (W * S_X * 12)$ )

Water Depth at Gutter Flowline

Allowable Spread for Discharge outside the Gutter Section W ( $T - W$ )

Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)

Discharge outside the Gutter Section W, carried in Section  $T_X$ Discharge within the Gutter Section W ( $Q_T - Q_X$ )

Discharge Behind the Curb (e.g., sidewalk, driveways, &amp; lawns)

**Maximum Flow Based On Allowable Spread**

Flow Velocity within the Gutter Section

 $V*d$  Product: Flow Velocity times Gutter Flowline Depth**Maximum Capacity for 1/2 Street based on Allowable Depth**

Theoretical Water Spread

Theoretical Spread for Discharge outside the Gutter Section W ( $T - W$ )

Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)

Theoretical Discharge outside the Gutter Section W, carried in Section  $T_{XTH}$ Actual Discharge outside the Gutter Section W, (limited by distance  $T_{CROWN}$ )Discharge within the Gutter Section W ( $Q_T - Q_X$ )

Discharge Behind the Curb (e.g., sidewalk, driveways, &amp; lawns)

Total Discharge for Major &amp; Minor Storm (Pre-Safety Factor)

Average Flow Velocity Within the Gutter Section

 $V*d$  Product: Flow Velocity Times Gutter Flowline DepthSlope-Based Depth Safety Reduction Factor for Major & Minor ( $d \geq 6"$ ) Storm**Max Flow Based on Allowable Depth (Safety Factor Applied)**

Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)

Resultant Flow Depth at Street Crown (Safety Factor Applied)

	Minor Storm	Major Storm	
$T_{TH} =$	18.7	28.3	ft
$T_{XTH} =$	16.7	26.3	ft
$E_O =$	0.318	0.206	
$Q_{XTH} =$	9.4	31.5	cfs
$Q_X =$	9.4	31.5	cfs
$Q_W =$	4.4	8.2	cfs
$Q_{BACK} =$	0.0	2.6	cfs
$Q =$	13.8	42.3	cfs
$V =$	5.2	6.7	fps
$V*d =$	2.6	4.7	
$R =$	1.00	1.00	
$Q_d =$	13.8	42.3	cfs
$d =$	6.00	8.30	inches
$d_{CROWN} =$	0.00	0.55	inches

MINOR STORM Allowable Capacity is based on Spread Criterion

MAJOR STORM Allowable Capacity is based on Spread Criterion

	Minor Storm	Major Storm	
$Q_{allow} =$	9.4	33.2	cfs

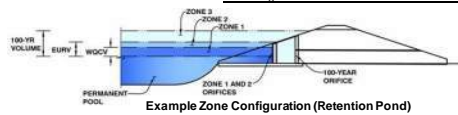
WARNING: MINOR STORM max. allowable capacity is less than the design flow given on sheet 'Inlet Management'

WARNING: MAJOR STORM max. allowable capacity is less than the design flow given on sheet 'Inlet Management'

# Current Pond Calculations

MHFD-Detention, Version 4.02 (February 2020)

Basin ID: BG Filling No. 1 - Ex. Pond 1 - Current Conditions



### Example Zone Configuration (Retention Pond)

Selected BMP Type =	EDB	
Watershed Area =	22.80	acres
Watershed Length =	1,100	ft
Watershed Length to Centroid =	420	ft
Watershed Slope =	0.030	ft/ft
Watershed Imperviousness =	53.00%	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 WOCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	User Input	

### Optional User Overrides

Water Quality Capture Volume (WQCV) =	0.408	acre-feet
Excess Urban Runoff Volume (EURV) =	1.416	acre-feet
2-yr Runoff Volume ( $P1 = 1.19$ in.) =	1.022	acre-feet
5-yr Runoff Volume ( $P1 = 1.5$ in.) =	1.354	acre-feet
10-yr Runoff Volume ( $P1 = 1.75$ in.) =	1.619	acre-feet
25-yr Runoff Volume ( $P1 = 2$ in.) =	2.020	acre-feet
50-yr Runoff Volume ( $P1 = 2.25$ in.) =	2.412	acre-feet
100-yr Runoff Volume ( $P1 = 2.52$ in.) =	2.906	acre-feet
500-yr Runoff Volume ( $P1 = 3.68$ in.) =	4.962	acre-feet
Approximate 2-yr Detention Volume =	0.913	acre-feet
Approximate 5-yr Detention Volume =	1.200	acre-feet
Approximate 10-yr Detention Volume =	1.461	acre-feet
Approximate 25-yr Detention Volume =	1.780	acre-feet
Approximate 50-yr Detention Volume =	1.981	acre-feet
Approximate 100-yr Detention Volume =	2.217	acre-feet

	acre-feet
	acre-feet
1.19	inches
1.50	inches
1.75	inches
2.00	inches
2.25	inches
2.52	inches
3.68	inches

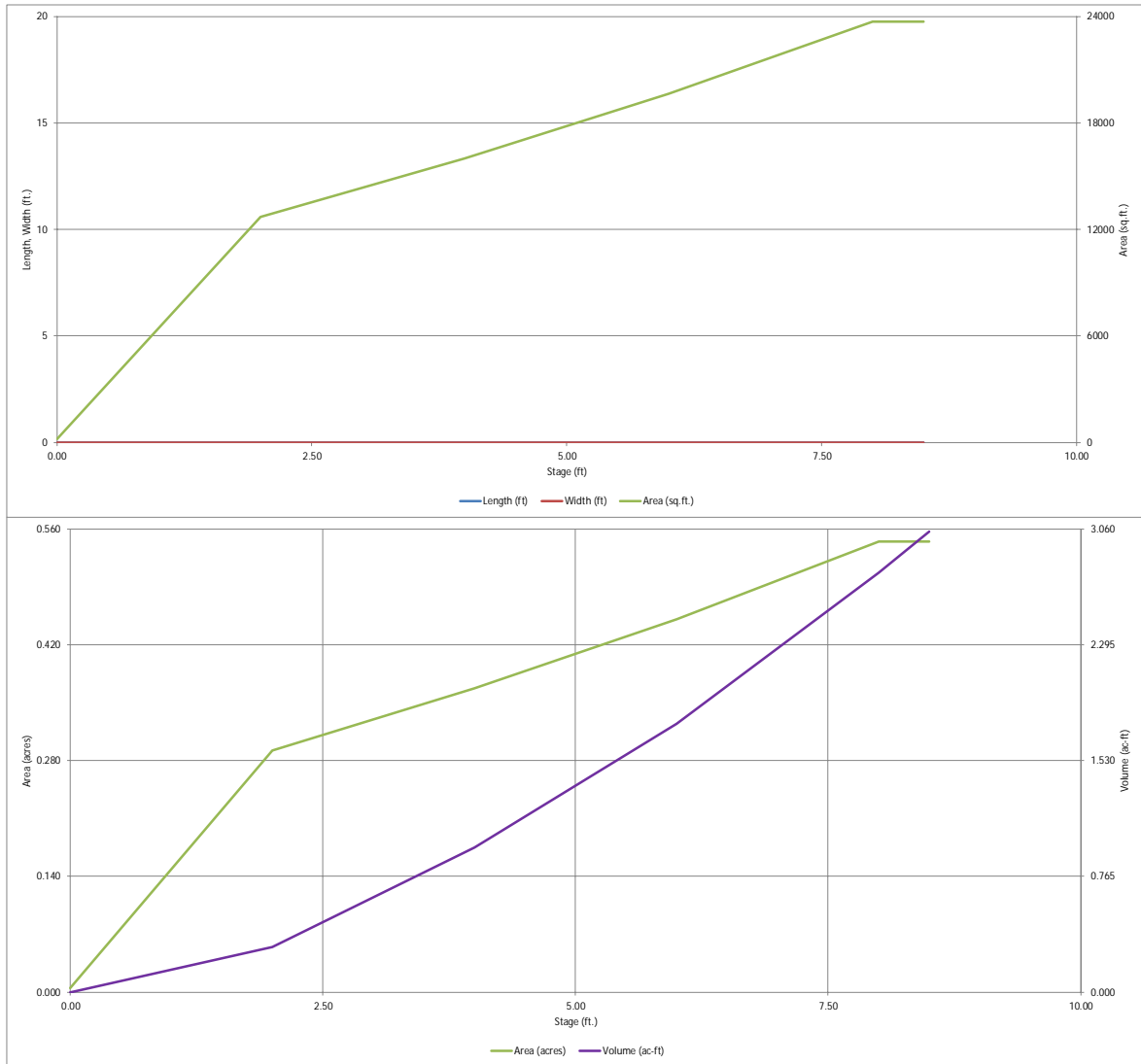
Zone 1 Volume (WOCV) =	0.408	acre-feet
Zone 2 Volume (EURV - Zone 1) =	1.008	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	0.801	acre-feet
Total Detention Basin Volume =	2.217	acre-feet
Initial Surcharge Volume (ISV) =	user	ft <sup>3</sup>
Initial Surcharge Depth (ISD) =	user	ft
Total Available 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	

Initial Surcharge Area ( $A_{ISV}$ )	=	user	ft <sup>2</sup>
Surcharge Volume Length ( $L_{SV}$ )	=	user	ft
Surcharge Volume Width ( $W_{SV}$ )	=	user	ft
Depth of Basin Floor ( $H_{1(COR)}$ )	=	user	ft
Length of Basin Floor ( $L_{1(COR)}$ )	=	user	ft
Width of Basin Floor ( $W_{1(COR)}$ )	=	user	ft
Area of Basin Floor ( $A_{1(COR)}$ )	=	user	ft <sup>2</sup>
Volume of Basin Floor ( $V_{1(COR)}$ )	=	user	ft <sup>3</sup>
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 <sup>2</sup>
Volume of Main Basin ( $V_{MAIN}$ )	=	user	ft <sup>3</sup>
Calculated Total Basin Volume ( $V_{TOTAL}$ )	=	user	acre-feet

1/25/2021, 1:42 PM

# DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Defention, Version 4.02 (February 2020)



Please make a note that this pond's calcs for existing conditions is for "information only" since there are not any proposed improvements to it.

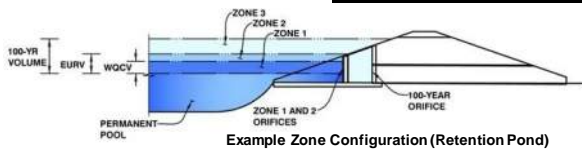
Note added

## DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.02 (February 2020)

Project: Meridian Road - Falcon MDDP

Basin ID: BG Filing No. 1 - Ex. Pond 1 - Current Conditions



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	2.38	0.408	Orifice Plate
Zone 2 (EURV)	5.18	1.008	Not Utilized
Zone 3 (100-year)	6.94	0.801	Weir&Pipe (Restrict)
Total (all zones)		2.217	

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

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

Calculated Parameters for Underdrain		
Underdrain Orifice Area =	N/A	ft <sup>2</sup>
Underdrain Orifice Centroid =	N/A	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 =	1.00	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Orifice Plate =	4.90	ft (relative to basin bottom at Stage = 0 ft)
Orifice Plate: Orifice Vertical Spacing =	N/A	inches
Orifice Plate: Orifice Area per Row =	0.99	sq. inches (diameter = 1-1/8 inches)

Calculated Parameters for Plate		
WQ Orifice Area per Row =	6.875E-03	ft <sup>2</sup>
Elliptical Half-Width =	N/A	feet
Elliptical Slot Centroid =	N/A	feet
Elliptical Slot Area =	N/A	ft <sup>2</sup>

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)	1.00	1.33	1.67	2.00	2.33	2.67	3.00	3.33
Orifice Area (sq. inches)	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99

	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)	3.67	4.00	4.33	4.67				
Orifice Area (sq. inches)	0.99	0.99	0.99	0.99				

User Input: Vertical Orifice (Circular or Rectangular)

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

Calculated Parameters for Vertical Orifice			
	Not Selected	Not Selected	
Vertical Orifice Area =	N/A	N/A	ft <sup>2</sup>
Vertical Orifice Centroid =	N/A	N/A	feet

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

	Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	5.00	N/A	ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length =	4.00	N/A	feet
Overflow Weir Gate Slope =	0.00	N/A	H:V
Horiz. Length of Weir Sides =	2.55	N/A	feet
Overflow Gate Open Area % =	70%	N/A	%, gate open area/total area
Debris Clogging % =	50%	N/A	%

Type)		Calculated Parameters for Overflow Weir		
		Zone 3 Weir	Not Selected	
ft)	Height of Gate Upper Edge, $H_1$ =	5.00	N/A	feet
	Overflow Weir Slope Length =	2.55	N/A	feet
	Gate Open Area / 100-yr Orifice Area =	2.27	N/A	
	Overflow Gate Open Area w/o Debris =	7.14	N/A	ft <sup>2</sup>
	Overflow Gate Open Area w/ Debris =	3.57	N/A	ft <sup>2</sup>

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

	Zone 3 Restrictor	Not Selected	
Depth to Invert of Outlet Pipe =	0.00	N/A	ft (distance below basin bottom at Stage = 0 ft)
Outlet Pipe Diameter =	24.00	N/A	inches
Restrictor Plate Height Above Pipe Invert =	24.00		inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate			
	Zone 3 Restrictor	Not Selected	
Outlet Orifice Area =	3.14	N/A	ft <sup>2</sup>
Outlet Orifice Centroid =	1.00	N/A	feet
Half-Central Angle of Restrictor Plate on Pipe =	3.14	N/A	radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage =	7.61	ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length =	24.00	feet
Spillway End Slopes =	3.00	H:V
Freeboard above Max Water Surface =	0.35	feet

Calculated Parameters for Spillway		
Spillway Design Flow Depth=	0.54	feet

Just as a side note, if this pond is being maintained by an HOA, they might want to look into adjusting the outlet structure, since they are detaining water longer than is acceptable by the state, per SB 15-212.

### 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).

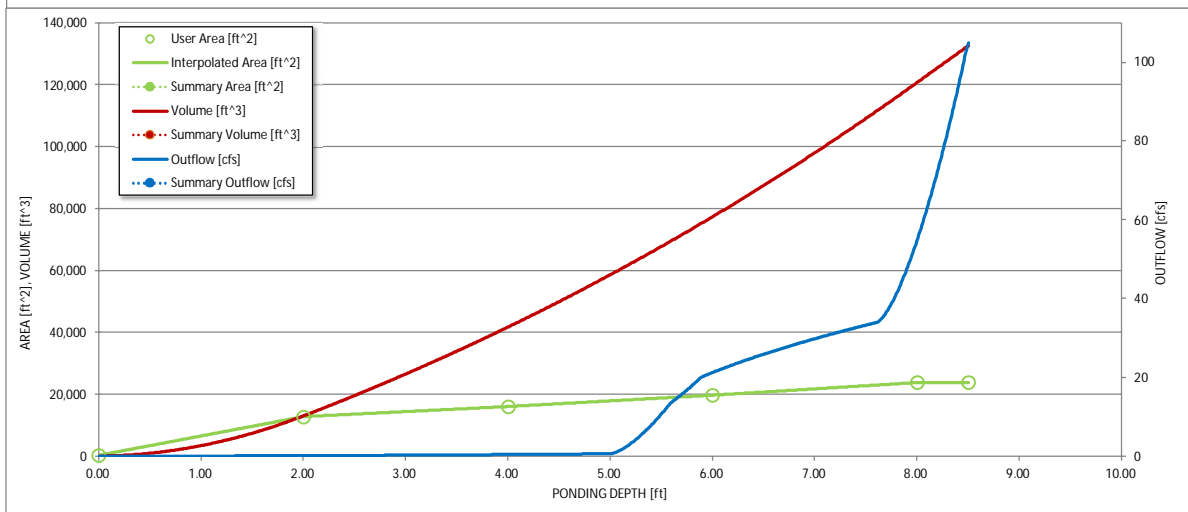
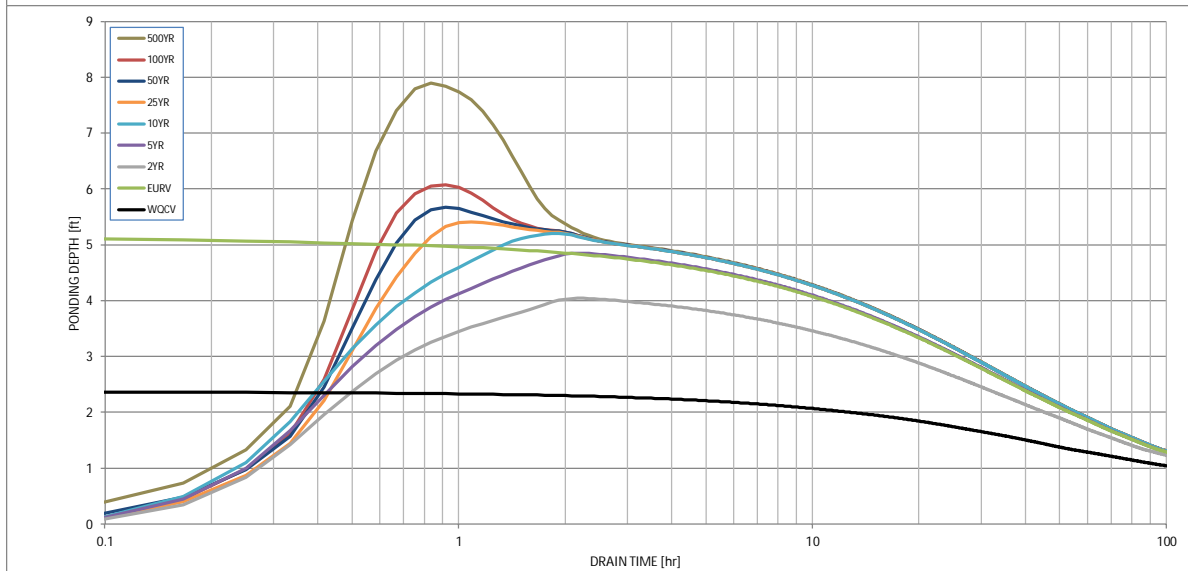
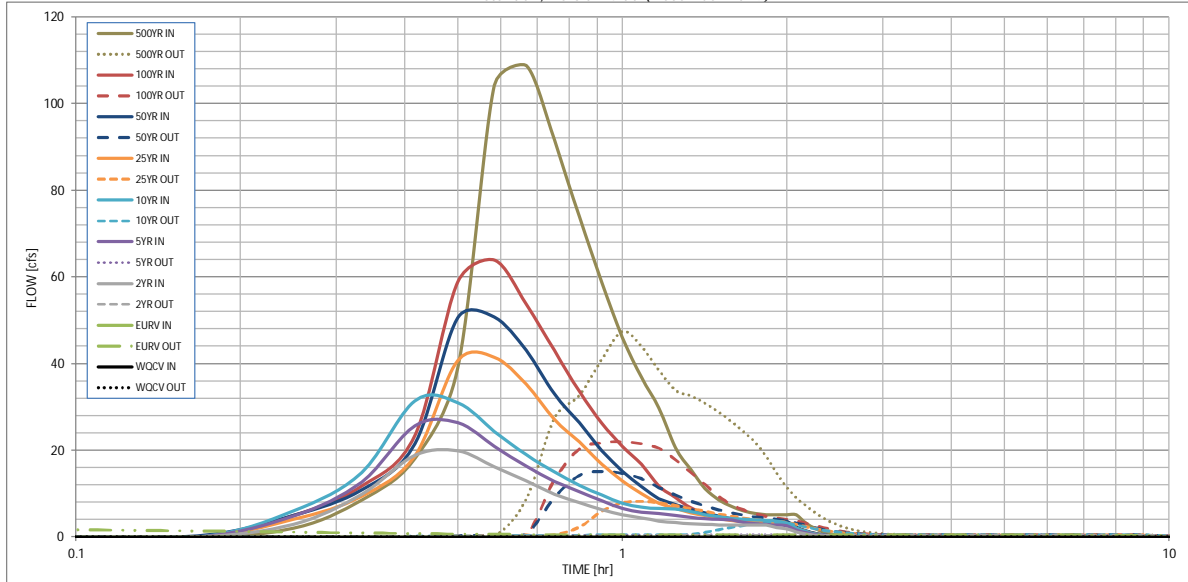
	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
Design Storm Return Period	N/A	N/A	1.19	1.50	1.75	2.00	2.25	2.52	3.68
One-Hour Rainfall Depth (in)	N/A	N/A	1.022	1.354	1.619	2.020	2.412	2.906	4.962
CUHP Runoff Volume (acre-ft)	0.408	1.416	1.022	1.354	1.619	2.020	2.412	2.906	4.962
Inflow Hydrograph Volume (acre-ft)	N/A	N/A	1.022	1.354	1.619	2.020	2.412	2.906	4.962
CUHP Predevelopment Peak Q (cfs)	N/A	N/A	0.3	0.5	0.7	0.9	1.2	1.6	2.9
OPTIONAL Override Predevelopment Peak Q (cfs)	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre)	N/A	N/A	0.01	0.02	0.03	0.04	0.05	0.06	0.10
Peak Inflow Q (cfs)	N/A	N/A	19.9	26.3	31.5	41.5	50.8	63.9	108.8
Peak Outflow Q (cfs)	0.1	2.3	0.4	0.5	0.7	0.9	1.2	1.6	2.9
Ratio Peak Outflow to Predevelopment Q	N/A	N/A	N/A	1.0	4.7	1.3	1.3	1.1	1.0
Structure Controlling Flow	Plate	Overflow Weir 1	Plate	Plate	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Spillway
Max Velocity through Gate 1 (fps)	N/A	0.30	N/A	N/A	0.4	1.1	2.0	3.0	4.9
Max Velocity through Gate 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)	>120	>120	>120	>120	>120	>120	>120	>120	91
Time to Drain 99% of Inflow Volume (hours)	>120	>120	>120	>120	>120	>120	>120	>120	>120
Maximum Ponding Depth (ft)	2.38	5.18	4.05	4.86	5.21	5.42	5.68	6.08	7.90
Area at Maximum Ponding Depth (acres)	0.31	0.42	0.37	0.40	0.42	0.43	0.44	0.45	0.54
Maximum Volume Stored (acre-ft)	0.411	1.418	0.971	1.283	1.431	1.515	1.627	1.810	2.716

Per SB 15-212: SW detention ponds should release or infiltrate at least 97% of all of the runoff from a rainfall event that is less than or equal to a 5-year storm within 72 hours after the end of the event

Per SB 15-212: SW detention ponds should release or infiltrate as quickly as practicable, but in all cases release or infiltrate at least 99% of the runoff within 120 hours after the end of events greater than a 5-year storm

# 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	WOCV [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	0.34	0.03	2.01
	0:15:00	0.00	0.00	2.97	4.82	5.99	4.04	4.97	4.93	8.52
	0:20:00	0.00	0.00	9.87	12.72	14.91	9.36	10.83	11.73	18.07
	0:25:00	0.00	0.00	18.88	25.69	31.49	18.74	21.53	23.45	39.16
	0:30:00	0.00	0.00	19.88	26.34	31.01	40.79	50.66	58.91	104.32
	0:35:00	0.00	0.00	16.15	20.89	24.38	41.50	50.76	63.94	108.83
	0:40:00	0.00	0.00	13.00	16.36	18.97	35.23	43.14	53.76	91.65
	0:45:00	0.00	0.00	9.93	12.85	15.04	27.21	33.00	43.05	73.95
	0:50:00	0.00	0.00	7.89	10.53	12.00	21.98	26.42	33.66	58.81
	0:55:00	0.00	0.00	6.33	8.35	9.65	16.77	19.95	26.28	46.09
	1:00:00	0.00	0.00	5.14	6.67	7.82	12.96	15.22	20.93	36.87
	1:05:00	0.00	0.00	4.47	5.74	6.88	10.05	11.65	16.76	29.82
	1:10:00	0.00	0.00	3.72	5.39	6.58	7.77	8.90	11.78	20.61
	1:15:00	0.00	0.00	3.31	4.96	6.49	6.67	7.58	9.13	15.61
	1:20:00	0.00	0.00	3.07	4.51	5.94	5.61	6.33	6.78	11.20
	1:25:00	0.00	0.00	2.93	4.22	5.15	4.97	5.60	5.39	8.60
	1:30:00	0.00	0.00	2.84	4.04	4.64	4.27	4.81	4.55	7.03
	1:35:00	0.00	0.00	2.78	3.94	4.31	3.83	4.31	4.00	6.00
	1:40:00	0.00	0.00	2.75	3.43	4.10	3.55	3.99	3.68	5.40
	1:45:00	0.00	0.00	2.74	3.10	3.96	3.39	3.81	3.54	5.18
	1:50:00	0.00	0.00	2.74	2.89	3.87	3.30	3.70	3.49	5.09
	1:55:00	0.00	0.00	2.24	2.76	3.69	3.25	3.65	3.48	5.07
	2:00:00	0.00	0.00	1.92	2.56	3.29	3.22	3.63	3.48	5.07
	2:05:00	0.00	0.00	1.21	1.61	2.08	2.04	2.29	2.20	3.19
	2:10:00	0.00	0.00	0.74	0.99	1.29	1.27	1.43	1.36	1.97
	2:15:00	0.00	0.00	0.44	0.59	0.77	0.77	0.86	0.82	1.17
	2:20:00	0.00	0.00	0.24	0.35	0.44	0.44	0.50	0.47	0.67
	2:25:00	0.00	0.00	0.12	0.19	0.23	0.24	0.27	0.25	0.35
	2:30:00	0.00	0.00	0.05	0.08	0.09	0.10	0.11	0.10	0.14
	2:35:00	0.00	0.00	0.01	0.02	0.02	0.02	0.02	0.02	0.02
	2:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	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	

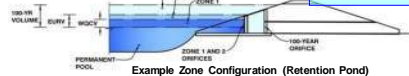
## DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)

Basin ID: Pond (North) (Water Quality only)

Basin ID: Pond (North) (Water Quality only)

Added



### Example Zone Configuration (Retention Pond)

#### Required Volume Calculation

Selected BMP Type =	<b>EDB</b>	
Watershed Area =	19.12	acres
Watershed Length =	1.700	ft
Watershed Slope =	0.020	ft/ft
Watershed Imperviousness =	47.90%	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
Desired WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	User Input	
Water Quality Capture Volume (WQCV) =	0.930	acres-feet
Excess Urban Runoff Volume (EURV) =	1.043	acres-feet
2-yr Runoff Volume ( $P_1 = 1.75$ in.) =	0.711	acres-feet
5-yr Runoff Volume ( $P_1 = 1.95$ in.) =	0.936	acres-feet
10-yr Runoff Volume ( $P_1 = 1.75$ in.) =	1.154	acres-feet
25-yr Runoff Volume ( $P_1 = 2.31$ in.) =	1.445	acres-feet
50-yr Runoff Volume ( $P_1 = 2.25$ in.) =	1.817	acres-feet
100-yr Runoff Volume ( $P_1 = 2.52$ in.) =	2.259	acres-feet
500-yr Runoff Volume ( $P_1 = 3.68$ in.) =	3.846	acres-feet
Approximate 2-yr Detention Volume =	0.670	acres-feet
Approximate 5-yr Detention Volume =	0.883	acres-feet
Approximate 10-yr Detention Volume =	1.079	acres-feet
Approximate 25-yr Detention Volume =	1.324	acres-feet
Approximate 50-yr Detention Volume =	1.481	acres-feet
Approximate 100-yr Detention Volume =	1.678	acres-feet

Water Quality Capture Volume (WQCV) =	0.320	acre-feet	Optional User Override 1-hr Precipitation	
Excess Urban Runoff Volume (EVR) =	1.043	acre-feet		
2-yr Runoff Volume (P1 = 1.19 in.) =	0.711	acre-feet		1.19 inches
5-yr Runoff Volume (P1 = 1.5 in.) =	0.936	acre-feet		1.50 inches
10-yr Runoff Volume (P1 = 1.75 in.) =	1.154	acre-feet		1.75 inches
25-yr Runoff Volume (P1 = 2 in.) =	1.445	acre-feet		2.00 inches
50-yr Runoff Volume (P1 = 2.25 in.) =	1.817	acre-feet		2.25 inches
100-yr Runoff Volume (P1 = 2.52 in.) =	2.259	acre-feet	2.52 inches	
500-yr Runoff Volume (P1 = 3.68 in.) =	3.846	acre-feet	3.68 inches	

### Stage-Storage Calculation

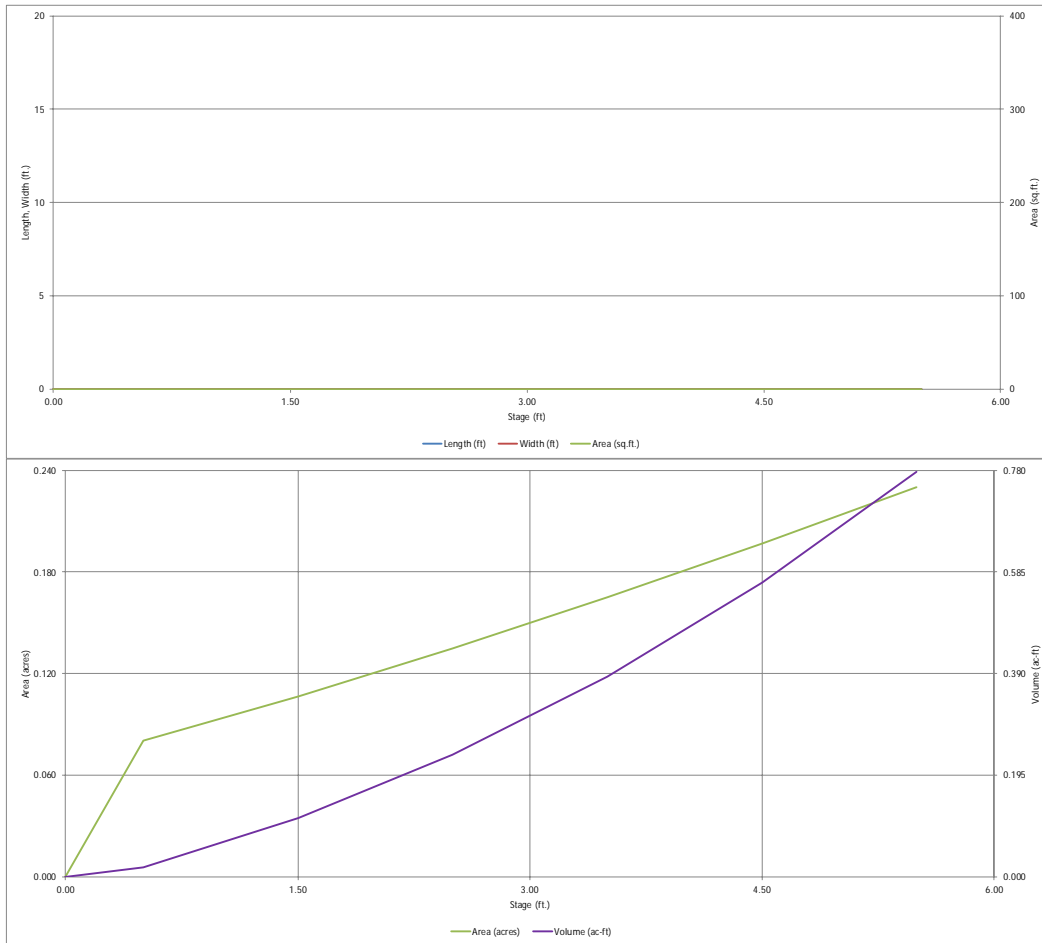
Zone 1 Volume ( $V_{QCV1}$ )	0.320	acre-feet
Select Zone 2 Storage Volume (Optional)		acre-feet
Select Zone 3 Storage Volume (Optional)		acre-feet
Total Detention Basin Volume	0.320	acre-feet
Initial Surcharge Volume ( $ISV$ )	user	ft <sup>3</sup>
Initial Surcharge Depth ( $ISD$ )	user	ft
Total Available Detention Depth ( $H_{DAV}$ )	user	ft
Depth of Trickle Channel ( $H_{TC}$ )	user	ft
Slope of Trickle Channel ( $S_{TC}$ )	user	ft/ft
Slopes of Main Basin Sides ( $S_{MAV}$ )	user	H:V
Basin Length-to-Width Ratio ( $R_{LW}$ )	user	
Initial Surcharge Area ( $A_{ISD}$ )	user	ft <sup>2</sup>
Surcharge Volume Length ( $L_{SV}$ )	user	ft
Surcharge Volume Width ( $W_{SV}$ )	user	ft
Depth of Basin Floor ( $H_{B1,OCB}$ )	user	ft
Length of Basin Floor ( $L_{B1,OCB}$ )	user	ft
Width of Basin Floor ( $W_{B1,OCB}$ )	user	ft
Area of Basin Floor ( $A_{B1,OCB}$ )	user	ft <sup>2</sup>
Volume of Basin Floor ( $V_{B1,OCB}$ )	user	ft <sup>3</sup>
Depth of Main Basin ( $H_{MAV}$ )	user	ft
Length of Main Basin ( $L_{MAV}$ )	user	ft
Width of Main Basin ( $W_{MAV}$ )	user	ft
Area of Main Basin ( $A_{MAV}$ )	user	ft <sup>2</sup>
Volume of Main Basin ( $V_{MAV}$ )	user	ft <sup>3</sup>
Calculated Total Basin Volume ( $V_{DAV}$ )	USER	acre-feet

Select Zone 2 Storage Volume (Optional) =		acre-feet	Total detention volume is less than 100-year volume.
Select Zone 3 Storage Volume (Optional) =		acre-feet	
Total Detention Basin Volume =	0.320	acre-feet	

[illegible]

# DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)



## Detention Basin Outlet Structure Design

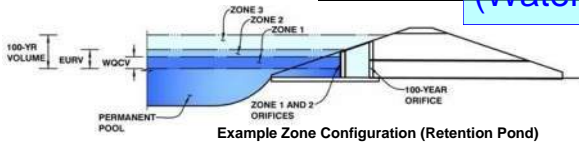
UD-Detention, Version 3.07 (February 2017)

Project: Bent Grass Residential Filing No. 2

Basin ID: Pond (North)

(Water Quality only)

Added



**Example Zone Configuration (Retention Pond)**

	Stage (ft)	Zone Volume (ac-ft)	Outlet Type
Zone 1 (WOCV)	3.10	0.320	Orifice Plate
Zone 2			
Zone 3			
		0.320	Total

User Input: Orifice at Underdrain Outlet (typically used to drain WOCV 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<sup>2</sup>  
Underdrain Orifice Centroid =  feet

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

Invert of Lowest Orifice =  ft (relative to basin bottom at Stage = 0 ft)  
Depth at top of Zone using Orifice Plate =  ft (relative to basin bottom at Stage = 0 ft)  
Orifice Plate: Orifice Vertical Spacing =  inches  
Orifice Plate: Orifice Area per Row =  sq. inches (diameter = 1-7/16 inches)

Calculated Parameters for Plate

WQ Orifice Area per Row =  ft<sup>2</sup>  
Elliptical Half-Width =  feet  
Elliptical Slot Centroid =  feet  
Elliptical Slot Area =  ft<sup>2</sup>

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					
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)

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

Vertical Orifice Area =  ft<sup>2</sup>  
Vertical Orifice Centroid =  feet

User Input: Overflow Weir (Dropbox) and Grate (Flat or Sloped)

Overflow Weir Front Edge Height, H<sub>o</sub> =  ft (relative to basin bottom at Stage = 0 ft)  
Overflow Weir Front Edge Length =  feet  
Overflow Weir Slope =  H:V (enter zero for flat grate)  
Horiz. Length of Weir Sides =  feet  
Overflow Grate Open Area % =  % grate open area/total area  
Debris Clogging % =  %

Calculated Parameters for Overflow Weir

Height of Grate Upper Edge, H<sub>1</sub> =  feet  
Over Flow Weir Slope Length =  feet  
Grate Open Area / 100-yr Orifice Area =  should be ≥ 4  
Overflow Grate Open Area w/o Debris =  ft<sup>2</sup>  
Overflow Grate Open Area w/ Debris =  ft<sup>2</sup>

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

Depth to Invert of Outlet Pipe =  ft (distance below basin bottom at Stage = 0 ft)  
Circular Orifice Diameter =  inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

Outlet Orifice Area =  ft<sup>2</sup>  
Outlet Orifice Centroid =  feet  
Half-Central Angle of Restrictor Plate on Pipe =  radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

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

Calculated Parameters for Spillway

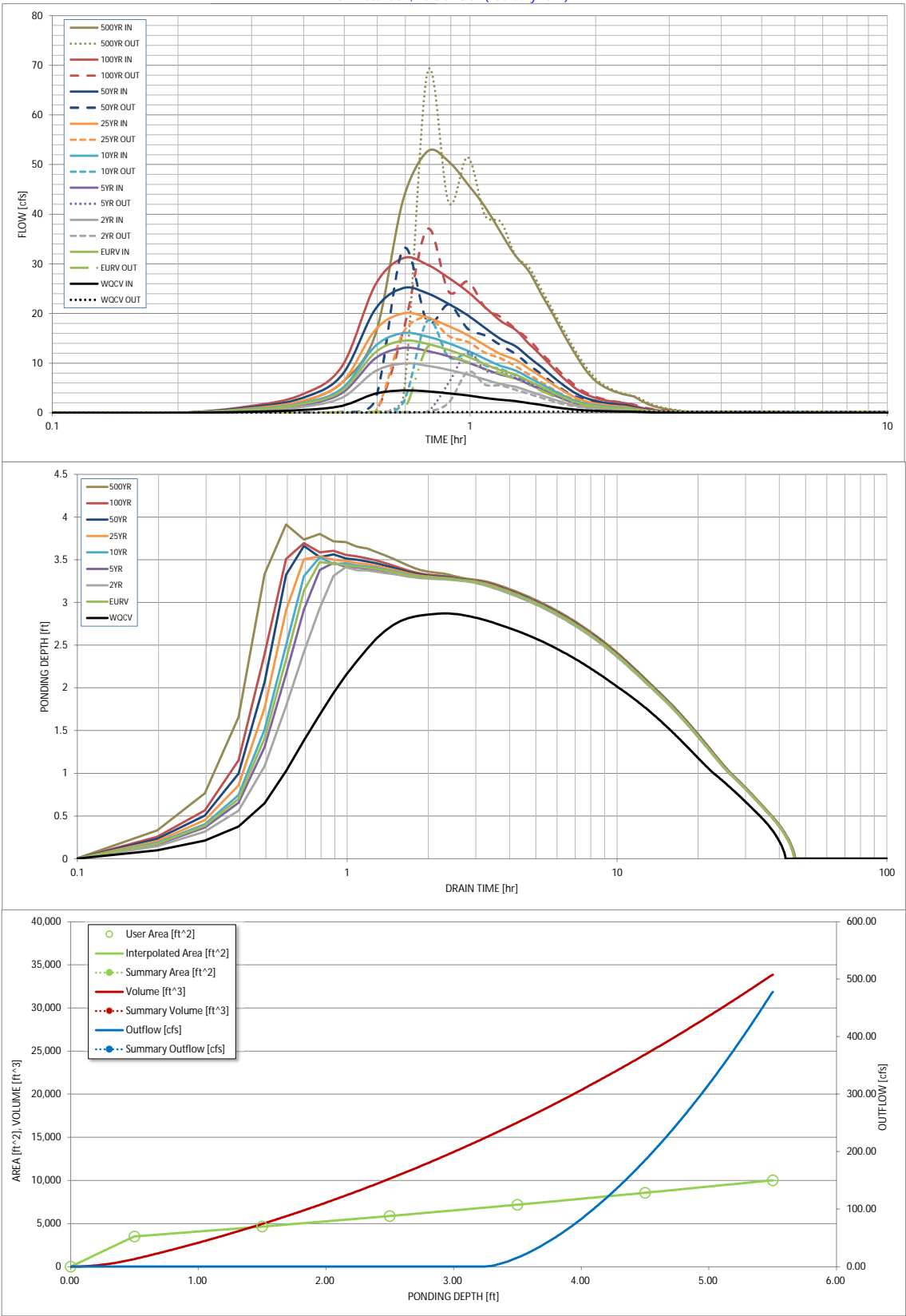
Spillway Design Flow Depth =  feet  
Stage at Top of Freeboard =  feet  
Basin Area at Top of Freeboard =  acres

### Routed Hydrograph Results

	WOCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
Design Storm Return Period =									
One-Hour Rainfall Depth (in) =	0.53	1.07	1.19	1.50	1.75	2.00	2.25	2.52	3.68
Calculated Runoff Volume (acre-ft) =	0.320	1.043	0.711	0.936	1.154	1.445	1.817	2.259	3.846
OPTIONAL Override Runoff Volume (acre-ft) =									
Inflow Hydrograph Volume (acre-ft) =	0.320	1.043	0.710	0.936	1.154	1.445	1.817	2.259	3.847
Predevelopment Unit Peak Flow, q (cfs/acre) =	0.00	0.00	0.00	0.00	0.01	0.02	0.15	0.38	1.02
Predevelopment Peak Q (cfs) =	0.0	0.0	0.0	0.1	0.2	0.4	3.0	7.2	19.5
Peak Inflow Q (cfs) =	4.5	14.5	9.9	13.0	16.1	20.0	25.1	31.1	52.6
Peak Outflow Q (cfs) =	0.2	13.2	8.3	12.2	18.5	19.2	32.9	37.0	68.4
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	159.6	104.1	48.2	11.1	5.1	3.5
Structure Controlling Flow =	Plate	Spillway	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) =	38	34	37	35	33	31	28	26	19
Time to Drain 99% of Inflow Volume (hours) =	40	40	42	41	40	39	38	37	32
Maximum Ponding Depth (ft) =	2.87	3.47	3.41	3.46	3.53	3.54	3.66	3.69	3.91
Area at Maximum Ponding Depth (acres) =	0.15	0.16	0.16	0.16	0.17	0.17	0.17	0.17	0.18
Maximum Volume Stored (acre-ft) =	0.286	0.379	0.369	0.377	0.389	0.389	0.410	0.416	0.454

Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)



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



## DETENTION BASIN STAGE-STORAGE TABLE BUILDER

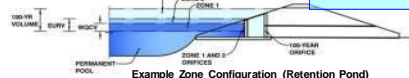
UD-Detention, Version 3.07 (February 2017)

Project: Bent Grass Residential Filing No. 2

Basin ID: Pond (South) (Water Quality only)

Basin ID: Pond (South) (Water Quality only)

Added



### Example Zone Configuration (Retention Pond)

#### Required Volume Calculation

Selected BMP Type =	EDB	
Watershed Area =	29.90	acres
Watershed Length =	1.800	ft
Watershed Slope =	0.020	ft/ft
Watershed Imperviousness =	53.20%	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
Desired WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depth =	User Input	
Water Quality Capture Volume (WQCV) =	0.536	acre-feet
Excess Urban Runoff Volume (EURV) =	1.866	acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	1.276	acre-feet
5-yr Runoff Volume (P1 = 1.75 in.) =	1.674	acre-feet
10-yr Runoff Volume (P1 = 1.75 in.) =	2.056	acre-feet
25-yr Runoff Volume (P1 = 2 in.) =	2.545	acre-feet
50-yr Runoff Volume (P1 = 2.25 in.) =	3.141	acre-feet
100-yr Runoff Volume (P1 = 2.52 in.) =	3.840	acre-feet
50-yr Runoff Volume (P1 = 3.68 in.) =	6.387	acre-feet
Approximate 2-yr Detention Volume =	1.203	acre-feet
Approximate 5-yr Detention Volume =	1.582	acre-feet
Approximate 10-yr Detention Volume =	1.924	acre-feet
Approximate 25-yr Detention Volume =	2.345	acre-feet
Approximate 50-yr Detention Volume =	2.609	acre-feet
Approximate 100-yr Detention Volume =	2.919	acre-feet

**Optional User Override**  
**1-hr Precipitation**

1.19	inches
1.50	inches
1.75	inches
2.00	inches
2.25	inches
2.52	inches
3.68	inches

### Stage-Storage Calculation

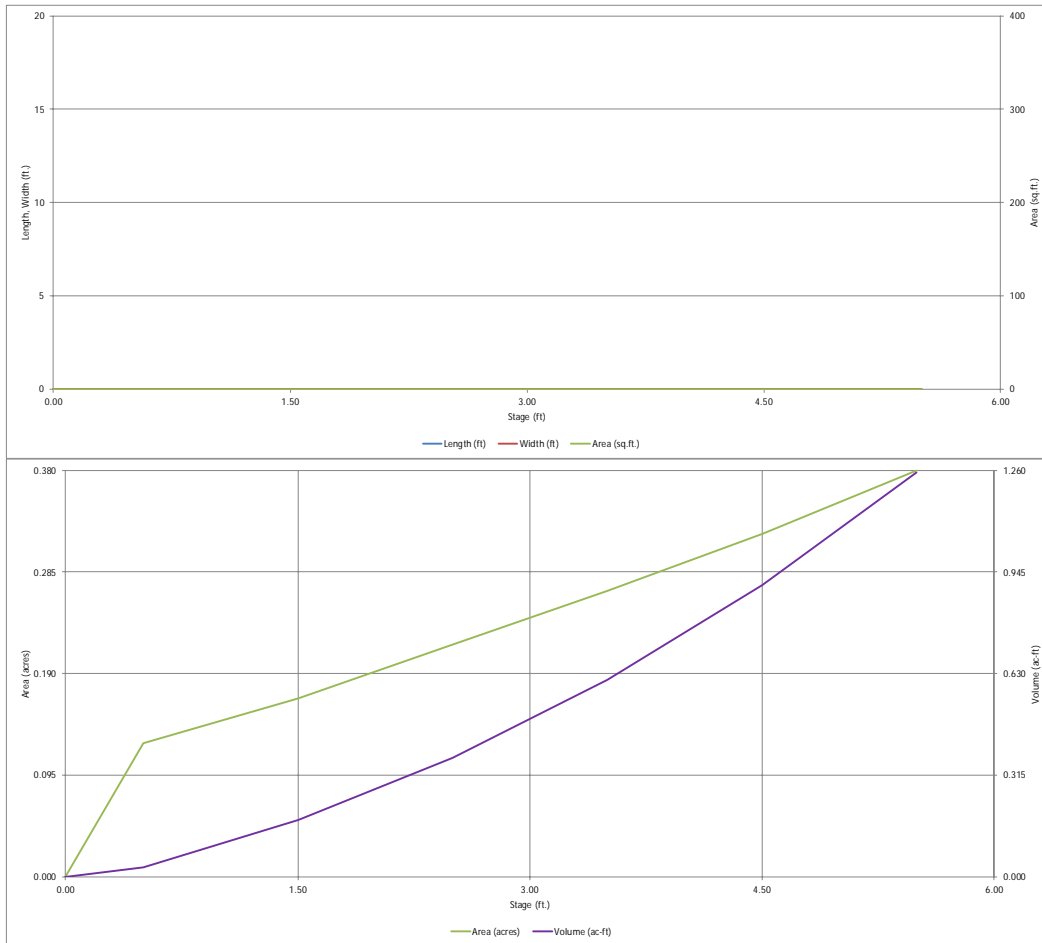
Zone 1 Volume ( $V_{Z1}$ )	0.536	acre-feet
Select Zone 2 Storage Volume ( $W_{Z2}$ )	user	acre-feet
Select Zone 3 Storage Volume (Optional)	user	acre-feet
Total Detention Basin Volume	0.536	acre-feet
Initial Surcharge Volume ( $ISV$ )	user	ft <sup>3</sup>
Initial Surcharge Depth ( $ISD$ )	user	ft
Total Available Detention Depth ( $H_{DAV}$ )	user	ft
Depth of Trickle Channel ( $H_{TC}$ )	user	ft
Slope of Trickle Channel ( $S_{TC}$ )	user	ft/ft
Slopes of Main Basin Sides ( $S_{MB}$ )	user	H:V
Basin Length-to-Width Ratio ( $R_{LW}$ )	user	
Initial Surcharge Area ( $A_{ISD}$ )	user	ft <sup>2</sup>
Surcharge Volume Length ( $L_{SD}$ )	user	ft
Surcharge Volume Width ( $W_{SD}$ )	user	ft
Depth of Basin Floor ( $H_{1,(LSD)}$ )	user	ft
Length of Basin Floor ( $L_{1,(LSD)}$ )	user	ft
Width of Basin Floor ( $W_{1,(LSD)}$ )	user	ft
Area of Basin Floor ( $A_{1,(LSD)}$ )	user	ft <sup>2</sup>
Volume of Basin Floor ( $V_{1,(LSD)}$ )	user	ft <sup>3</sup>
Depth of Main Basin ( $H_{MB}$ )	user	ft
Length of Main Basin ( $L_{MB}$ )	user	ft
Width of Main Basin ( $W_{MB}$ )	user	ft
Area of Main Basin ( $A_{MB}$ )	user	ft <sup>2</sup>
Volume of Main Basin ( $V_{MB}$ )	user	ft <sup>3</sup>
Calculated Total Basin Volume ( $V_{TASD}$ )	0.536	acre-feet

Total detention volume is less than 100-year volume.

[illegible]

# DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)



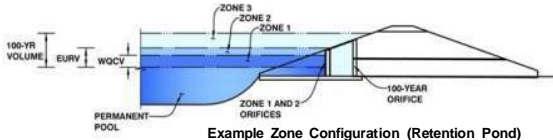


# Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)

Project: Bent Grass Residential Filing No. 2

Basin ID: Pond (South)



Example Zone Configuration (Retention Pond)

	Stage (ft)	Zone Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	3.22	0.536	Orifice Plate
Zone 2			Not Utilized
Zone 3			Not Utilized
		0.536	Total

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<sup>2</sup>  
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 =  ft (relative to basin bottom at Stage = 0 ft)  
Depth at top of Zone using Orifice Plate =  ft (relative to basin bottom at Stage = 0 ft)  
Orifice Plate: Orifice Vertical Spacing =  inches  
Orifice Plate: Orifice Area per Row =  sq. inches (diameter = 1-7/8 inches)

Calculated Parameters for Plate

WQ Orifice Area per Row =  ft<sup>2</sup>  
Elliptical Half-Width =  feet  
Elliptical Slot Centroid =  feet  
Elliptical Slot Area =  ft<sup>2</sup>

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)	2.75	2.75	2.75					

	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)

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

Vertical Orifice Area =  ft<sup>2</sup>  
Vertical Orifice Centroid =  feet

User Input: Overflow Weir (Dropbox) and Grate (Flat or Sloped)

Overflow Weir Front Edge Height, H<sub>o</sub> =  ft (relative to basin bottom at Stage = 0 ft)  
Overflow Weir Front Edge Length =  feet  
Overflow Weir Slope =  H:V (enter zero for flat grate)  
Horiz. Length of Weir Sides =  feet  
Overflow Grate Open Area % =  %  
Debris Clogging % =  %

Calculated Parameters for Overflow Weir

Height of Grate Upper Edge, H<sub>u</sub> =  feet  
Over Flow Weir Slope Length =  feet  
Grate Open Area / 100-yr Orifice Area =  should be ≥ 4  
Overflow Grate Open Area w/o Debris =  ft<sup>2</sup>  
Overflow Grate Open Area w/ Debris =  ft<sup>2</sup>

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

Depth to Invert of Outlet Pipe =  ft (distance below basin bottom at Stage = 0 ft)  
Circular Orifice Diameter =  inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

Outlet Orifice Area =  ft<sup>2</sup>  
Outlet Orifice Centroid =  feet  
Half-Central Angle of Restrictor Plate on Pipe =  radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

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

Calculated Parameters for Spillway

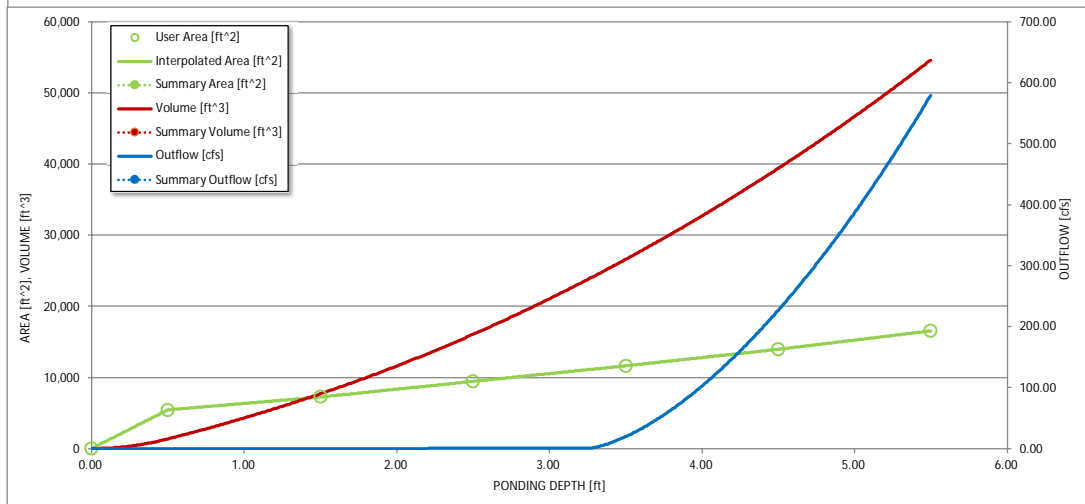
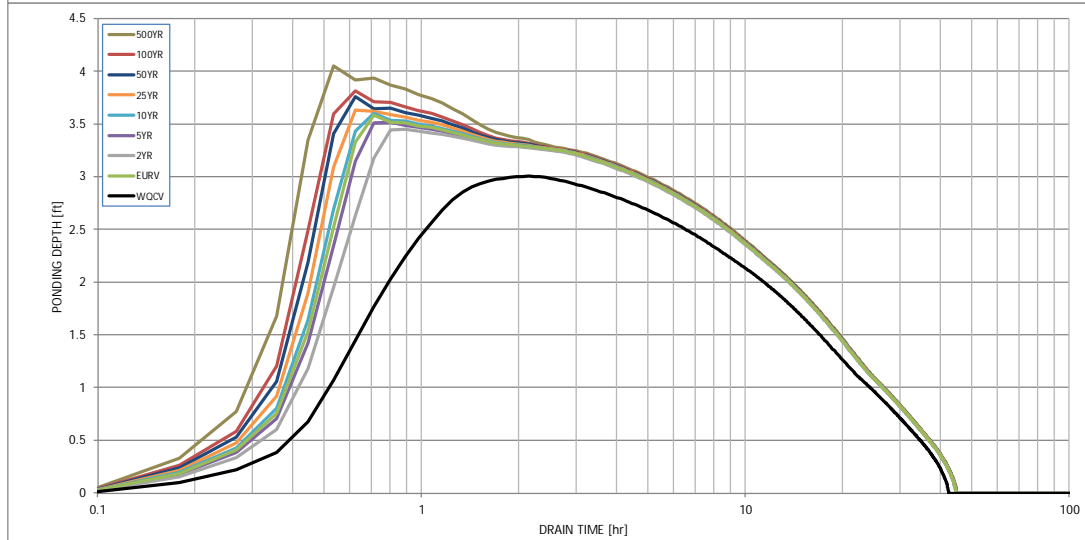
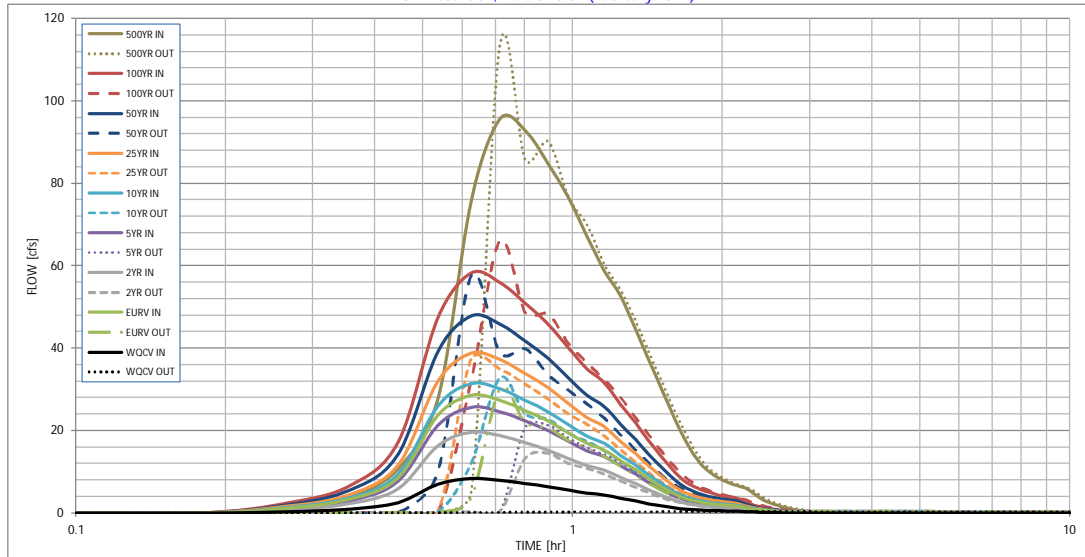
Spillway Design Flow Depth =  feet  
Stage at Top of Freeboard =  feet  
Basin Area at Top of Freeboard =  acres

## Routed Hydrograph Results

	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
Design Storm Return Period =	0.53	1.07	1.19	1.50	1.75	2.00	2.25	2.52	3.68
One-Hour Rainfall Depth (in) =	0.536	1.866	1.276	1.674	2.056	2.545	3.141	3.840	6.387
Calculated Runoff Volume (acre-ft) =									
OPTIONAL Override Runoff Volume (acre-ft) =									
Inflow Hydrograph Volume (acre-ft) =	0.536	1.866	1.275	1.674	2.055	2.544	3.141	3.840	6.382
Predevelopment Unit Peak Flow, q (cfs/acre) =	0.00	0.00	0.00	0.00	0.01	0.02	0.18	0.43	1.16
Predevelopment Peak Q (cfs) =	0.0	0.0	0.0	0.1	0.3	0.7	5.4	13.0	34.7
Peak Inflow Q (cfs) =	8.3	28.6	19.6	25.7	31.5	38.8	47.8	58.2	95.7
Peak Outflow Q (cfs) =	0.4	30.1	14.5	21.3	32.8	37.3	57.5	66.0	113.4
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	153.5	101.7	51.7	10.7	5.1	3.3
Structure Controlling Flow =	Plate	Spillway	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) =	38	33	36	34	32	30	27	25	19
Time to Drain 99% of Inflow Volume (hours) =	40	40	41	40	39	38	37	36	32
Maximum Ponding Depth (ft) =	3.01	3.58	3.45	3.52	3.60	3.64	3.76	3.81	4.05
Area at Maximum Ponding Depth (acres) =	0.24	0.27	0.26	0.27	0.27	0.27	0.28	0.28	0.30
Maximum Volume Stored (acre-ft) =	0.483	0.632	0.597	0.613	0.637	0.646	0.682	0.696	0.765

# Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)



S-A-V-D Chart Axis Override

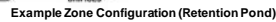
	X-axis	Left Y-Axis	Right Y-Axis
minimum bound			
maximum bound			



## Future Pond Calculations

MHFD-Detention, Version 4.02 (February 2020)

Basin ID: Future Pond for Offsite Flows

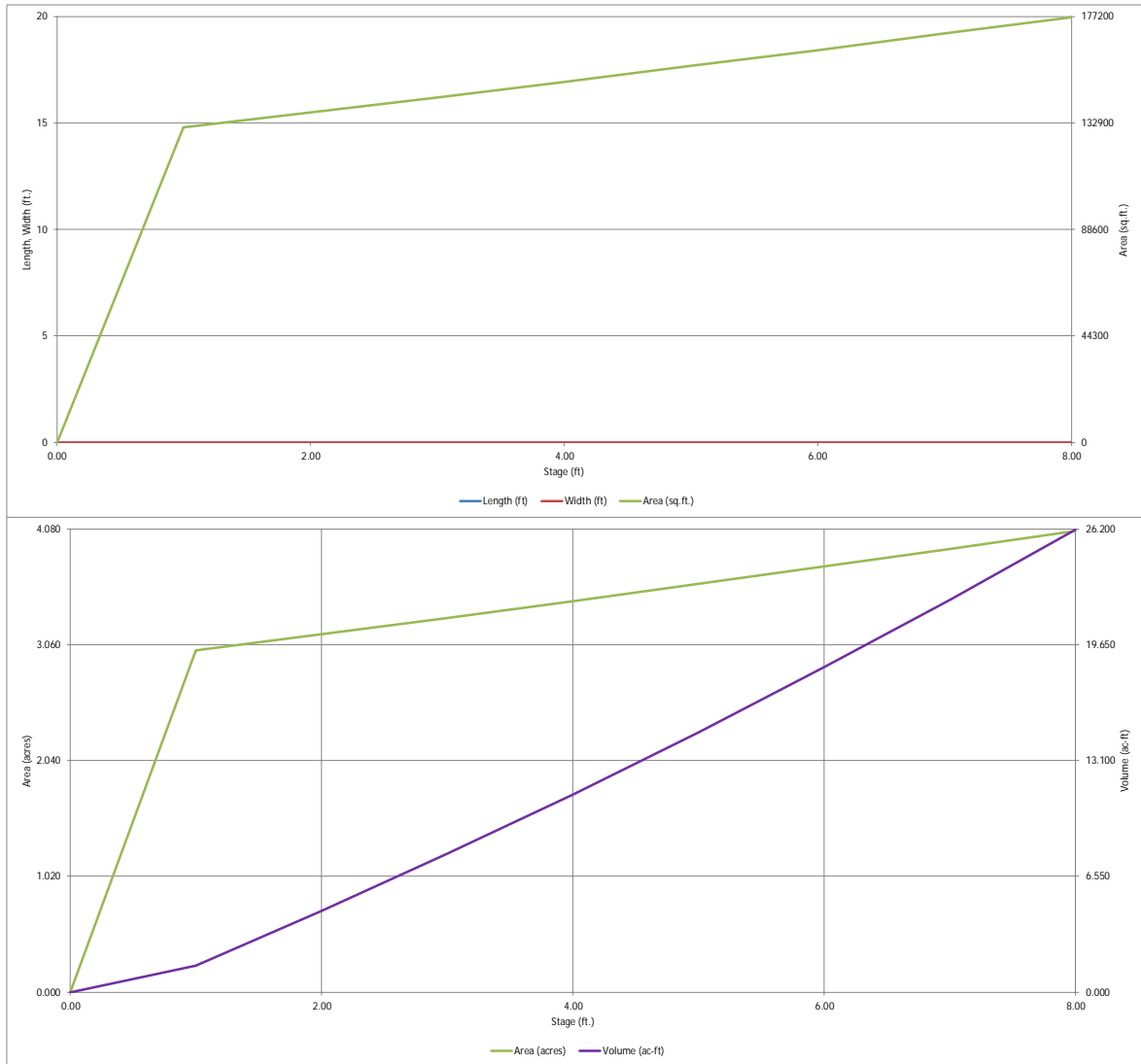


Initial Surcharge Area ( $A_{ISV}$ )	=	user	ft <sup>2</sup>
Surcharge Volume Length ( $L_{SV}$ )	=	user	ft
Surcharge Volume Width ( $W_{SV}$ )	=	user	ft
Depth of Basin Floor ( $H_{1,COR}$ )	=	user	ft
Length of Basin Floor ( $L_{1,COR}$ )	=	user	ft
Width of Basin Floor ( $W_{1,COR}$ )	=	user	ft
Area of Basin Floor ( $A_{1,COR}$ )	=	user	ft <sup>2</sup>
Volume of Basin Floor ( $V_{1,COR}$ )	=	user	ft <sup>3</sup>
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 <sup>2</sup>
Volume of Main Basin ( $V_{MAIN}$ )	=	user	ft <sup>3</sup>
Calculated Total Basin Volume ( $V_{TBS}$ )	=	user	acre-feet

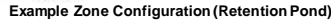
[illegible]

# DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD- Detention, Version 4.02 (February 2020)



*MHFD-Detention, Version 4.02 (February 2020)*

Basin ID: Future Pond for Offsite Flows

Zone 1 (WQCV)  
Zone 2 (EURV)  
Zone 3 (100-year)

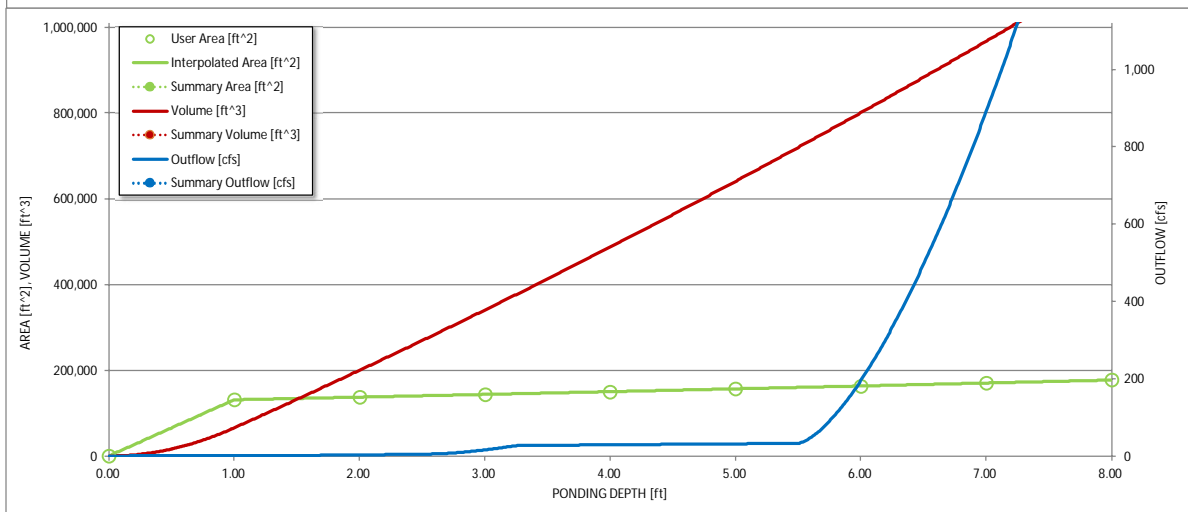
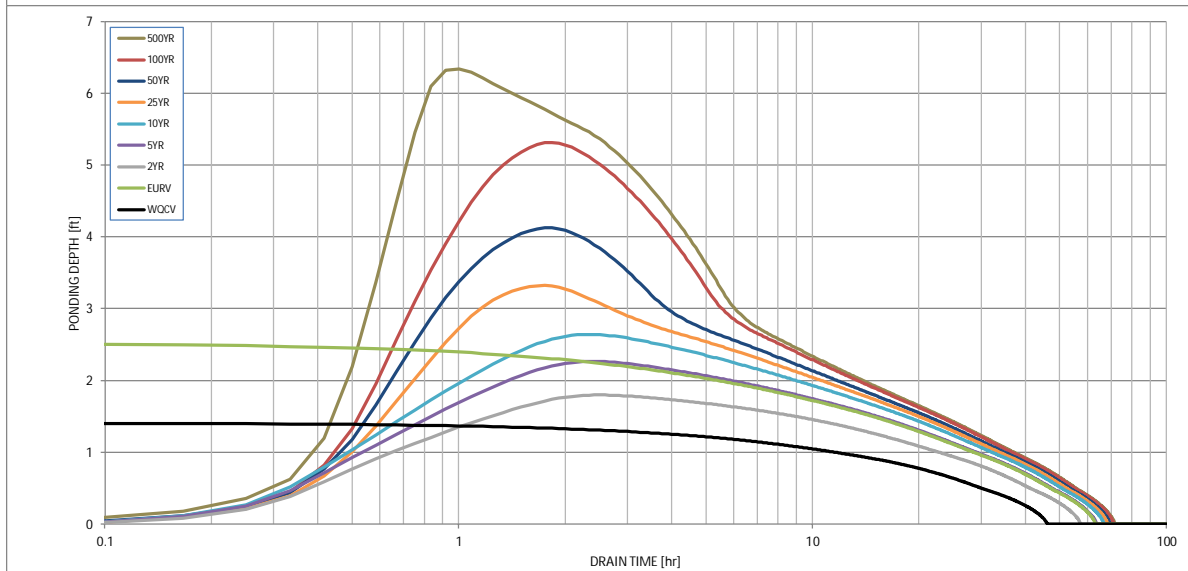
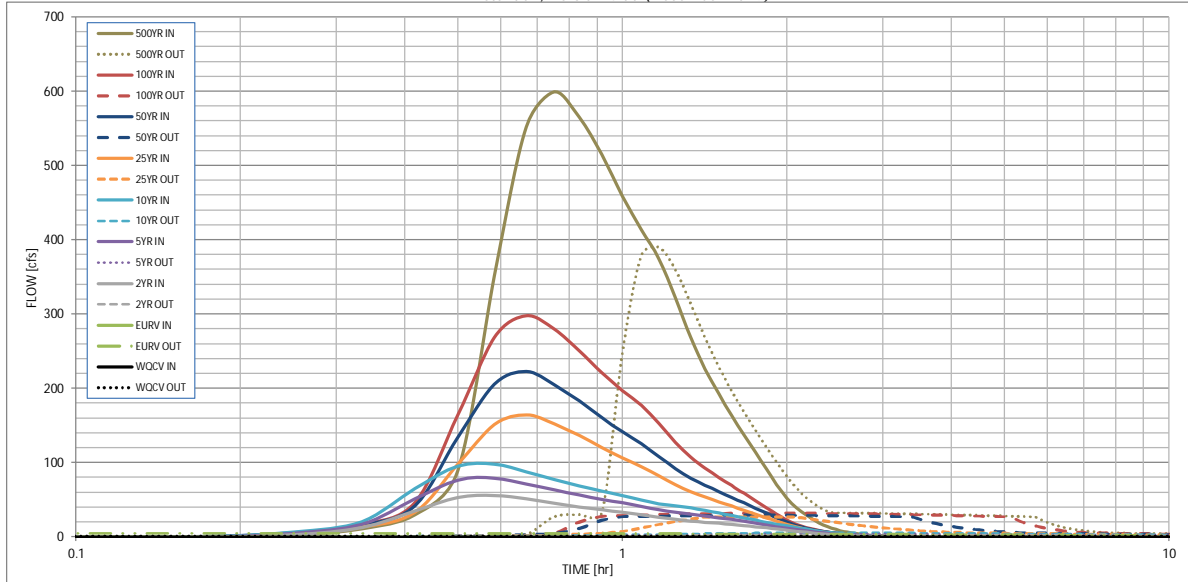
Underdrain Orifice Centroid = N/A feet

Elliptical Slot Area = N/A ft<sup>2</sup>

Maximum Volume Stored (acre-ft)	2.781	6.275	3.957	5.408	6.631	8.870	11.592	15.819	19.653
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# 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

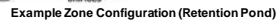
Outflow Hydrograph Workbook Filename:

### 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	0.36	0.04	2.25
	0:15:00	0.00	0.00	3.17	5.15	6.42	4.34	5.62	5.36	11.14
	0:20:00	0.00	0.00	12.88	17.39	20.72	13.26	15.74	16.61	29.79
	0:25:00	0.00	0.00	34.95	51.45	65.17	33.08	41.62	46.39	89.31
	0:30:00	0.00	0.00	53.08	76.70	95.51	97.89	134.37	164.02	351.30
	0:35:00	0.00	0.00	56.14	79.47	98.20	151.18	205.50	268.52	552.35
	0:40:00	0.00	0.00	51.58	71.43	87.75	164.65	222.97	297.67	599.52
	0:45:00	0.00	0.00	45.77	63.25	77.65	152.11	204.89	279.90	564.97
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	1:15:00	0.00	0.00	23.62	33.13	41.93	70.31	91.98	127.64	268.42
	1:20:00	0.00	0.00	21.57	30.47	39.15	60.88	79.39	107.61	226.50
	1:25:00	0.00	0.00	19.92	28.10	35.74	53.81	69.75	92.67	192.72
	1:30:00	0.00	0.00	18.38	25.86	32.20	47.56	61.28	80.20	163.60
	1:35:00	0.00	0.00	16.90	23.71	28.89	41.72	53.39	69.20	137.95
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	2:45:00	0.00	0.00	1.32	1.67	2.08	1.90	2.12	1.97	2.74
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	3:05:00	0.00	0.00	0.41	0.52	0.67	0.63	0.69	0.65	0.84
	3:10:00	0.00	0.00	0.26	0.35	0.45	0.43	0.47	0.44	0.53
	3:15:00	0.00	0.00	0.15	0.22	0.27	0.26	0.28	0.26	0.29
	3:20:00	0.00	0.00	0.07	0.12	0.14	0.14	0.14	0.13	0.13
	3:25:00	0.00	0.00	0.03	0.05	0.05	0.05	0.05	0.04	0.03
	3:30:00	0.00	0.00	0.01	0.01	0.01	0.01	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
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	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
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	4:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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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	

MHFD-Detention, Version 4.03 (May 2020)

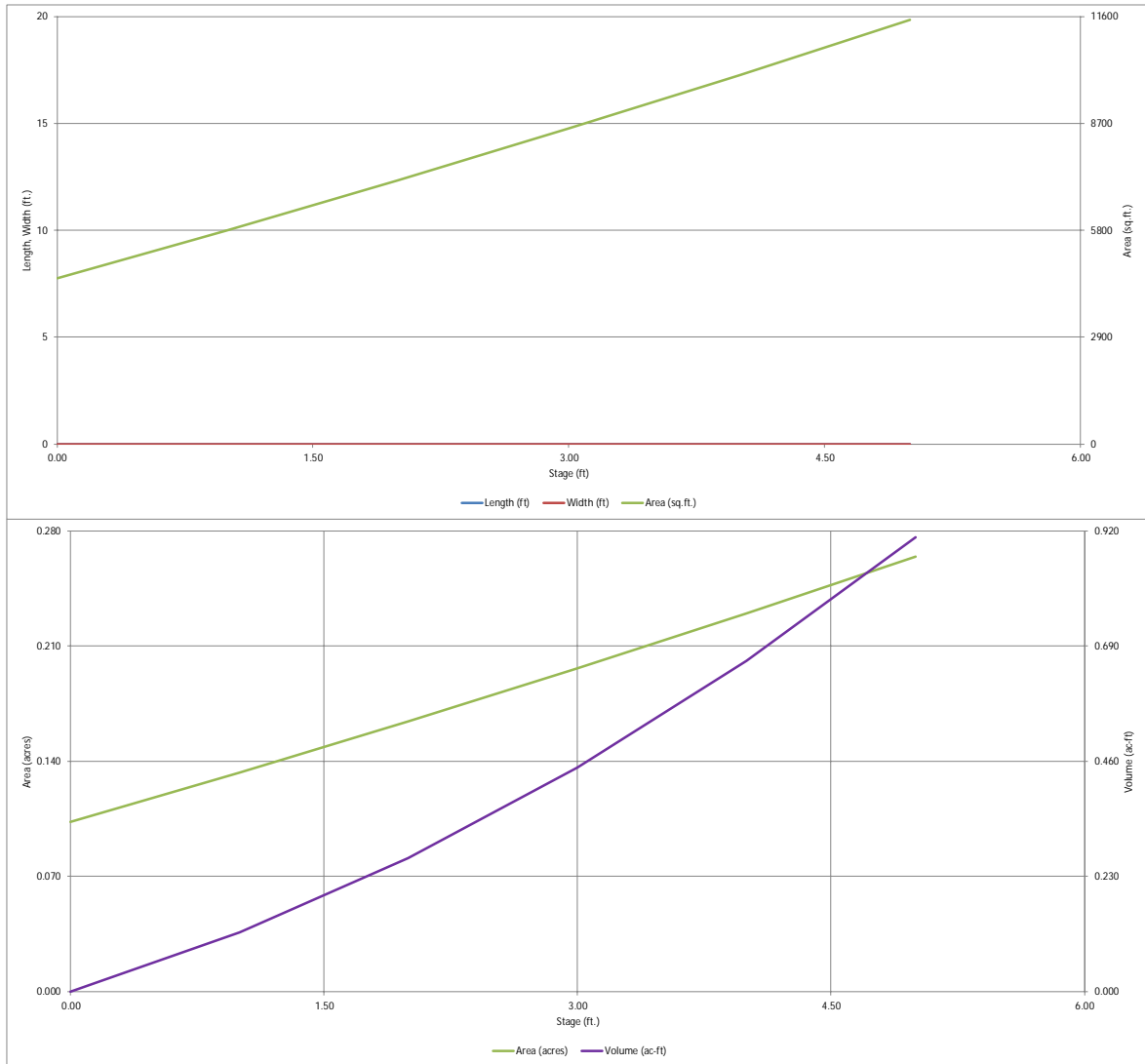
Basin ID: WQCV Pond - North

Total detention volume is less than 100-year volume.

1/25/2021, 3:07 PM

# DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.03 (May 2020)

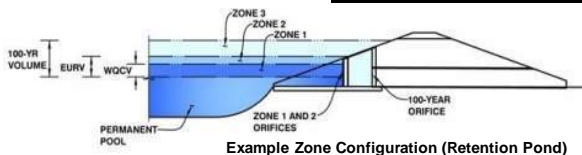


# DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.03 (May 2020)

Project: Falcon Meadows at Bent Grass

Basin ID: WQCV Pond - North



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	1.74	0.225	Orifice Plate
Zone 2			
Zone 3			
Total (all zones)		0.225	

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<sup>2</sup>  
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)

Calculated Parameters for Plate

Invert of Lowest Orifice =  ft (relative to basin bottom at Stage = 0 ft)  
Depth at top of Zone using Orifice Plate =  ft (relative to basin bottom at Stage = 0 ft)  
Orifice Plate: Orifice Vertical Spacing =  inches  
Orifice Plate: Orifice Area per Row =  sq. inches (diameter = 1-9/16 inches)

WQ Orifice Area per Row =  ft<sup>2</sup>  
Elliptical Half-Width =  feet  
Elliptical Slot Centroid =  feet  
Elliptical Slot Area =  ft<sup>2</sup>

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	0.80	1.60					
Orifice Area (sq. inches)	2.00	2.00	2.00					

	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)

Calculated Parameters for Vertical Orifice

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

Vertical Orifice Area =   ft<sup>2</sup>  
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))

Calculated Parameters for Overflow Weir

Overflow Weir Front Edge Height, H<sub>o</sub> =   ft (relative to basin bottom at Stage = 0 ft)  
Overflow Weir Front Edge Length =   feet  
Overflow Weir Grate Slope =   H:V  
Horiz. Length of Weir Sides =   feet  
Overflow Grate Open Area % =   %  
Debris Clogging % =   %

Height of Grate Upper Edge, H<sub>1</sub> =   feet  
Overflow Weir Slope Length =   feet  
Grate Open Area / 100-yr Orifice Area =    
Overflow Grate Open Area w/o Debris =   ft<sup>2</sup>  
Overflow Grate Open Area w/ Debris =   ft<sup>2</sup>

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

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

Depth to Invert of Outlet Pipe =   ft (distance below basin bottom at Stage = 0 ft)  
Circular Orifice Diameter =   inches

Outlet Orifice Area =   ft<sup>2</sup>  
Outlet Orifice Centroid =   feet  
Half-Central Angle of Restrictor Plate on Pipe =   radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Calculated Parameters for Spillway

Spillway Invert Stage =  ft (relative to basin bottom at Stage = 0 ft)  
Spillway Crest Length =  feet  
Spillway End Slopes =    
Freeboard above Max Water Surface =  feet

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

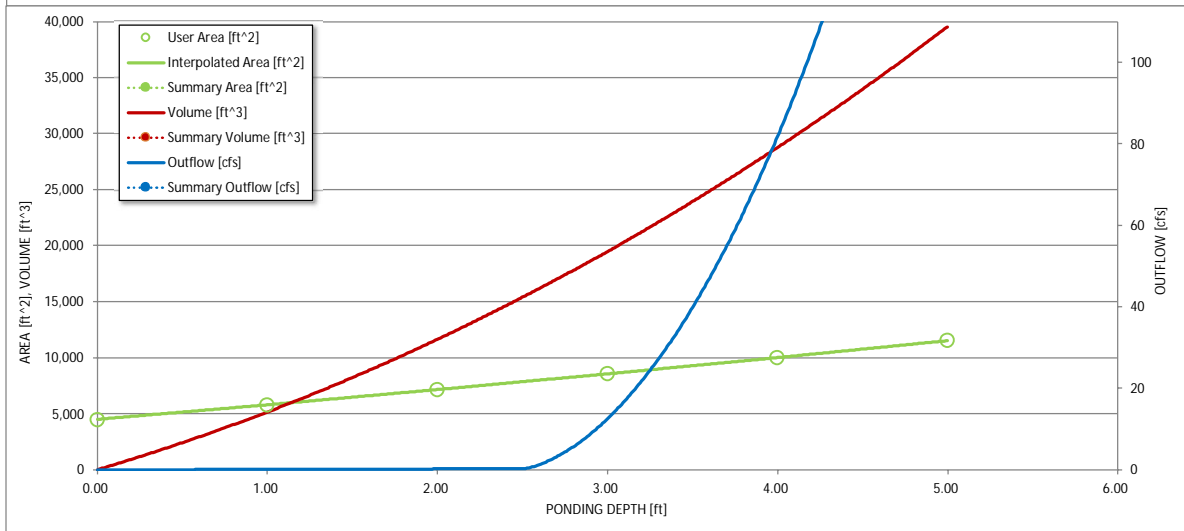
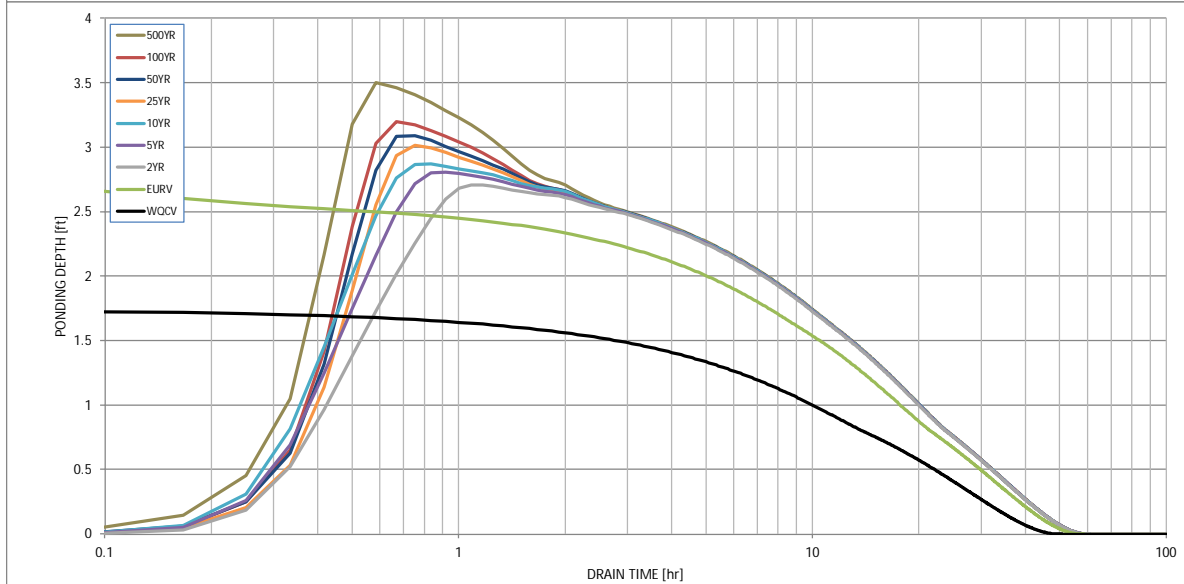
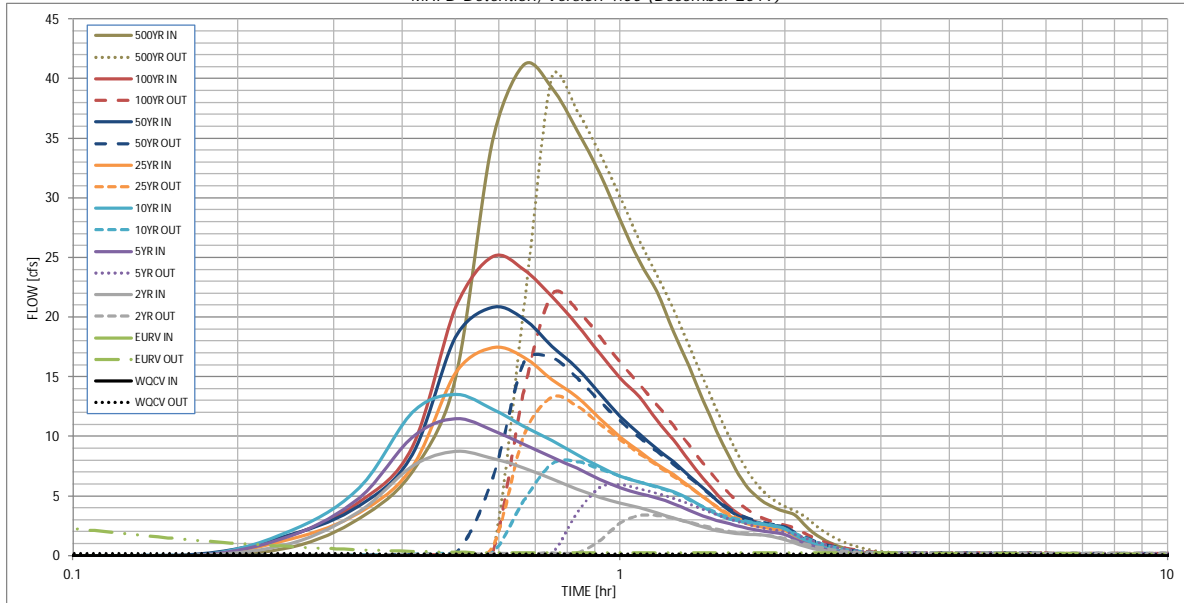
## Routed Hydrograph Results

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

	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
Design Storm Return Period =	N/A	N/A	1.19	1.50	1.75	2.00	2.25	2.52	3.68
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) =	0.225	0.849	0.622	0.817	0.973	1.180	1.383	1.631	2.666
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	0.622	0.817	0.973	1.180	1.383	1.631	2.666
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	0.1	0.1	0.2	1.6	3.3	5.3	14.0
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	0.49	1.28
Peak Inflow Q (cfs) =	N/A	N/A	8.8	11.5	13.5	17.4	20.8	25.1	41.2
Peak Outflow Q (cfs) =	0.2	66.0	3.4	6.0	7.9	13.3	16.6	21.9	40.2
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	47.3	44.7	8.2	5.1	4.1	2.9
Structure Controlling Flow =	Plate	Spillway	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) =	40	42	44	42	40	38	36	34	27
Time to Drain 99% of Inflow Volume (hours) =	44	48	51	49	48	47	46	45	41
Maximum Ponding Depth (ft) =	1.74	4.78	2.71	2.81	2.87	3.02	3.09	3.20	3.50
Area at Maximum Ponding Depth (acres) =	0.16	0.26	0.19	0.19	0.19	0.20	0.20	0.20	0.21
Maximum Volume Stored (acre-ft) =	0.225	0.850	0.392	0.409	0.422	0.449	0.465	0.487	0.550

# 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

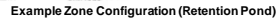
Outflow Hydrograph Workbook Filename:

## Inflow Hydrographs

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

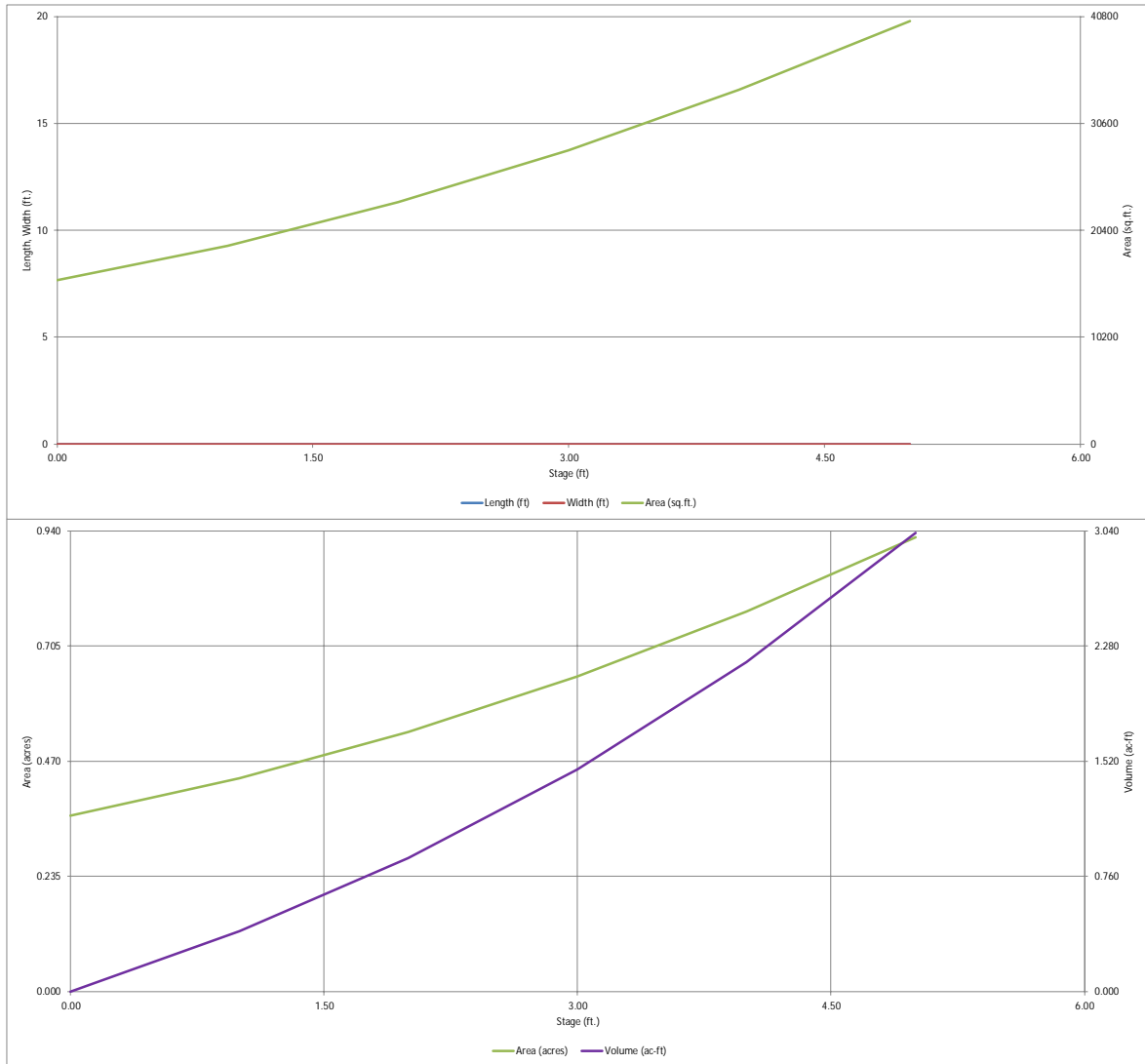
	SOURCE	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP
Time Interval	TIME	WQCV [cfs]	EURV [cfs]	2 Year [cfs]	5 Year [cfs]	10 Year [cfs]	25 Year [cfs]	50 Year [cfs]	100 Year [cfs]	500 Year [cfs]
5.00_min	0:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.01	0.70
	0:15:00	0.00	0.00	1.04	1.69	2.10	1.41	1.76	1.72	3.13
	0:20:00	0.00	0.00	3.70	4.86	5.71	3.60	4.20	4.50	7.06
	0:25:00	0.00	0.00	7.52	9.95	12.01	7.45	8.51	9.15	14.81
	0:30:00	0.00	0.00	8.78	11.52	13.54	15.28	18.32	20.76	34.73
	0:35:00	0.00	0.00	8.17	10.54	12.30	17.44	20.83	25.10	41.19
	0:40:00	0.00	0.00	7.38	9.34	10.86	16.66	19.87	23.98	39.26
	0:45:00	0.00	0.00	6.43	8.26	9.66	14.77	17.55	21.72	35.71
	0:50:00	0.00	0.00	5.61	7.34	8.47	13.30	15.76	19.38	32.07
	0:55:00	0.00	0.00	4.91	6.42	7.45	11.52	13.58	16.97	28.11
	1:00:00	0.00	0.00	4.39	5.70	6.68	9.95	11.66	14.89	24.68
	1:05:00	0.00	0.00	4.04	5.23	6.19	8.75	10.21	13.31	22.17
	1:10:00	0.00	0.00	3.59	4.86	5.78	7.69	8.95	11.36	18.81
	1:15:00	0.00	0.00	3.17	4.38	5.37	6.81	7.89	9.72	15.94
	1:20:00	0.00	0.00	2.78	3.85	4.78	5.84	6.74	8.02	13.03
	1:25:00	0.00	0.00	2.42	3.36	4.07	4.96	5.70	6.51	10.48
	1:30:00	0.00	0.00	2.12	2.96	3.48	4.08	4.66	5.19	8.25
	1:35:00	0.00	0.00	1.92	2.70	3.09	3.33	3.77	4.09	6.38
	1:40:00	0.00	0.00	1.83	2.41	2.87	2.84	3.20	3.36	5.19
	1:45:00	0.00	0.00	1.78	2.20	2.73	2.55	2.87	2.93	4.49
	1:50:00	0.00	0.00	1.74	2.05	2.62	2.36	2.66	2.66	4.02
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	2:00:00	0.00	0.00	1.37	1.79	2.29	2.15	2.41	2.34	3.45
	2:05:00	0.00	0.00	1.07	1.40	1.78	1.67	1.88	1.79	2.63
	2:10:00	0.00	0.00	0.82	1.06	1.35	1.26	1.42	1.33	1.94
	2:15:00	0.00	0.00	0.62	0.81	1.02	0.95	1.07	1.00	1.46
	2:20:00	0.00	0.00	0.47	0.61	0.77	0.72	0.81	0.76	1.10
	2:25:00	0.00	0.00	0.35	0.45	0.57	0.53	0.60	0.57	0.82
	2:30:00	0.00	0.00	0.26	0.33	0.42	0.39	0.44	0.42	0.60
	2:35:00	0.00	0.00	0.19	0.23	0.30	0.29	0.32	0.31	0.44
	2:40:00	0.00	0.00	0.13	0.17	0.22	0.21	0.23	0.22	0.32
	2:45:00	0.00	0.00	0.09	0.11	0.15	0.14	0.16	0.15	0.22
	2:50:00	0.00	0.00	0.05	0.07	0.09	0.09	0.10	0.10	0.14
	2:55:00	0.00	0.00	0.02	0.04	0.05	0.05	0.05	0.05	0.07
	3:00:00	0.00	0.00	0.01	0.02	0.02	0.02	0.02	0.02	0.03
	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

MHFD-Detention, Version 4.03 (May 2020)

Basin ID: WQCV Pond - South

# DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.03 (May 2020)



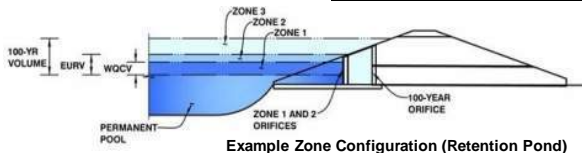


# DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.03 (May 2020)

Project: Falcon Meadows at Bent Grass

Basin ID: WQCV Pond - South



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	1.90	0.825	Orifice Plate
Zone 2			
Zone 3			
Total (all zones)		0.825	

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<sup>2</sup>  
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)

Calculated Parameters for Plate

Invert of Lowest Orifice =  ft (relative to basin bottom at Stage = 0 ft)  
Depth at top of Zone using Orifice Plate =  ft (relative to basin bottom at Stage = 0 ft)  
Orifice Plate: Orifice Vertical Spacing =  inches  
Orifice Plate: Orifice Area per Row =  sq. inches (use rectangular openings)

WO Orifice Area per Row =  ft<sup>2</sup>  
Elliptical Half-Width =  feet  
Elliptical Slot Centroid =  feet  
Elliptical Slot Area =  ft<sup>2</sup>

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	0.80	1.60					
Orifice Area (sq. inches)	7.00	7.00	7.00					

	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)

Calculated Parameters for Vertical Orifice

	<input type="text" value="Not Selected"/>	<input type="text" value="Not Selected"/>			<input type="text" value="Not Selected"/>	<input type="text" value="Not Selected"/>	
Invert of Vertical Orifice =			ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Area =			ft <sup>2</sup>
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				

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

Calculated Parameters for Overflow Weir

	<input type="text" value="Not Selected"/>	<input type="text" value="Not Selected"/>			<input type="text" value="Not Selected"/>	<input type="text" value="Not Selected"/>	
Overflow Weir Front Edge Height, H <sub>o</sub> =			ft (relative to basin bottom at Stage = 0 ft)	Height of Grate Upper Edge, H <sub>1</sub> =			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 =			ft <sup>2</sup>
Overflow Grate Open Area % =			% , grate open area/total area	Overflow Grate Open Area w/ Debris =			ft <sup>2</sup>
Debris Clogging % =			%				

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

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

	<input type="text" value="Not Selected"/>	<input type="text" value="Not Selected"/>			<input type="text" value="Not Selected"/>	<input type="text" value="Not Selected"/>	
Depth to Invert of Outlet Pipe =			ft (distance below basin bottom at Stage = 0 ft)	Outlet Orifice Area =			ft <sup>2</sup>
Circular Orifice Diameter =			inches	Outlet Orifice Centroid =			feet
				Half-Central Angle of Restrictor Plate on Pipe =	N/A	N/A	radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Calculated Parameters for Spillway

Spillway Invert Stage =	<input type="text" value="3.50"/>	ft (relative to basin bottom at Stage = 0 ft)	Spillway Design Flow Depth =	<input type="text" value="0.95"/>	feet
Spillway Crest Length =	<input type="text" value="20.00"/>	feet	Stage at Top of Freeboard =	<input type="text" value="4.45"/>	feet
Spillway End Slopes =	<input type="text" value="4.00"/>	H:V	Basin Area at Top of Freeboard =	<input type="text" value="0.84"/>	acres
Freeboard above Max Water Surface =	<input type="text" value="0.00"/>	feet	Basin Volume at Top of Freeboard =	<input type="text" value="2.54"/>	acre-ft

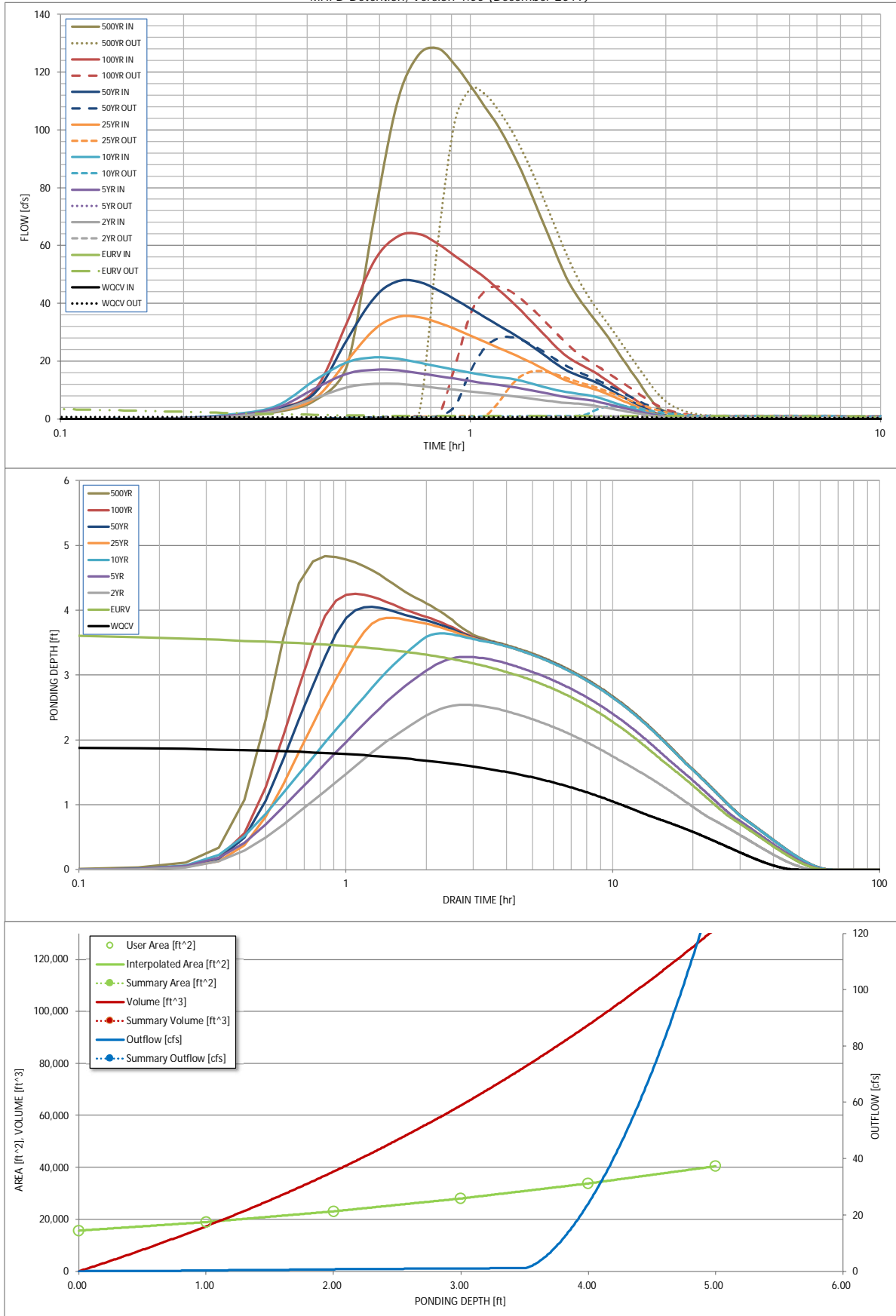
## Routed Hydrograph Results

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

	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
Design Storm Return Period =	N/A	N/A	1.19	1.50	1.75	2.00	2.25	2.52	3.68
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) =	0.825	1.938	1.351	1.865	2.297	3.405	4.438	5.824	11.682
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	1.351	1.865	2.297	3.405	4.438	5.824	11.682
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	0.4	0.8	1.1	9.8	19.6	32.5	84.9
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	0.49	1.29
Peak Inflow Q (cfs) =	N/A	N/A	12.2	17.1	21.3	35.3	47.8	64.0	128.3
Peak Outflow Q (cfs) =	0.7	5.2	0.9	1.1	4.7	16.5	28.4	45.8	114.2
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	1.5	4.4	1.7	1.5	1.4	1.3
Structure Controlling Flow =	Plate	Spillway	Plate	Plate	Spillway	Spillway	Spillway	Spillway	Spillway
Max Velocity through Gate 1 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Max Velocity through Gate 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) =	40	48	46	49	50	46	43	40	29
Time to Drain 99% of Inflow Volume (hours) =	44	54	51	55	56	54	53	51	45
Maximum Ponding Depth (ft) =	1.90	3.69	2.55	3.28	3.65	3.89	4.06	4.26	4.84
Area at Maximum Ponding Depth (acres) =	0.52	0.73	0.59	0.68	0.73	0.76	0.78	0.81	0.90
Maximum Volume Stored (acre-ft) =	0.827	1.941	1.182	1.651	1.904	2.083	2.214	2.374	2.871

# 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	0.08	0.01	0.49
	0:15:00	0.00	0.00	0.66	1.08	1.36	0.93	1.22	1.17	2.41
	0:20:00	0.00	0.00	2.70	3.64	4.39	2.84	3.40	3.61	6.34
	0:25:00	0.00	0.00	7.15	10.47	13.36	6.99	8.83	9.86	18.69
	0:30:00	0.00	0.00	10.96	15.74	19.72	20.21	27.61	33.65	70.54
	0:35:00	0.00	0.00	12.17	17.12	21.31	31.15	42.17	54.90	110.97
	0:40:00	0.00	0.00	12.12	16.81	20.82	35.35	47.78	63.29	126.34
	0:45:00	0.00	0.00	11.48	15.83	19.47	35.23	47.41	64.02	128.28
	0:50:00	0.00	0.00	10.74	14.86	18.20	33.47	44.65	60.56	122.65
	0:55:00	0.00	0.00	10.11	13.98	17.07	31.17	41.45	56.41	115.35
	1:00:00	0.00	0.00	9.53	13.13	16.01	28.88	38.24	52.55	108.08
	1:05:00	0.00	0.00	9.04	12.39	15.14	26.77	35.31	48.95	101.49
	1:10:00	0.00	0.00	8.55	11.82	14.52	24.72	32.52	44.98	93.68
	1:15:00	0.00	0.00	8.06	11.23	13.97	22.92	30.05	41.12	85.46
	1:20:00	0.00	0.00	7.56	10.57	13.22	21.12	27.56	37.24	76.82
	1:25:00	0.00	0.00	7.07	9.87	12.27	19.31	25.05	33.41	68.26
	1:30:00	0.00	0.00	6.57	9.18	11.27	17.49	22.55	29.79	60.21
	1:35:00	0.00	0.00	6.11	8.53	10.34	15.71	20.09	26.30	52.60
	1:40:00	0.00	0.00	5.73	7.89	9.62	14.06	17.84	23.16	46.40
	1:45:00	0.00	0.00	5.47	7.41	9.13	12.82	16.26	20.93	41.86
	1:50:00	0.00	0.00	5.29	7.02	8.72	11.90	15.07	19.23	38.07
	1:55:00	0.00	0.00	5.01	6.65	8.30	11.14	14.04	17.74	34.70
	2:00:00	0.00	0.00	4.69	6.29	7.83	10.43	13.08	16.36	31.58
	2:05:00	0.00	0.00	4.26	5.74	7.12	9.49	11.86	14.75	28.17
	2:10:00	0.00	0.00	3.81	5.13	6.33	8.47	10.54	13.06	24.73
	2:15:00	0.00	0.00	3.37	4.54	5.57	7.47	9.26	11.44	21.45
	2:20:00	0.00	0.00	2.96	3.99	4.85	6.52	8.03	9.91	18.32
	2:25:00	0.00	0.00	2.58	3.47	4.19	5.62	6.86	8.42	15.29
	2:30:00	0.00	0.00	2.22	2.97	3.56	4.75	5.73	6.98	12.33
	2:35:00	0.00	0.00	1.88	2.50	2.96	3.91	4.64	5.57	9.47
	2:40:00	0.00	0.00	1.55	2.05	2.41	3.11	3.61	4.22	6.79
	2:45:00	0.00	0.00	1.24	1.64	1.91	2.37	2.65	2.98	4.70
	2:50:00	0.00	0.00	0.97	1.28	1.53	1.71	1.90	2.09	3.42
	2:55:00	0.00	0.00	0.79	1.05	1.28	1.29	1.45	1.55	2.55
	3:00:00	0.00	0.00	0.67	0.89	1.08	1.03	1.15	1.19	1.91
	3:05:00	0.00	0.00	0.57	0.75	0.91	0.84	0.93	0.93	1.43
	3:10:00	0.00	0.00	0.48	0.63	0.77	0.68	0.75	0.73	1.07
	3:15:00	0.00	0.00	0.41	0.53	0.65	0.57	0.62	0.58	0.80
	3:20:00	0.00	0.00	0.35	0.45	0.55	0.47	0.51	0.46	0.61
	3:25:00	0.00	0.00	0.29	0.38	0.45	0.38	0.41	0.37	0.49
	3:30:00	0.00	0.00	0.24	0.31	0.37	0.31	0.33	0.30	0.39
	3:35:00	0.00	0.00	0.20	0.25	0.29	0.25	0.27	0.24	0.31
	3:40:00	0.00	0.00	0.16	0.20	0.23	0.20	0.21	0.19	0.24
	3:45:00	0.00	0.00	0.12	0.15	0.18	0.15	0.16	0.14	0.18
	3:50:00	0.00	0.00	0.09	0.12	0.14	0.11	0.12	0.10	0.12
	3:55:00	0.00	0.00	0.07	0.09	0.10	0.08	0.08	0.07	0.08
	4:00:00	0.00	0.00	0.05	0.06	0.07	0.05	0.05	0.05	0.05
	4:05:00	0.00	0.00	0.03	0.04	0.04	0.03	0.03	0.02	0.02
	4:10:00	0.00	0.00	0.02	0.02	0.02	0.02	0.01	0.01	0.01
	4:15:00	0.00	0.00	0.01	0.01	0.01	0.01	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

## Current Channel Calculations

# Meridian Road

## Worksheet for Ex Channel - Pr DBPS 100 Yr Flow-MR

### Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

### Input Data

Roughness Coefficient	0.035
Channel Slope	1.75 %
Left Side Slope	4.00 ft/ft (H:V)
Right Side Slope	4.00 ft/ft (H:V)
Discharge	850.00 ft <sup>3</sup> /s

### Results

Normal Depth	4.68 ft
Flow Area	87.61 ft <sup>2</sup>
Wetted Perimeter	38.59 ft
Hydraulic Radius	2.27 ft
Top Width	37.44 ft
Critical Depth	4.89 ft
Critical Slope	0.01379 ft/ft
Velocity	9.70 ft/s
Velocity Head	1.46 ft
Specific Energy	6.14 ft
Froude Number	1.12
Flow Type	Supercritical

### GVF Input Data

Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

### GVF Output Data

Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	4.68 ft
Critical Depth	4.89 ft
Channel Slope	1.75 %
Critical Slope	0.01379 ft/ft

# Meridian Road

## Worksheet for Ex Channel - Pr 100 Yr Flow-MR

### Project Description

Friction Method	Manning Formula	
Solve For	Normal Depth	

### Input Data

Roughness Coefficient	0.035	
Channel Slope	1.75	%
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)
Discharge	925.00	ft³/s

### Results

Normal Depth	4.83	ft
Flow Area	93.35	ft²
Wetted Perimeter	39.84	ft
Hydraulic Radius	2.34	ft
Top Width	38.65	ft
Critical Depth	5.06	ft
Critical Slope	0.01364	ft/ft
Velocity	9.91	ft/s
Velocity Head	1.53	ft
Specific Energy	6.36	ft
Froude Number	1.12	
Flow Type	Supercritical	

### GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

### GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	4.83	ft
Critical Depth	5.06	ft
Channel Slope	1.75	%
Critical Slope	0.01364	ft/ft

## Worksheet for Ex Owl Place

### Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

### Input Data

Roughness Coefficient	0.050	
Channel Slope	1.60	%
Left Side Slope	11.00	ft/ft (H:V)
Right Side Slope	12.00	ft/ft (H:V)
Discharge	850.00	ft <sup>3</sup> /s

### Results

Normal Depth	3.64	ft
Flow Area	152.13	ft <sup>2</sup>
Wetted Perimeter	83.97	ft
Hydraulic Radius	1.81	ft
Top Width	83.66	ft
Critical Depth	3.21	ft
Critical Slope	0.03128	ft/ft
Velocity	5.59	ft/s
Velocity Head	0.49	ft
Specific Energy	4.12	ft
Froude Number	0.73	
Flow Type	Subcritical	

### GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

### GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	3.64	ft
Critical Depth	3.21	ft
Channel Slope	1.60	%
Critical Slope	0.03128	ft/ft

## Future Channel Calculations



# Meridian Road

## Worksheet for Fut Channel - Pr 100 Yr Flow-MR

### Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

### Input Data

Roughness Coefficient	0.035	
Channel Slope	0.30	%
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)
Bottom Width	15.00	ft
Discharge	925.00	ft³/s

### Results

Normal Depth	5.15	ft
Flow Area	183.50	ft²
Wetted Perimeter	57.49	ft
Hydraulic Radius	3.19	ft
Top Width	56.22	ft
Critical Depth	3.58	ft
Critical Slope	0.01368	ft/ft
Velocity	5.04	ft/s
Velocity Head	0.39	ft
Specific Energy	5.55	ft
Froude Number	0.49	
Flow Type	Subcritical	

### GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

### GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	5.15	ft
Critical Depth	3.58	ft
Channel Slope	0.30	%

Meridian Road

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Worksheet for Fut Channel - Pr 100 Yr Flow-MR

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GVF Output Data

Critical Slope 0.01368 ft/ft

# **HY-8 Culvert Analysis Report**

Culvert Alternative for Roadside Ditch alongside Meridian Road

**Crossing Discharge Data**

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 248.6 cfs

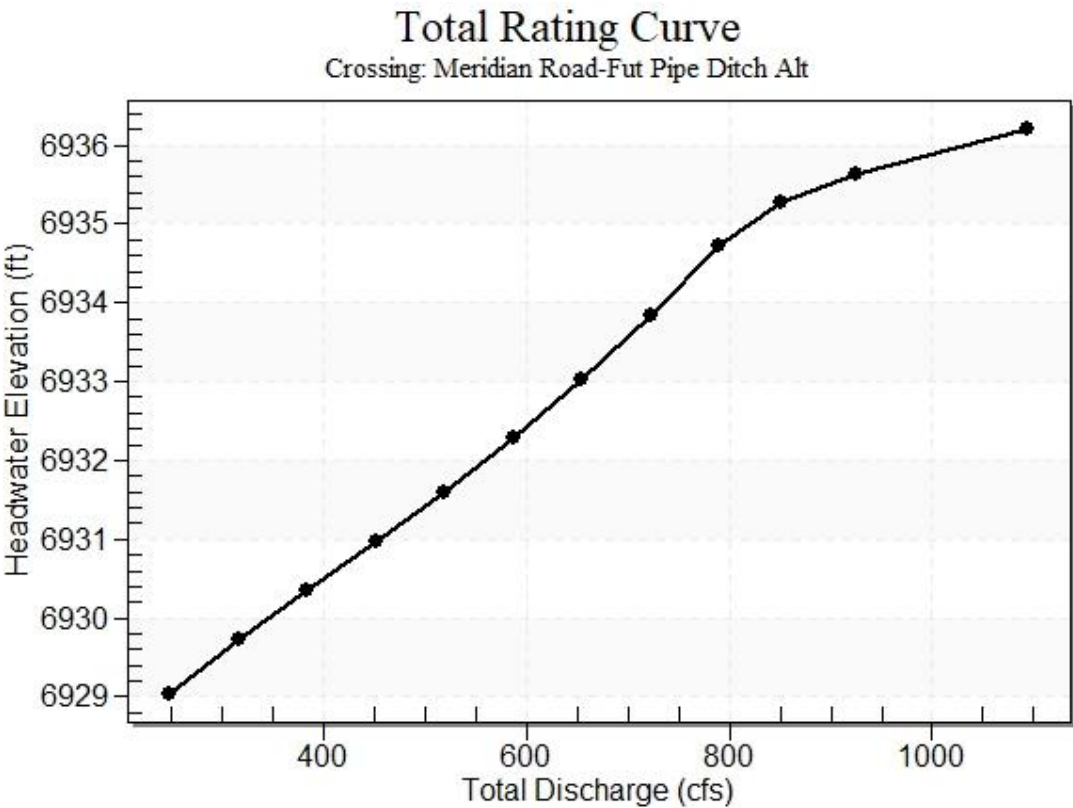
Design Flow: 850 cfs

Maximum Flow: 925 cfs

**Table 1 - Summary of Culvert Flows at Crossing: Meridian Road-Fut Pipe Ditch Alt**

Headwater Elevation (ft)	Total Discharge (cfs)	Fut Culvert Option-Parallel Meridian Rd Discharge (cfs)	Roadway Discharge (cfs)	Iterations
6929.05	248.60	248.60	0.00	1
6929.72	316.24	316.24	0.00	1
6930.35	383.88	383.88	0.00	1
6930.97	451.52	451.52	0.00	1
6931.60	519.16	519.16	0.00	1
6932.28	586.80	586.80	0.00	1
6933.02	654.44	654.44	0.00	1
6933.83	722.08	722.08	0.00	1
6934.73	789.72	789.72	0.00	1
6935.28	850.00	828.14	21.64	5
6935.62	925.00	851.12	73.83	5
6935.00	809.07	809.07	0.00	Overtopping

Rating Curve Plot for Crossing: Meridian Road-Fut Pipe Ditch Alt



**Table 2 - Culvert Summary Table: Fut Culvert Option-Parallel Meridian Rd**

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
248.60	248.60	6929.05	4.247	0.0*	1-S2n	2.284	2.941	2.284	0.496	11.945	14.310
316.24	316.24	6929.72	4.923	0.0*	1-S2n	2.600	3.336	2.600	0.574	12.756	15.730
383.88	383.88	6930.35	5.551	0.0*	1-S2n	2.895	3.692	2.895	0.646	13.430	16.969
451.52	451.52	6930.97	6.168	0.0*	1-S2n	3.178	4.019	3.178	0.713	14.000	18.082
519.16	519.16	6931.60	6.802	0.0*	5-S2n	3.453	4.320	3.453	0.777	14.493	19.092
586.80	586.80	6932.28	7.480	0.0*	5-S2n	3.725	4.599	3.725	0.837	14.917	20.026
654.44	654.44	6933.02	8.218	0.0*	5-S2n	3.998	4.856	3.998	0.895	15.282	20.889
722.08	722.08	6933.83	9.030	1.896	5-S2n	4.278	5.091	4.278	0.951	15.590	21.705
789.72	789.72	6934.73	9.927	4.435	5-S2n	4.570	5.305	4.576	1.004	15.818	22.467
850.00	828.14	6935.28	10.476	5.969	5-S2n	4.746	5.417	4.746	1.051	15.953	23.118
925.00	851.12	6935.62	10.819	6.919	5-S2n	4.855	5.480	4.855	1.107	16.010	23.882

\* Full Flow Headwater elevation is below inlet invert.

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Straight Culvert

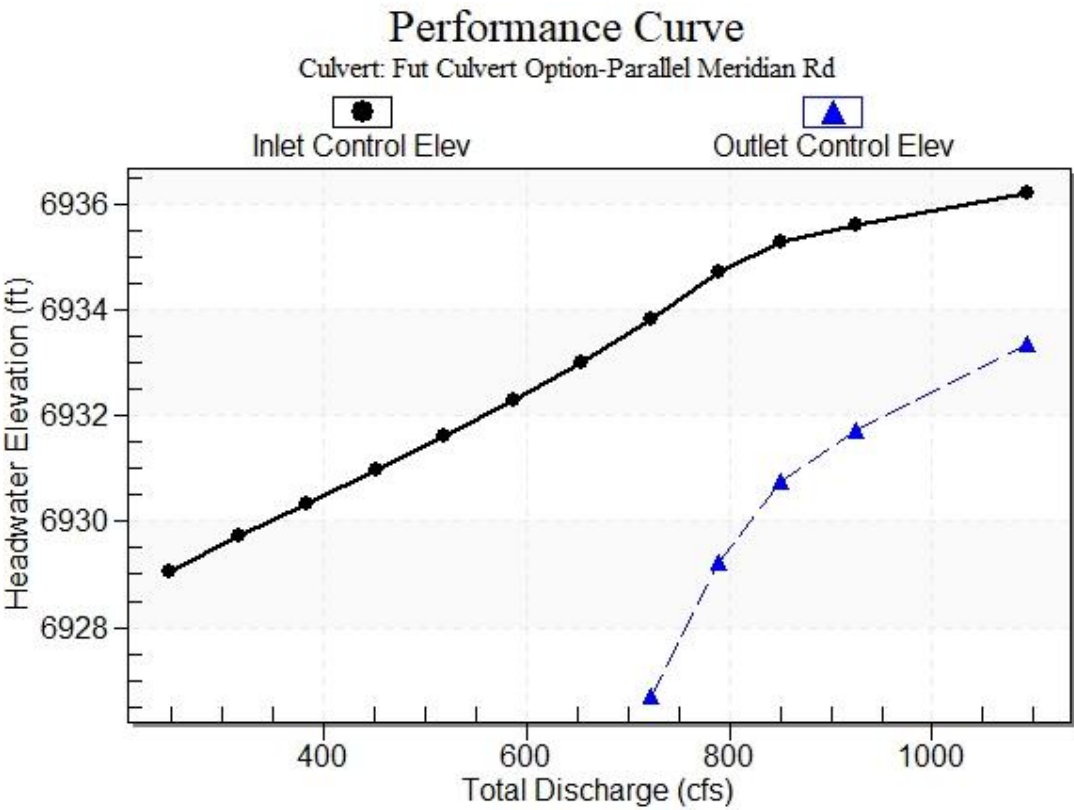
Inlet Elevation (invert): 6924.80 ft,    Outlet Elevation (invert): 6908.50 ft

Culvert Length: 2400.06 ft,    Culvert Slope: 0.0068

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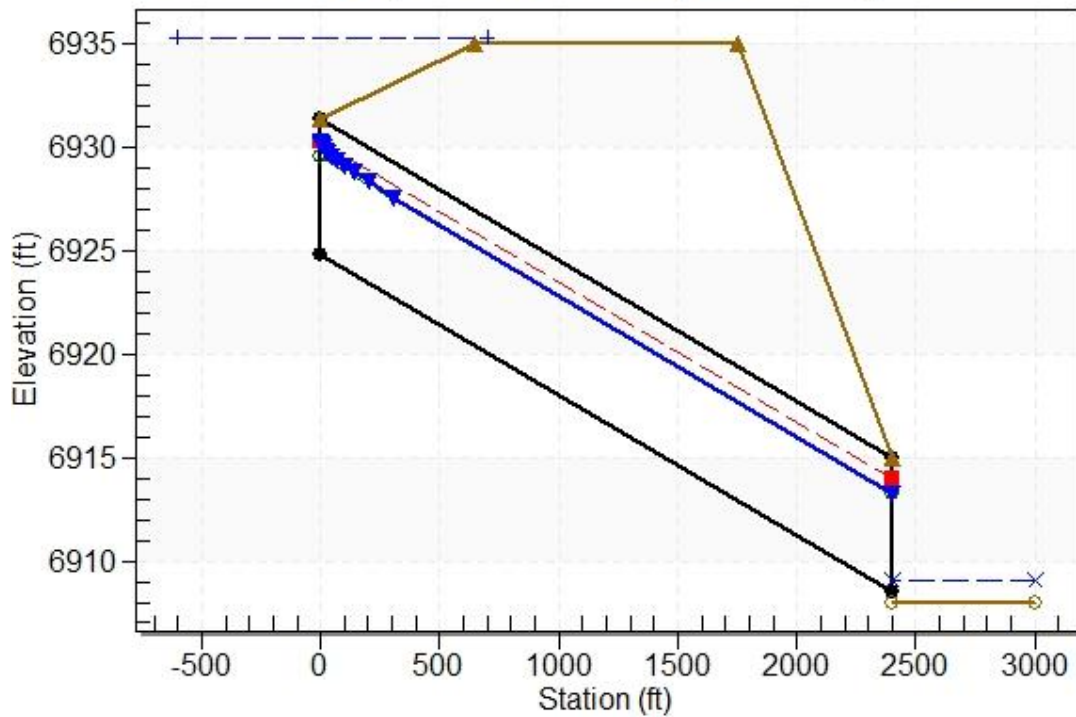
Culvert Performance Curve Plot: Fut Culvert Option-Parallel Meridian Rd



## Water Surface Profile Plot for Culvert: Fut Culvert Option-Parallel Meridian Rd

Crossing - Meridian Road-Fut Pipe Ditch Alt, Design Discharge - 850.0 cfs

Culvert - Fut Culvert Option-Parallel Meridian Rd, Culvert Discharge - 828.1 cfs



## Site Data - Fut Culvert Option-Parallel Meridian Rd

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 6924.80 ft

Outlet Station: 2400.00 ft

Outlet Elevation: 6908.50 ft

Number of Barrels: 2

## Culvert Data Summary - Fut Culvert Option-Parallel Meridian Rd

Barrel Shape: Circular

Barrel Diameter: 6.50 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall

Inlet Depression: None

**Table 3 - Downstream Channel Rating Curve (Crossing: Meridian Road-Fut Pipe Ditch**

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
248.60	6908.50	0.50	14.31	9.29	3.58
316.24	6908.57	0.57	15.73	10.75	3.66
383.88	6908.65	0.65	16.97	12.10	3.72
451.52	6908.71	0.71	18.08	13.36	3.77
519.16	6908.78	0.78	19.09	14.54	3.82
586.80	6908.84	0.84	20.03	15.67	3.86
654.44	6908.90	0.90	20.89	16.76	3.89
722.08	6908.95	0.95	21.70	17.79	3.92
789.72	6909.00	1.00	22.47	18.80	3.95
850.00	6909.05	1.05	23.12	19.67	3.97
925.00	6909.11	1.11	23.88	20.72	4.00

**Alt)**

**Tailwater Channel Data - Meridian Road-Fut Pipe Ditch Alt**

Tailwater Channel Option: Rectangular Channel

Bottom Width: 35.00 ft

Channel Slope: 0.3000

Channel Manning's n: 0.0350

Channel Invert Elevation: 6908.00 ft

## Worksheet for Fut Owl Place

### Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

### Input Data

Roughness Coefficient	0.035	
Channel Slope	0.30	%
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)
Bottom Width	35.00	ft
Discharge	925.00	ft <sup>3</sup> /s

### Results

Normal Depth	3.86	ft
Flow Area	194.93	ft <sup>2</sup>
Wetted Perimeter	66.86	ft
Hydraulic Radius	2.92	ft
Top Width	65.91	ft
Critical Depth	2.52	ft
Critical Slope	0.01424	ft/ft
Velocity	4.75	ft/s
Velocity Head	0.35	ft
Specific Energy	4.21	ft
Froude Number	0.49	
Flow Type	Subcritical	

### GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

### GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	3.86	ft
Critical Depth	2.52	ft
Channel Slope	0.30	%

---

## Worksheet for Fut Owl Place

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### GVF Output Data

Critical Slope 0.01424 ft/ft

## Worksheet for Fut BGMD

### Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

### Input Data

Roughness Coefficient	0.035
Channel Slope	1.00 %
Left Side Slope	4.00 ft/ft (H:V)
Right Side Slope	6.00 ft/ft (H:V)
Bottom Width	10.00 ft
Discharge	35.00 ft³/s

### Results

Normal Depth	0.81 ft
Flow Area	11.32 ft²
Wetted Perimeter	18.23 ft
Hydraulic Radius	0.62 ft
Top Width	18.07 ft
Critical Depth	0.65 ft
Critical Slope	0.02244 ft/ft
Velocity	3.09 ft/s
Velocity Head	0.15 ft
Specific Energy	0.96 ft
Froude Number	0.69
Flow Type	Subcritical

### GVF Input Data

Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

### GVF Output Data

Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.81 ft
Critical Depth	0.65 ft
Channel Slope	1.00 %
Critical Slope	0.02244 ft/ft

# **HY-8 Culvert Analysis Report**

Culvert Alternative for Ditch alongside Bent Grass Meadows Drive

### **Crossing Discharge Data**

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 8 cfs

Design Flow: 40.9 cfs

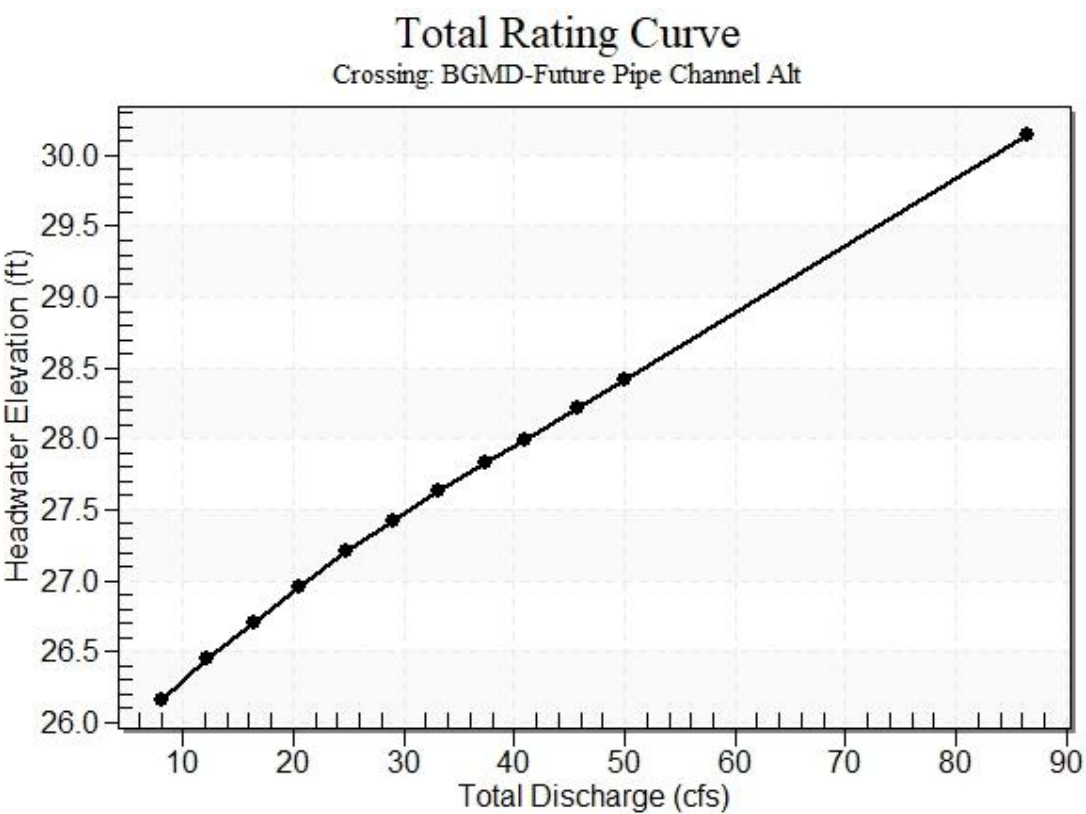
Maximum Flow: 50 cfs



**Table 1 - Summary of Culvert Flows at Crossing: BGMD-Future Pipe Channel Alt**

Headwater Elevation (ft)	Total Discharge (cfs)	Fut Culvert Option-Parallel BGMD Discharge (cfs)	Roadway Discharge (cfs)	Iterations
26.16	8.00	8.00	0.00	1
26.45	12.20	12.20	0.00	1
26.70	16.40	16.40	0.00	1
26.96	20.60	20.60	0.00	1
27.20	24.80	24.80	0.00	1
27.42	29.00	29.00	0.00	1
27.63	33.20	33.20	0.00	1
27.83	37.40	37.40	0.00	1
28.00	40.90	40.90	0.00	1
28.22	45.80	45.80	0.00	1
28.42	50.00	50.00	0.00	1
30.00	78.87	78.87	0.00	Overtopping

Rating Curve Plot for Crossing: BGMD-Future Pipe Channel Alt



**Table 2 - Culvert Summary Table: Fut Culvert Option-Parallel BGMD**

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
8.00	8.00	26.16	1.163	0.0*	1-S2n	0.760	0.853	0.760	0.207	5.193	7.721
12.20	12.20	26.45	1.453	0.0*	1-S2n	0.940	1.060	0.940	0.269	5.865	9.058
16.40	16.40	26.70	1.702	0.0*	1-S2n	1.095	1.235	1.095	0.324	6.376	10.116
20.60	20.60	26.96	1.959	0.0*	1-S2n	1.234	1.390	1.234	0.374	6.795	11.007
24.80	24.80	27.20	2.201	0.0*	1-S2n	1.363	1.532	1.363	0.421	7.149	11.778
29.00	29.00	27.42	2.424	0.0*	1-S2n	1.486	1.662	1.486	0.465	7.456	12.463
33.20	33.20	27.63	2.633	0.0*	1-S2n	1.603	1.784	1.603	0.508	7.724	13.080
37.40	37.40	27.83	2.833	0.0*	1-S2n	1.717	1.899	1.717	0.548	7.963	13.649
40.90	40.90	28.00	2.995	0.0*	1-S2n	1.811	1.990	1.811	0.581	8.142	14.085
45.80	45.80	28.22	3.221	0.0*	1-S2n	1.940	2.111	1.940	0.625	8.367	14.651
50.00	50.00	28.42	3.416	0.0*	1-S2n	2.050	2.210	2.050	0.662	8.538	15.103

\* Full Flow Headwater elevation is below inlet invert.

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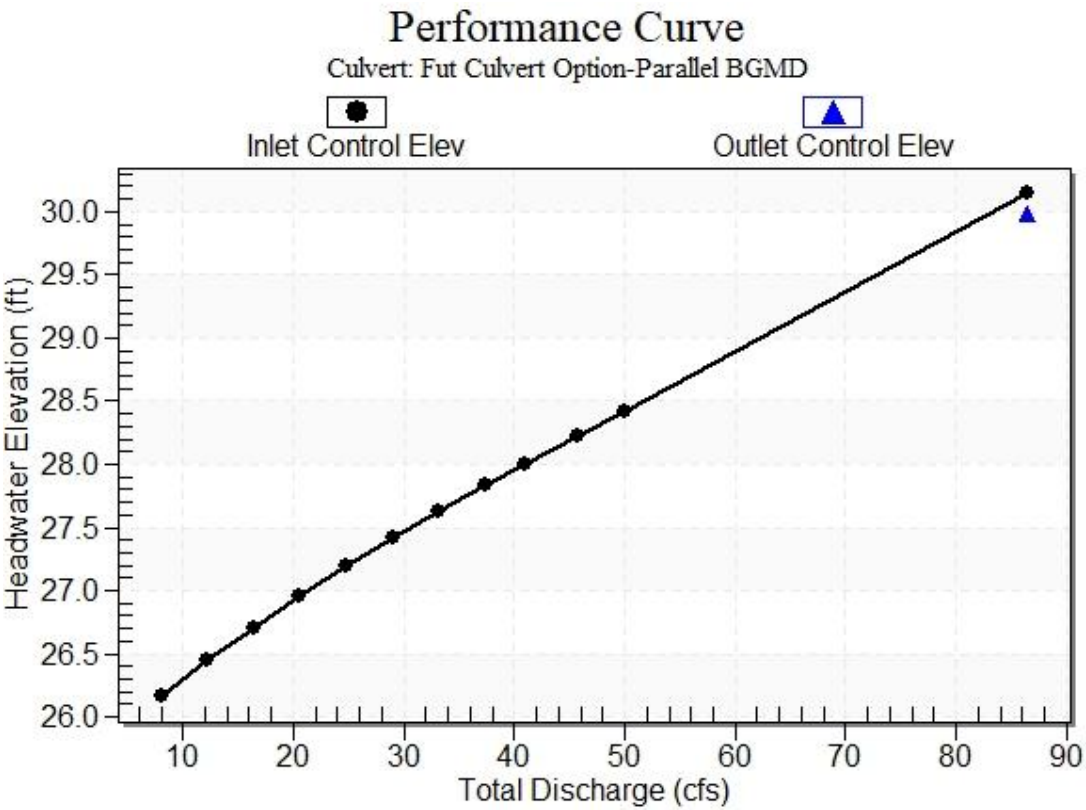
Straight Culvert

Inlet Elevation (invert): 25.00 ft,    Outlet Elevation (invert): 13.00 ft

Culvert Length: 2400.03 ft,    Culvert Slope: 0.0050

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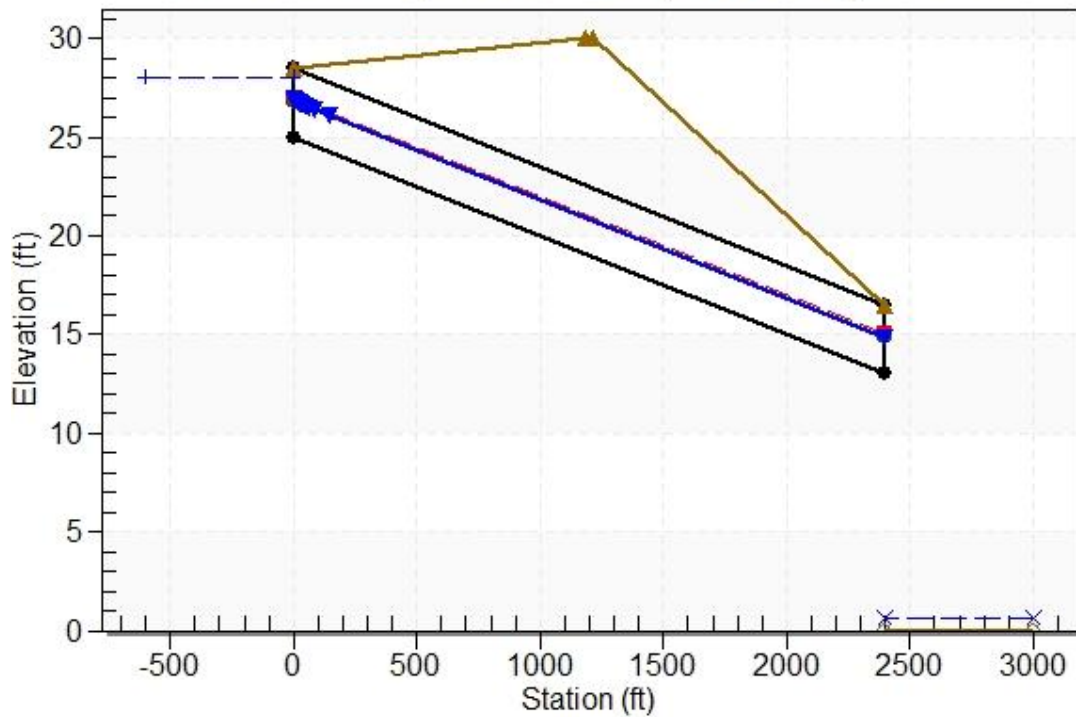
Culvert Performance Curve Plot: Fut Culvert Option-Parallel BGMD



## Water Surface Profile Plot for Culvert: Fut Culvert Option-Parallel BGMD

Crossing - BGMD-Future Pipe Channel Alt, Design Discharge - 40.9 cfs

Culvert - Fut Culvert Option-Parallel BGMD, Culvert Discharge - 40.9 cfs



## Site Data - Fut Culvert Option-Parallel BGMD

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 25.00 ft

Outlet Station: 2400.00 ft

Outlet Elevation: 13.00 ft

Number of Barrels: 1

## Culvert Data Summary - Fut Culvert Option-Parallel BGMD

Barrel Shape: Circular

Barrel Diameter: 3.50 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall

Inlet Depression: None

**Table 3 - Downstream Channel Rating Curve (Crossing: BGMD-Future Pipe Channel**

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
8.00	0.21	0.21	7.72	3.88	2.99
12.20	0.27	0.27	9.06	5.04	3.08
16.40	0.32	0.32	10.12	6.07	3.13
20.60	0.37	0.37	11.01	7.01	3.17
24.80	0.42	0.42	11.78	7.88	3.20
29.00	0.47	0.47	12.46	8.71	3.22
33.20	0.51	0.51	13.08	9.50	3.24
37.40	0.55	0.55	13.65	10.26	3.25
40.90	0.58	0.58	14.09	10.87	3.26
45.80	0.63	0.63	14.65	11.70	3.27
50.00	0.66	0.66	15.10	12.39	3.27

**Alt)****Tailwater Channel Data - BGMD-Future Pipe Channel Alt**

Tailwater Channel Option: Rectangular Channel

Bottom Width: 5.00 ft

Channel Slope: 0.3000

Channel Manning's n: 0.0350

Channel Invert Elevation: 0.00 ft

## Current Culvert Calculations



# **HY-8 Culvert Analysis Report**

**Crossing Discharge Data**

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 143 cfs

Maximum Flow: 143 cfs

**Table 1 - Summary of Culvert Flows at Crossing: Bent Grass & Meridian Existing Ex**

Headwater Elevation (ft)	Total Discharge (cfs)	Ex Culverts - Ex Pipe Capacity Discharge (cfs)	Roadway Discharge (cfs)	Iterations
6928.05	0.00	0.00	0.00	1
6929.11	14.30	14.30	0.00	1
6929.47	28.60	28.60	0.00	1
6929.76	42.90	42.90	0.00	1
6930.02	57.20	57.20	0.00	1
6930.29	71.50	71.50	0.00	1
6930.56	85.80	85.80	0.00	1
6930.86	100.10	100.10	0.00	1
6931.18	114.40	114.40	0.00	1
6931.53	128.70	128.70	0.00	1
6931.90	143.00	143.00	0.00	1
6931.90	143.03	143.03	0.00	Overtopping

**Pipe Cap Check**

Rating Curve Plot for Crossing: Bent Grass & Meridian Existing Ex Pipe Cap Check

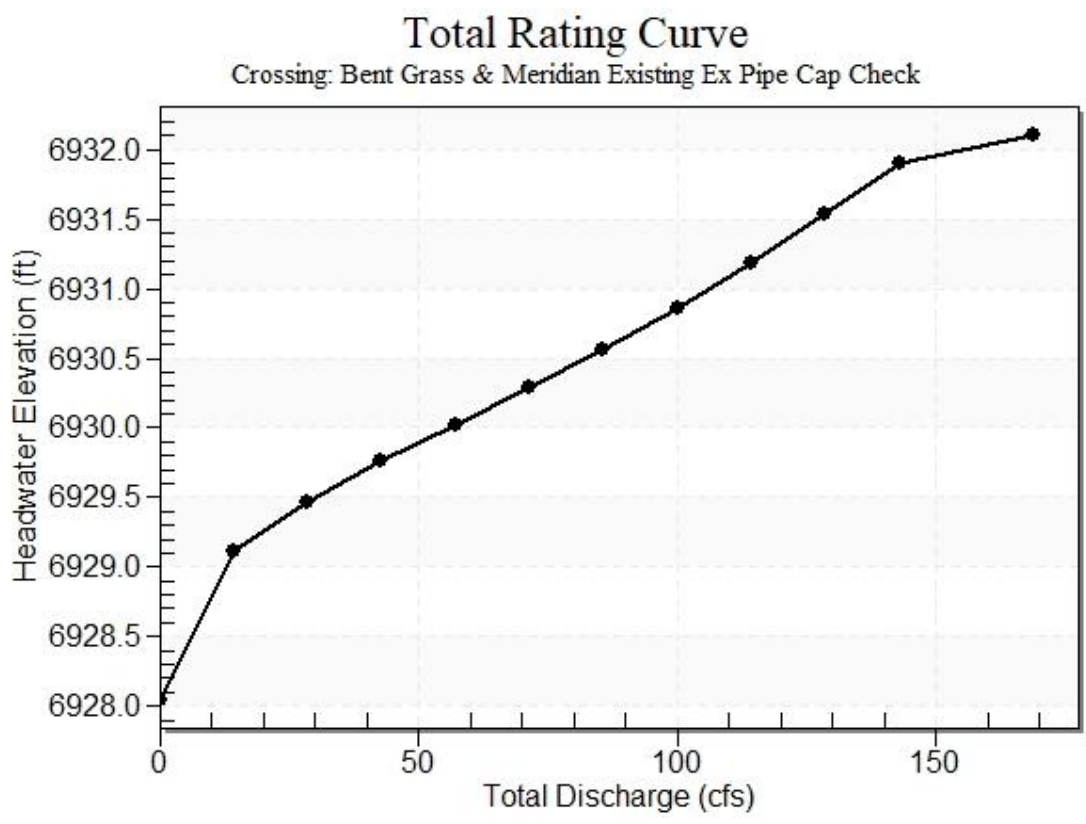


Table 2 - Culvert Summary Table: Ex Culverts - Ex Pipe Capacity

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	6928.05	0.000	0.000	0-NF	0.000	0.000	0.710	0.000	0.000	0.000
14.30	14.30	6929.11	0.753	1.061	1-S1t	0.481	0.558	1.722	1.012	0.851	3.494
28.60	28.60	6929.47	1.094	1.420	1-S1t	0.678	0.802	2.022	1.312	1.446	4.155
42.90	42.90	6929.76	1.388	1.709	1-S1t	0.835	0.995	2.237	1.527	1.997	4.598
57.20	57.20	6930.02	1.659	1.972	1-S1t	0.973	1.161	2.411	1.701	2.570	4.941
71.50	71.50	6930.29	1.913	2.237	1-S1f	1.100	1.303	2.417	1.850	3.213	5.225
85.80	85.80	6930.56	2.161	2.511	1-S1f	1.213	1.438	2.417	1.981	3.855	5.468
100.10	100.10	6930.86	2.415	2.810	1-S1f	1.321	1.562	2.417	2.098	4.498	5.683
114.40	114.40	6931.18	2.681	3.135	4-FFf	1.433	1.677	2.417	2.206	5.140	5.876
128.70	128.70	6931.53	2.968	3.481	4-FFf	1.545	1.783	2.417	2.306	5.783	6.052
143.00	143.00	6931.90	3.280	3.850	4-FFf	1.659	1.882	2.417	2.399	6.425	6.213

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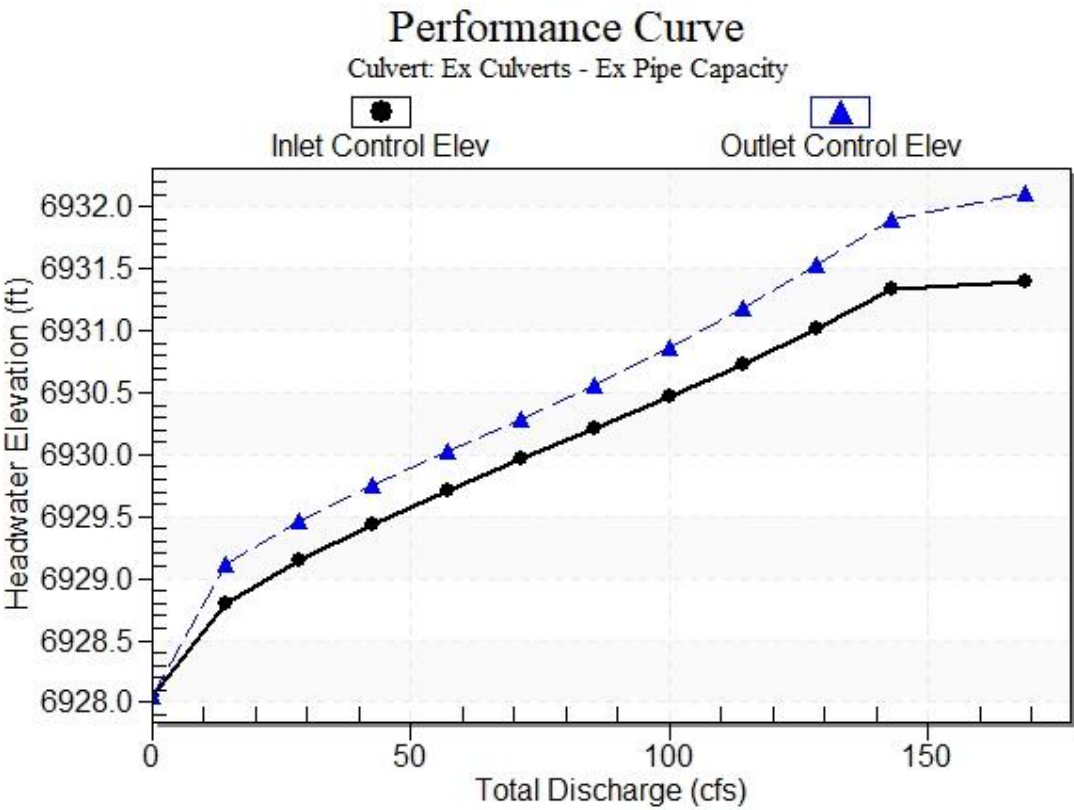
Straight Culvert

Inlet Elevation (invert): 6928.05 ft,    Outlet Elevation (invert): 6927.34 ft

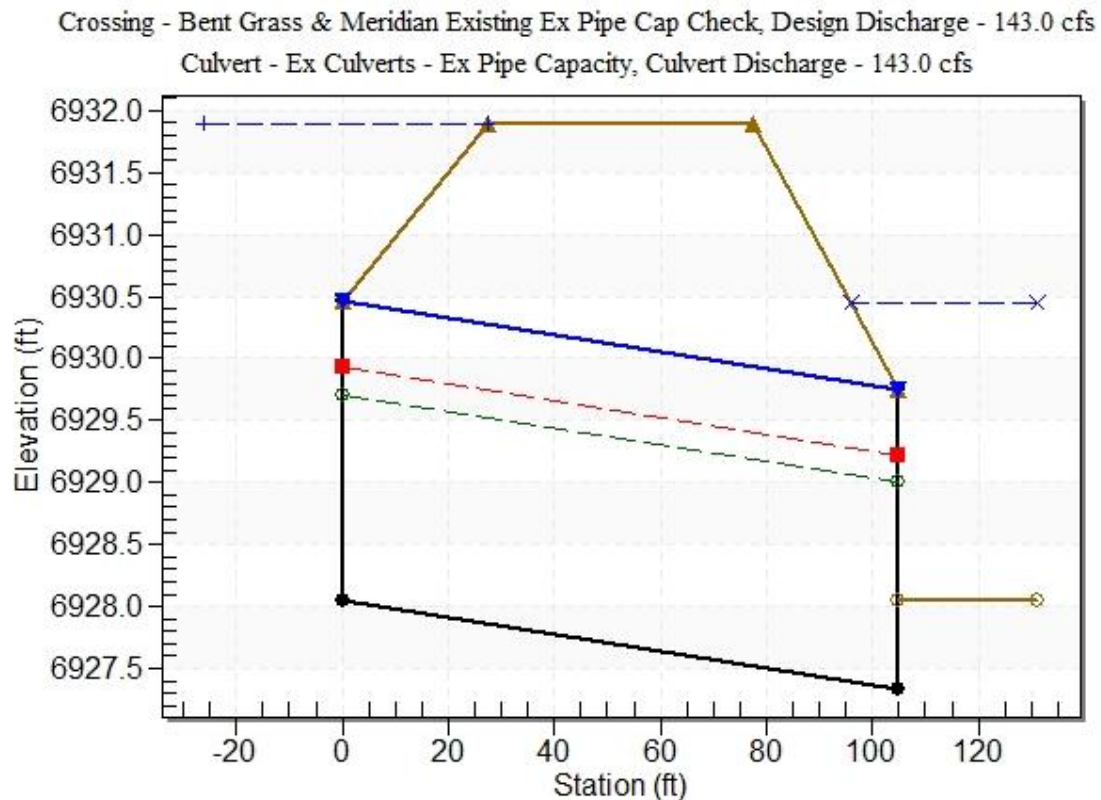
Culvert Length: 105.00 ft,    Culvert Slope: 0.0068

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Culvert Performance Curve Plot: Ex Culverts - Ex Pipe Capacity



## Water Surface Profile Plot for Culvert: Ex Culverts - Ex Pipe Capacity



## Site Data - Ex Culverts - Ex Pipe Capacity

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 6928.05 ft

Outlet Station: 105.00 ft

Outlet Elevation: 6927.34 ft

Number of Barrels: 3

## Culvert Data Summary - Ex Culverts - Ex Pipe Capacity

Barrel Shape: Elliptical

Barrel Span: 45.00 in

Barrel Rise: 29.00 in

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0130

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall

Inlet Depression: None

**Table 3 - Downstream Channel Rating Curve (Crossing: Bent Grass & Meridian**

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	6928.05	0.00	0.00	0.00	0.00
14.30	6929.06	1.01	3.49	1.10	0.87
28.60	6929.36	1.31	4.16	1.43	0.90
42.90	6929.58	1.53	4.60	1.67	0.93
57.20	6929.75	1.70	4.94	1.86	0.94
71.50	6929.90	1.85	5.22	2.02	0.96
85.80	6930.03	1.98	5.47	2.16	0.97
100.10	6930.15	2.10	5.68	2.29	0.98
114.40	6930.26	2.21	5.88	2.41	0.99
128.70	6930.36	2.31	6.05	2.52	0.99
143.00	6930.45	2.40	6.21	2.62	1.00

**Existing Ex Pipe Cap Check)****Tailwater Channel Data - Bent Grass & Meridian Existing Ex Pipe Cap Check**

Tailwater Channel Option: Triangular Channel

Side Slope (H:V): 4.00 (\_:1)

Channel Slope: 0.0175

Channel Manning's n: 0.0350

Channel Invert Elevation: 6928.05 ft

**Roadway Data for Crossing: Bent Grass & Meridian Existing Ex Pipe Cap Check**

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 80.00 ft

Crest Elevation: 6931.90 ft

Roadway Surface: Paved

Roadway Top Width: 50.00 ft



# **HY-8 Culvert Analysis Report**

**Crossing Discharge Data**

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 270 cfs

Maximum Flow: 850 cfs

**Table 1 - Summary of Culvert Flows at Crossing: Bent Grass & Meridian Existing Pr**

Headwater Elevation (ft)	Total Discharge (cfs)	Ex Culverts - Pr DBPS Flow Discharge (cfs)	Roadway Discharge (cfs)	Iterations
6928.05	0.00	0.00	0.00	1
6930.55	85.00	85.00	0.00	1
6932.12	170.00	145.81	24.11	8
6932.55	270.00	143.20	126.70	5
6932.78	340.00	140.88	199.06	5
6933.02	425.00	138.39	286.31	4
6933.23	510.00	136.38	373.41	4
6933.43	595.00	134.77	460.09	4
6933.62	680.00	133.49	546.45	4
6933.79	765.00	132.46	632.08	3
6933.96	850.00	131.74	718.07	3
6931.90	143.05	143.05	0.00	Overtopping

**DBPS Flows**

Rating Curve Plot for Crossing: Bent Grass & Meridian Existing Pr DBPS Flows

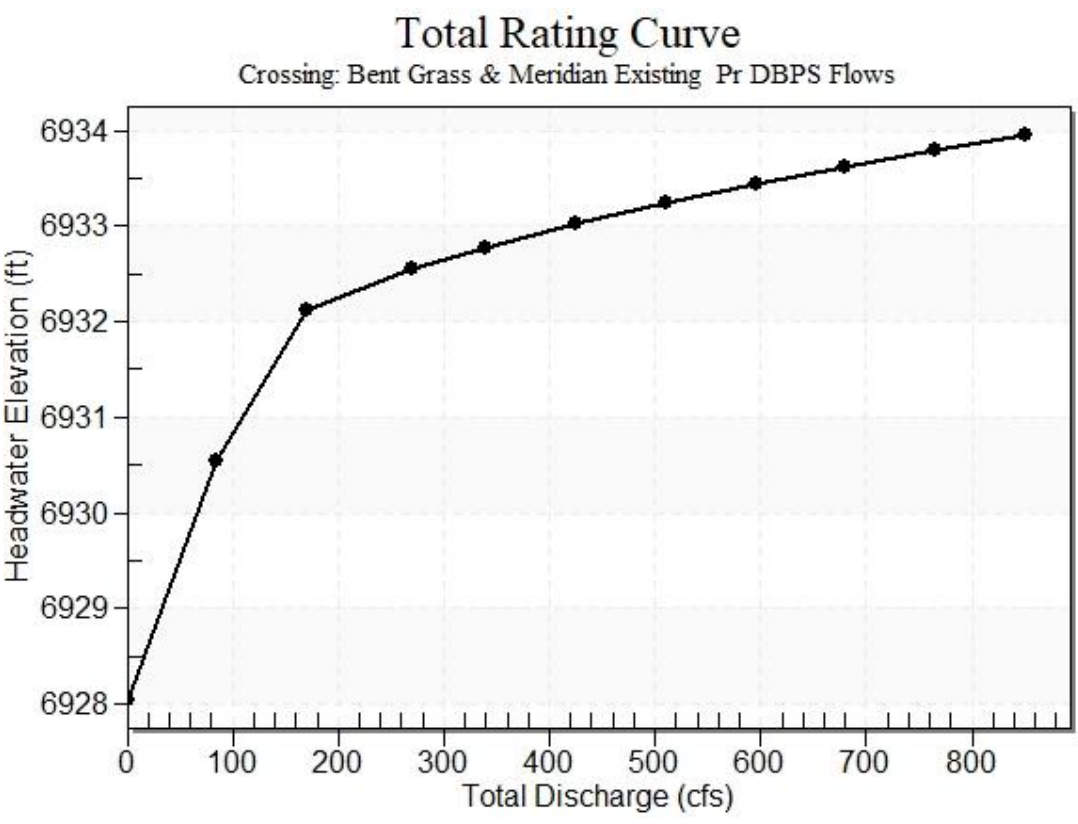


Table 2 - Culvert Summary Table: Ex Culverts - Pr DBPS Flow

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	6928.05	0.000	0.000	0-NF	0.000	0.000	0.710	0.000	0.000	0.000
85.00	85.00	6930.55	2.148	2.496	1-S1f	1.207	1.431	2.417	1.974	3.819	5.456
170.00	145.81	6932.12	3.345	4.068	4-FFf	1.682	1.900	2.417	2.559	6.551	6.488
270.00	143.20	6932.55	3.285	4.499	4-FFf	1.660	1.883	2.417	3.044	6.434	7.283
340.00	140.88	6932.78	3.232	4.727	4-FFf	1.642	1.868	2.417	3.319	6.330	7.715
425.00	138.39	6933.02	3.176	4.968	4-FFf	1.622	1.851	2.417	3.609	6.218	8.158
510.00	136.38	6933.23	3.132	5.184	4-FFf	1.606	1.837	2.417	3.864	6.128	8.539
595.00	134.77	6933.43	3.097	5.383	4-FFf	1.593	1.826	2.417	4.094	6.055	8.874
680.00	133.49	6933.62	3.069	5.569	4-FFf	1.583	1.817	2.417	4.304	5.998	9.175
765.00	132.46	6933.79	3.047	5.744	4-FFf	1.574	1.810	2.417	4.499	5.951	9.449
850.00	131.74	6933.96	3.032	5.912	4-FFf	1.569	1.805	2.417	4.680	5.919	9.702

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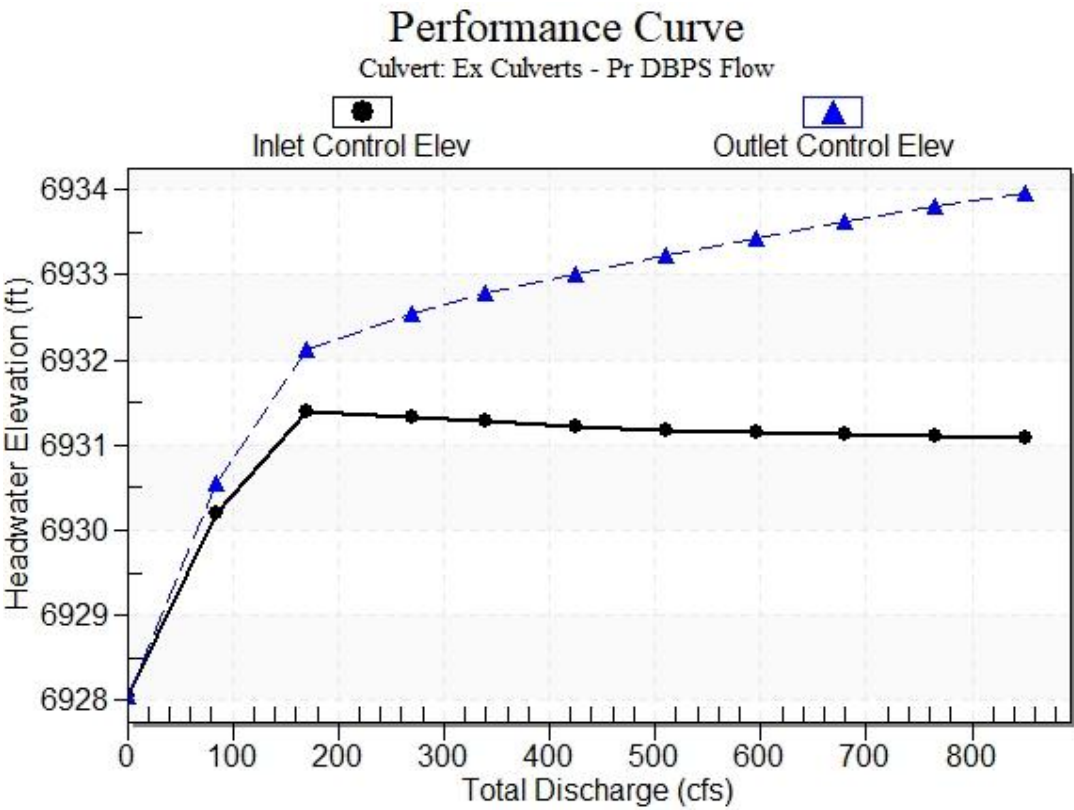
Straight Culvert

Inlet Elevation (invert): 6928.05 ft,    Outlet Elevation (invert): 6927.34 ft

Culvert Length: 105.00 ft,    Culvert Slope: 0.0068

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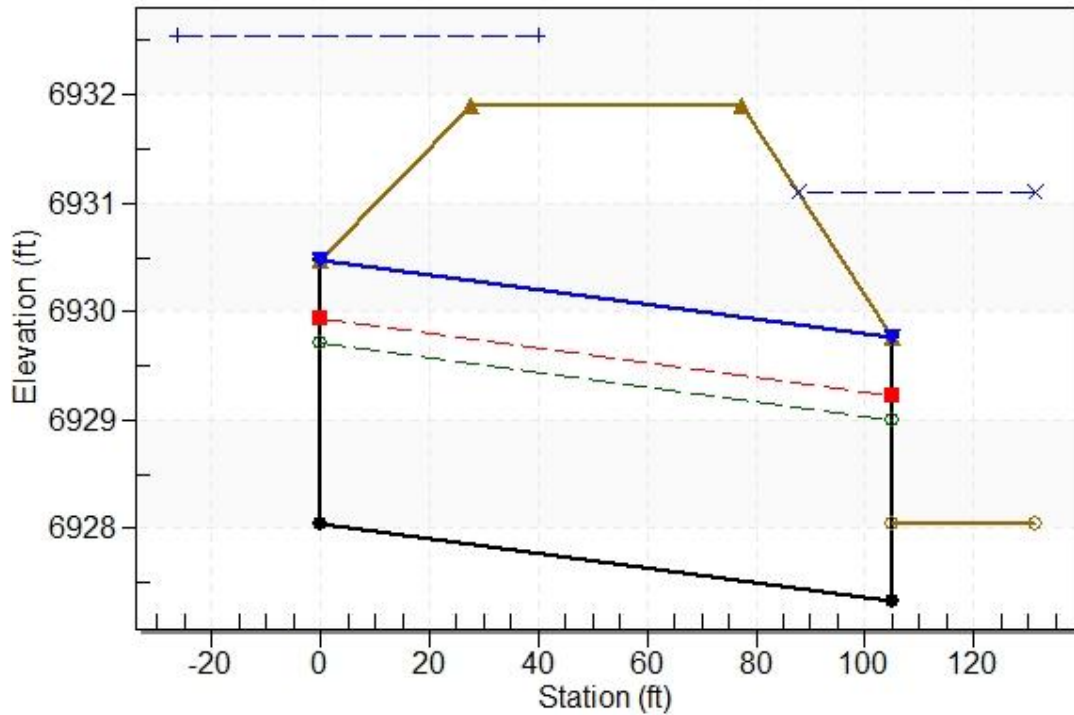
Culvert Performance Curve Plot: Ex Culverts - Pr DBPS Flow



## Water Surface Profile Plot for Culvert: Ex Culverts - Pr DBPS Flow

Crossing - Bent Grass & Meridian Existing Pr DBPS Flows, Design Discharge - 270.0 cfs

Culvert - Ex Culverts - Pr DBPS Flow, Culvert Discharge - 143.2 cfs



## Site Data - Ex Culverts - Pr DBPS Flow

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 6928.05 ft

Outlet Station: 105.00 ft

Outlet Elevation: 6927.34 ft

Number of Barrels: 3

## Culvert Data Summary - Ex Culverts - Pr DBPS Flow

Barrel Shape: Elliptical

Barrel Span: 45.00 in

Barrel Rise: 29.00 in

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0130

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall

Inlet Depression: None

**Table 3 - Downstream Channel Rating Curve (Crossing: Bent Grass & Meridian**

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	6928.05	0.00	0.00	0.00	0.00
85.00	6930.02	1.97	5.46	2.16	0.97
170.00	6930.61	2.56	6.49	2.79	1.01
270.00	6931.09	3.04	7.28	3.32	1.04
340.00	6931.37	3.32	7.72	3.62	1.06
425.00	6931.66	3.61	8.16	3.94	1.07
510.00	6931.91	3.86	8.54	4.22	1.08
595.00	6932.14	4.09	8.87	4.47	1.09
680.00	6932.35	4.30	9.18	4.70	1.10
765.00	6932.55	4.50	9.45	4.91	1.11
850.00	6932.73	4.68	9.70	5.11	1.12

**Existing Pr DBPS Flows)****Tailwater Channel Data - Bent Grass & Meridian Existing Pr DBPS Flows**

Tailwater Channel Option: Triangular Channel

Side Slope (H:V): 4.00 (\_:1)

Channel Slope: 0.0175

Channel Manning's n: 0.0350

Channel Invert Elevation: 6928.05 ft

**Roadway Data for Crossing: Bent Grass & Meridian Existing Pr DBPS Flows**

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 80.00 ft

Crest Elevation: 6931.90 ft

Roadway Surface: Paved

Roadway Top Width: 50.00 ft



# HY-8 Culvert Analysis Report

## Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 25.8 cfs

Design Flow: 255 cfs

Maximum Flow: 275 cfs

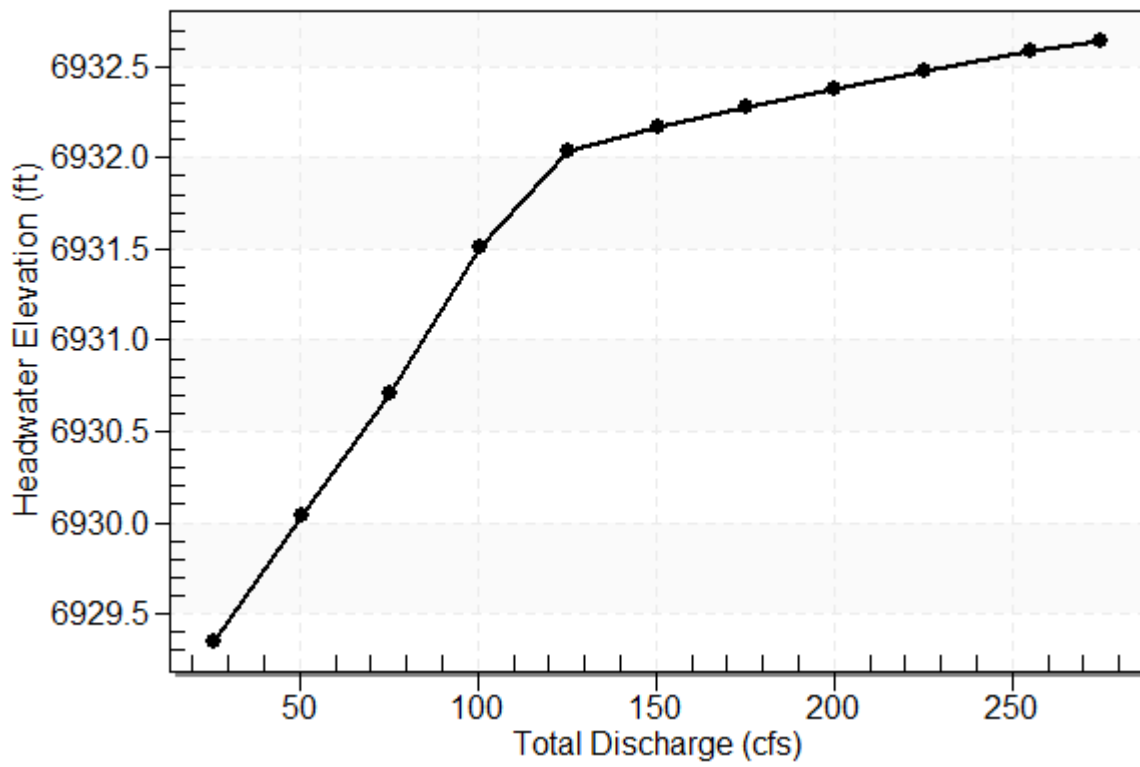
**Table 1 - Summary of Culvert Flows at Crossing: Add't Culverts for Add't Offsite Flow**

Headwater Elevation (ft)	Total Discharge (cfs)	New Ellp Culverts for Offsite Flow Discharge (cfs)	Roadway Discharge (cfs)	Iterations
6929.35	25.80	25.80	0.00	1
6930.04	50.72	50.72	0.00	1
6930.71	75.64	75.64	0.00	1
6931.51	100.56	100.56	0.00	1
6932.03	125.48	114.03	11.26	9
6932.17	150.40	117.27	32.97	6
6932.28	175.32	119.82	55.38	5
6932.38	200.24	120.43	79.53	4
6932.47	225.16	119.77	105.23	4
6932.58	255.00	118.96	135.95	4
6932.65	275.00	118.48	156.17	3
6931.90	110.74	110.74	0.00	Overtopping

# Rating Curve Plot for Crossing: Add't Culverts for Add't Offsite Flow

## Total Rating Curve

Crossing: Add't Culverts for Add't Offsite Flow



**Table 2 - Culvert Summary Table: New Ellp Culverts for Offsite Flow**

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
25.80	25.80	6929.35	1.303	0.658	1-JS1t	0.792	0.941	1.262	1.262	3.305	4.049
50.72	50.72	6930.04	1.993	1.327	1-S2n	1.139	1.348	1.150	1.626	7.371	4.795
75.64	75.64	6930.71	2.663	2.093	5-S2n	1.426	1.670	1.441	1.889	8.261	5.299
100.56	100.56	6931.51	3.464	3.007	5-S2n	1.723	1.932	1.737	2.102	8.884	5.690
125.48	114.03	6932.03	3.982	3.650	5-JS1t	1.905	2.046	2.284	2.284	7.861	6.014
150.40	117.27	6932.17	4.116	3.930	4-FFf	1.955	2.070	2.417	2.445	7.904	6.292
175.32	119.82	6932.28	4.225	4.171	4-FFf	1.998	2.088	2.417	2.589	8.075	6.538
200.24	120.43	6932.38	4.252	4.327	4-FFf	2.009	2.093	2.417	2.721	8.117	6.759
225.16	119.77	6932.47	4.223	4.424	4-FFf	1.997	2.088	2.417	2.844	8.072	6.960
255.00	118.96	6932.58	4.188	4.529	4-FFf	1.982	2.082	2.417	2.980	8.018	7.180
275.00	118.48	6932.65	4.168	4.596	4-FFf	1.974	2.079	2.417	3.065	7.985	7.317

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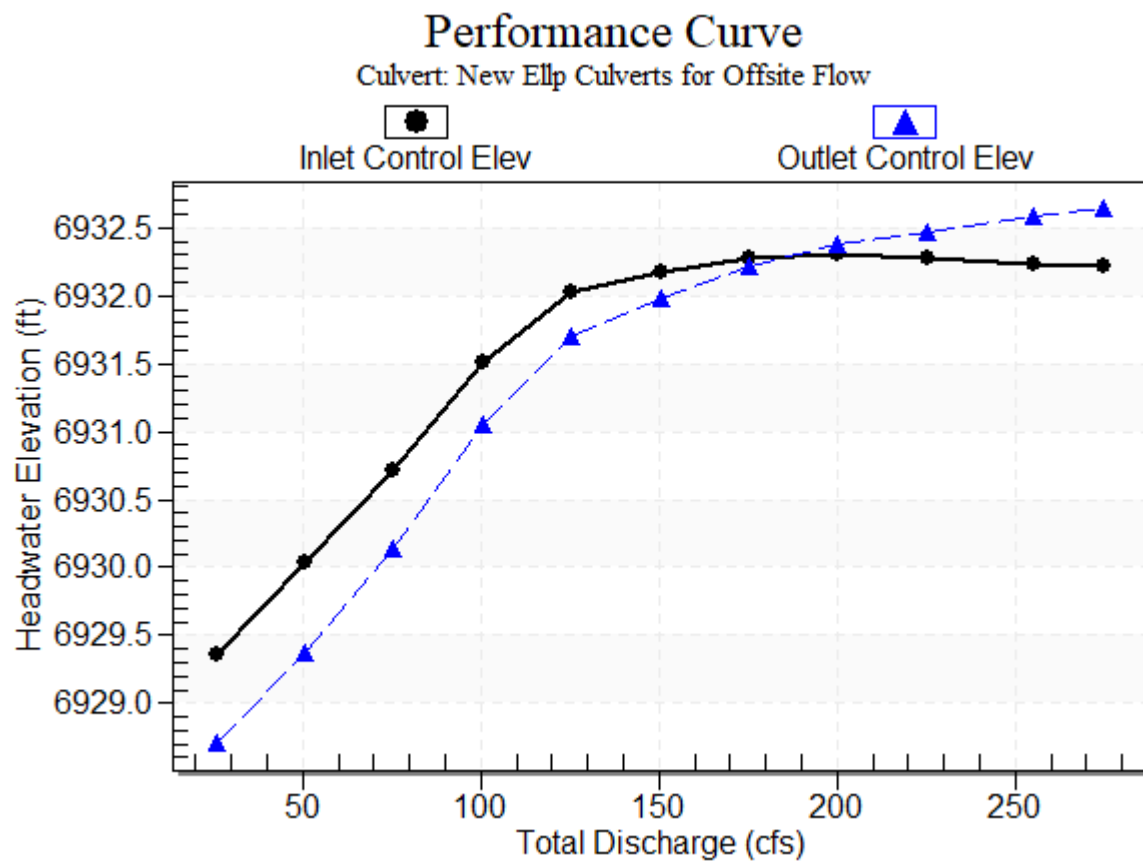
Straight Culvert

Inlet Elevation (invert): 6928.05 ft,    Outlet Elevation (invert): 6927.34 ft

Culvert Length: 105.00 ft,    Culvert Slope: 0.0068

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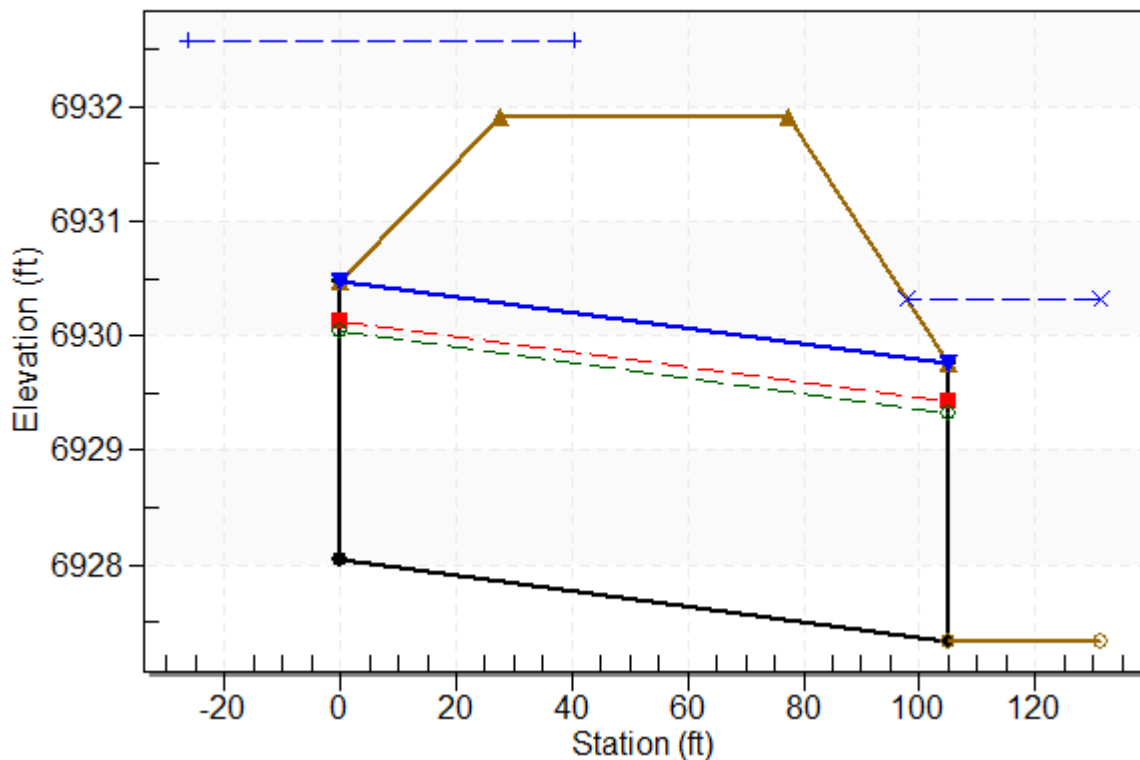
## Culvert Performance Curve Plot: New Ellp Culverts for Offsite Flow



## Water Surface Profile Plot for Culvert: New Ellp Culverts for Offsite Flow

Crossing - Add't Culverts for Add't Offsite Flow, Design Discharge - 255.0 cfs

Culvert - New Ellp Culverts for Offsite Flow, Culvert Discharge - 119.0 cfs



### Site Data - New Ellp Culverts for Offsite Flow

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 6928.05 ft

Outlet Station: 105.00 ft

Outlet Elevation: 6927.34 ft

Number of Barrels: 2

### Culvert Data Summary - New Ellp Culverts for Offsite Flow

Barrel Shape: Elliptical

Barrel Span: 45.00 in

Barrel Rise: 29.00 in

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0130

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall

Inlet Depression: None

**Table 3 - Downstream Channel Rating Curve (Crossing: Add't Culverts for Add't**

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
25.80	6928.60	1.26	4.05	1.38	0.90
50.72	6928.97	1.63	4.79	1.78	0.94
75.64	6929.23	1.89	5.30	2.06	0.96
100.56	6929.44	2.10	5.69	2.30	0.98
125.48	6929.62	2.28	6.01	2.49	0.99
150.40	6929.78	2.44	6.29	2.67	1.00
175.32	6929.93	2.59	6.54	2.83	1.01
200.24	6930.06	2.72	6.76	2.97	1.02
225.16	6930.18	2.84	6.96	3.11	1.03
255.00	6930.32	2.98	7.18	3.25	1.04
275.00	6930.41	3.07	7.32	3.35	1.04



**Tailwater Channel Data - Add't Culverts for Add't Offsite Flow**

Tailwater Channel Option: Triangular Channel

Side Slope (H:V): 4.00 (1:1)

Channel Slope: 0.0175

Channel Manning's n: 0.0350

Channel Invert Elevation: 6927.34 ft

**Roadway Data for Crossing: Add't Culverts for Add't Offsite Flow**

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 80.00 ft

Crest Elevation: 6931.90 ft

Roadway Surface: Paved

Roadway Top Width: 50.00 ft

**HY-8 Culvert Analysis Report**

**Existing Culverts @ Owl Place**

### **Crossing Discharge Data**

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 248.6 cfs

Design Flow: 850 cfs

Maximum Flow: 925 cfs

**Table 1 - Summary of Culvert Flows at Crossing: Owl Place - Ex Culvert Fut DBPS**

Headwater Elevation (ft)	Total Discharge (cfs)	Ex Twin 36-IN CMPs Discharge (cfs)	Roadway Discharge (cfs)	Iterations
6913.60	248.60	109.05	139.42	7
6913.77	316.24	111.86	204.26	5
6913.92	383.88	114.62	268.95	4
6914.07	451.52	116.94	334.34	4
6914.20	519.16	118.93	400.05	4
6914.33	586.80	121.04	465.66	4
6914.45	654.44	122.77	531.61	4
6914.57	722.08	123.99	597.68	3
6914.69	789.72	124.68	664.77	3
6914.79	850.00	125.03	724.82	3
6914.91	925.00	125.07	799.85	3
6913.00	97.95	97.95	0.00	Overtopping

**Flow (850 cfs)**

Rating Curve Plot for Crossing: Owl Place - Ex Culvert Fut DBPS Flow (850 cfs)

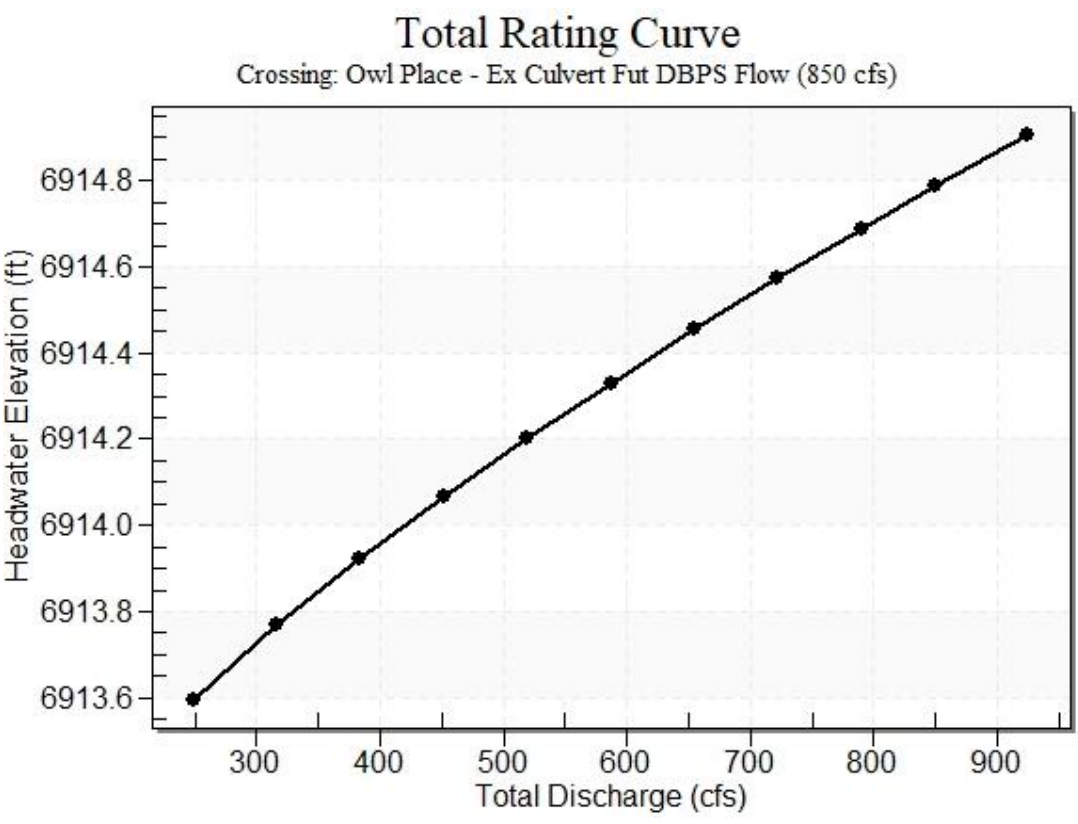


Table 2 - Culvert Summary Table: Ex Twin 36-IN CMPs

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
248.60	109.05	6913.60	5.096	5.078	7-M2c	3.000	2.397	2.397	2.361	9.005	4.055
316.24	111.86	6913.77	5.258	5.271	7-M2c	3.000	2.425	2.425	2.584	9.136	4.306
383.88	114.62	6913.92	5.423	5.421	7-M2c	3.000	2.452	2.452	2.779	9.267	4.520
451.52	116.94	6914.07	5.565	5.567	7-M2c	3.000	2.474	2.474	2.953	9.379	4.707
519.16	118.93	6914.20	5.689	5.702	7-M2c	3.000	2.492	2.492	3.112	9.476	4.874
586.80	121.04	6914.33	5.824	5.831	7-M2c	3.000	2.511	2.511	3.258	9.579	5.026
654.44	122.77	6914.45	5.937	5.954	7-M2t	3.000	2.526	2.624	3.394	9.362	5.165
722.08	123.99	6914.57	6.017	6.071	7-M2t	3.000	2.536	2.752	3.522	9.130	5.293
789.72	124.68	6914.69	6.063	6.187	7-M2t	3.000	2.542	2.872	3.642	8.951	5.413
850.00	125.03	6914.79	6.087	6.287	7-M2t	3.000	2.545	2.974	3.744	8.856	5.513
925.00	125.07	6914.91	6.090	6.408	4-FFf	3.000	2.545	3.000	3.864	8.847	5.631

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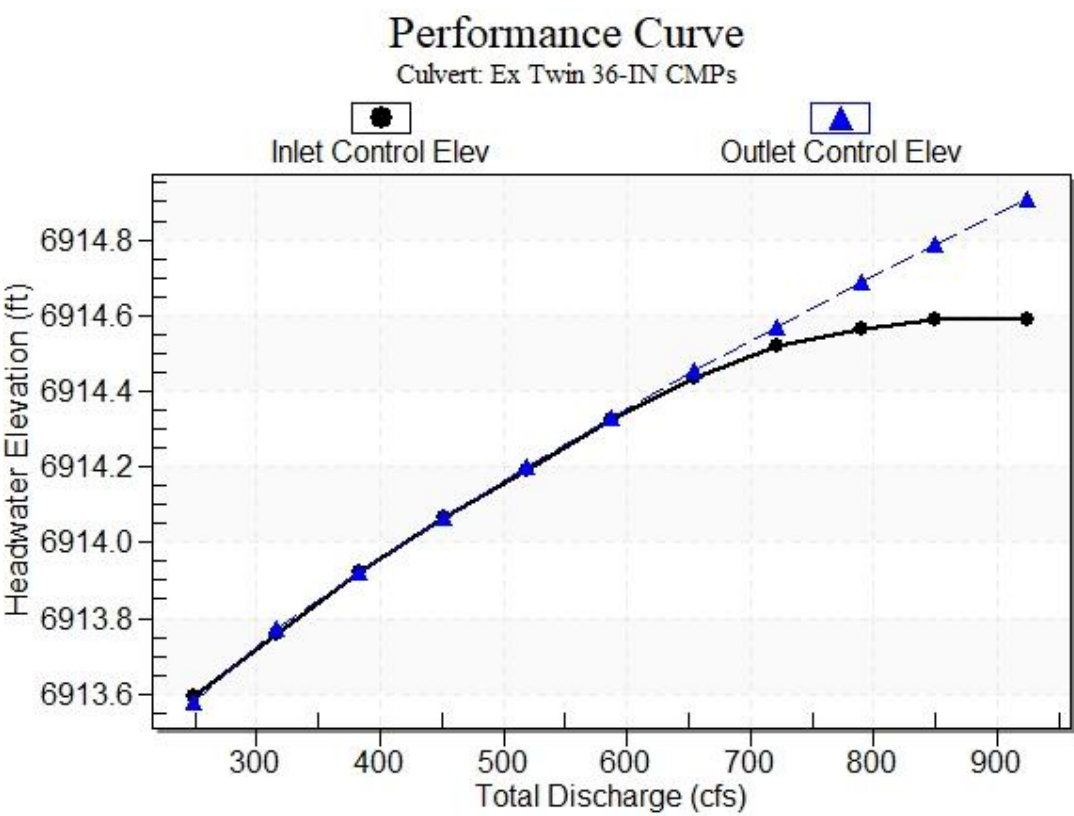
Straight Culvert

Inlet Elevation (invert): 6908.50 ft,    Outlet Elevation (invert): 6908.00 ft

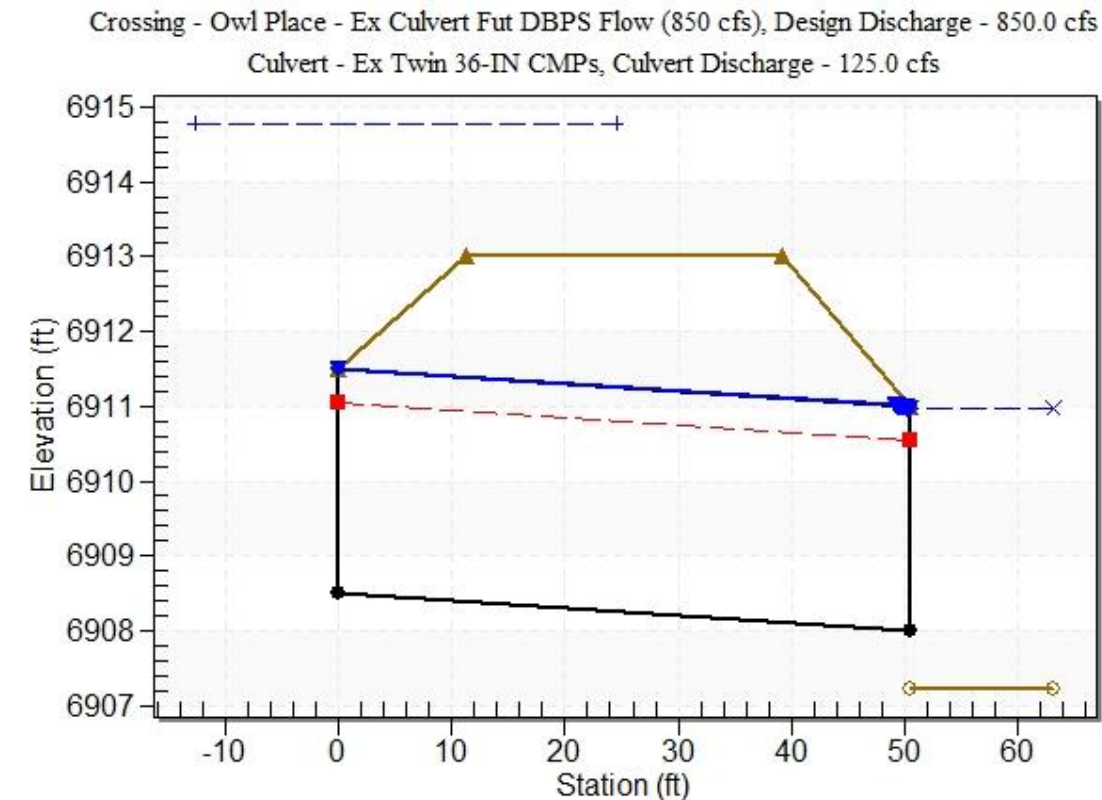
Culvert Length: 50.50 ft,    Culvert Slope: 0.0099

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Culvert Performance Curve Plot: Ex Twin 36-IN CMPs



## Water Surface Profile Plot for Culvert: Ex Twin 36-IN CMPs



## Site Data - Ex Twin 36-IN CMPs

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 6908.50 ft

Outlet Station: 50.50 ft

Outlet Elevation: 6908.00 ft

Number of Barrels: 2

## Culvert Data Summary - Ex Twin 36-IN CMPs

Barrel Shape: Circular

Barrel Diameter: 3.00 ft

Barrel Material: Corrugated Steel

Embedment: 0.00 in

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: None



**Table 3 - Downstream Channel Rating Curve (Crossing: Owl Place - Ex Culvert Fut**

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
248.60	6909.59	2.36	4.05	2.21	0.66
316.24	6909.81	2.58	4.31	2.42	0.67
383.88	6910.01	2.78	4.52	2.60	0.68
451.52	6910.18	2.95	4.71	2.76	0.68
519.16	6910.34	3.11	4.87	2.91	0.69
586.80	6910.49	3.26	5.03	3.05	0.69
654.44	6910.62	3.39	5.16	3.18	0.70
722.08	6910.75	3.52	5.29	3.30	0.70
789.72	6910.87	3.64	5.41	3.41	0.71
850.00	6910.97	3.74	5.51	3.50	0.71
925.00	6911.09	3.86	5.63	3.62	0.71

**DBPS Flow (850 cfs))****Tailwater Channel Data - Owl Place - Ex Culvert Fut DBPS Flow (850 cfs)**

Tailwater Channel Option: Triangular Channel

Side Slope (H:V): 11.00 (1:1)

Channel Slope: 0.0150

Channel Manning's n: 0.0500

Channel Invert Elevation: 6907.23 ft

**Roadway Data for Crossing: Owl Place - Ex Culvert Fut DBPS Flow (850 cfs)**

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 6913.00 ft

Roadway Surface: Paved

Roadway Top Width: 28.00 ft

## **Future Culvert Calculations**

# **HY-8 Culvert Analysis Report**

**Future Culvert @ Bent Grass  
Meadows Drive/Meridian Road**

**Crossing Discharge Data**

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 298 cfs

Design Flow: 850 cfs

Maximum Flow: 925 cfs

**Table 1 - Summary of Culvert Flows at Crossing: Bent Grass & Meridian Future - Fut**

Headwater Elevation (ft)	Total Discharge (cfs)	Future Culvert - Fut Flow Discharge (cfs)	Roadway Discharge (cfs)	Iterations
6927.25	298.00	298.00	0.00	1
6927.54	360.70	360.70	0.00	1
6927.82	423.40	423.40	0.00	1
6928.08	486.10	486.10	0.00	1
6928.34	548.80	548.80	0.00	1
6928.58	611.50	611.50	0.00	1
6928.83	674.20	674.20	0.00	1
6929.08	736.90	736.90	0.00	1
6929.33	799.60	799.60	0.00	1
6929.53	850.00	850.00	0.00	1
6929.85	925.00	925.00	0.00	1
6931.50	1258.18	1258.18	0.00	Overtopping

**DBPS Flow (850 cfs)**

Rating Curve Plot for Crossing: Bent Grass & Meridian Future - Fut DBPS Flow (850 cfs)

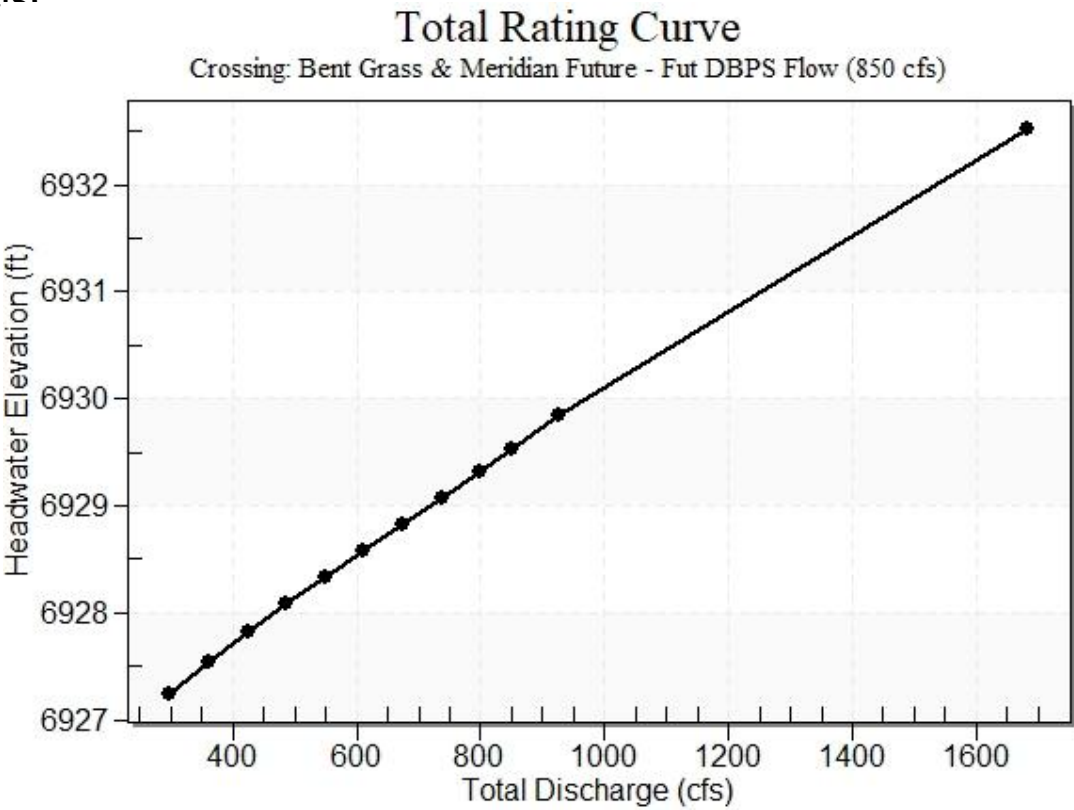


Table 2 - Culvert Summary Table: Future Culvert - Fut Flow

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
298.00	298.00	6927.25	2.138	1.250	1-S2n	1.356	1.391	1.356	0.729	6.866	7.728
360.70	360.70	6927.54	2.435	1.504	1-S2n	1.533	1.580	1.535	0.816	7.343	8.298
423.40	423.40	6927.82	2.712	1.759	1-S2n	1.699	1.758	1.702	0.897	7.773	8.808
486.10	486.10	6928.08	2.975	2.017	1-S2n	1.858	1.928	1.861	0.973	8.161	9.267
548.80	548.80	6928.34	3.228	2.281	1-S2n	2.010	2.090	2.015	1.045	8.513	9.688
611.50	611.50	6928.58	3.475	2.551	1-S2n	2.158	2.247	2.163	1.114	8.835	10.078
674.20	674.20	6928.83	3.719	2.828	1-S2n	2.301	2.398	2.307	1.180	9.133	10.441
736.90	736.90	6929.08	3.965	3.113	1-S2n	2.440	2.544	2.447	1.243	9.412	10.781
799.60	799.60	6929.33	4.216	3.406	5-S2n	2.576	2.687	2.583	1.304	9.673	11.102
850.00	850.00	6929.53	4.422	3.647	5-S2n	2.683	2.798	2.691	1.352	9.872	11.347
925.00	925.00	6929.85	4.740	4.018	5-S2n	2.839	2.961	2.848	1.420	10.151	11.695

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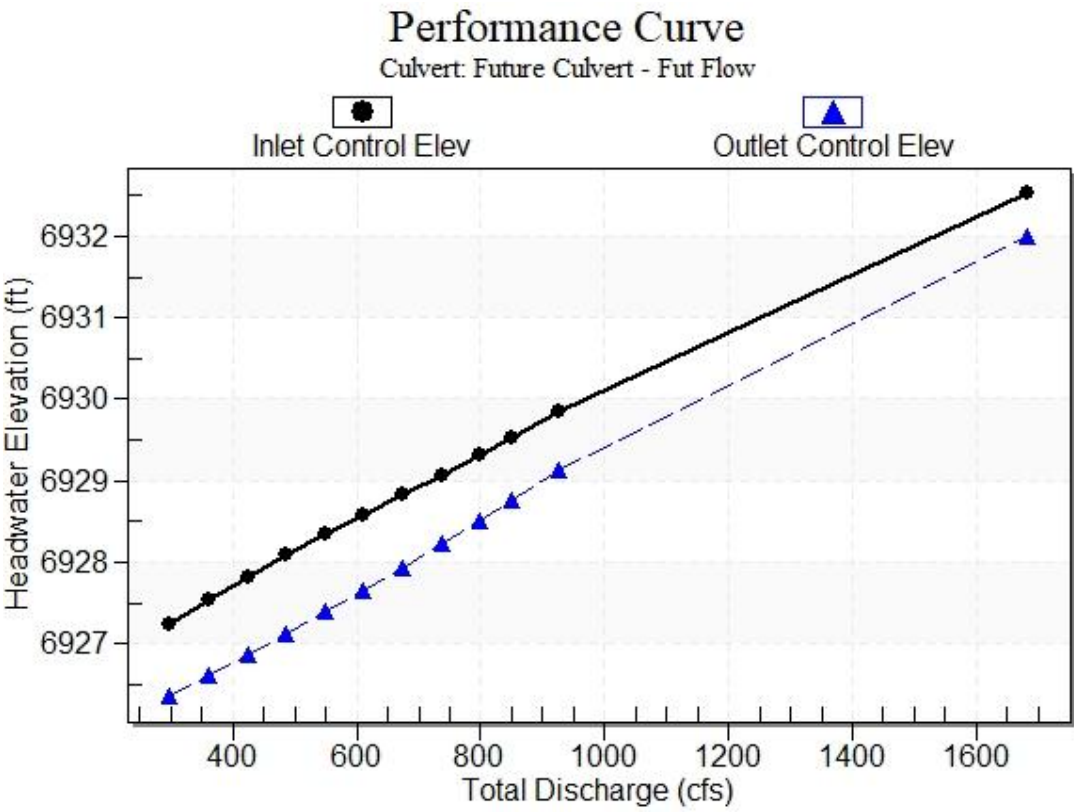
Straight Culvert

Inlet Elevation (invert): 6925.11 ft,    Outlet Elevation (invert): 6924.83 ft

Culvert Length: 95.00 ft,    Culvert Slope: 0.0029

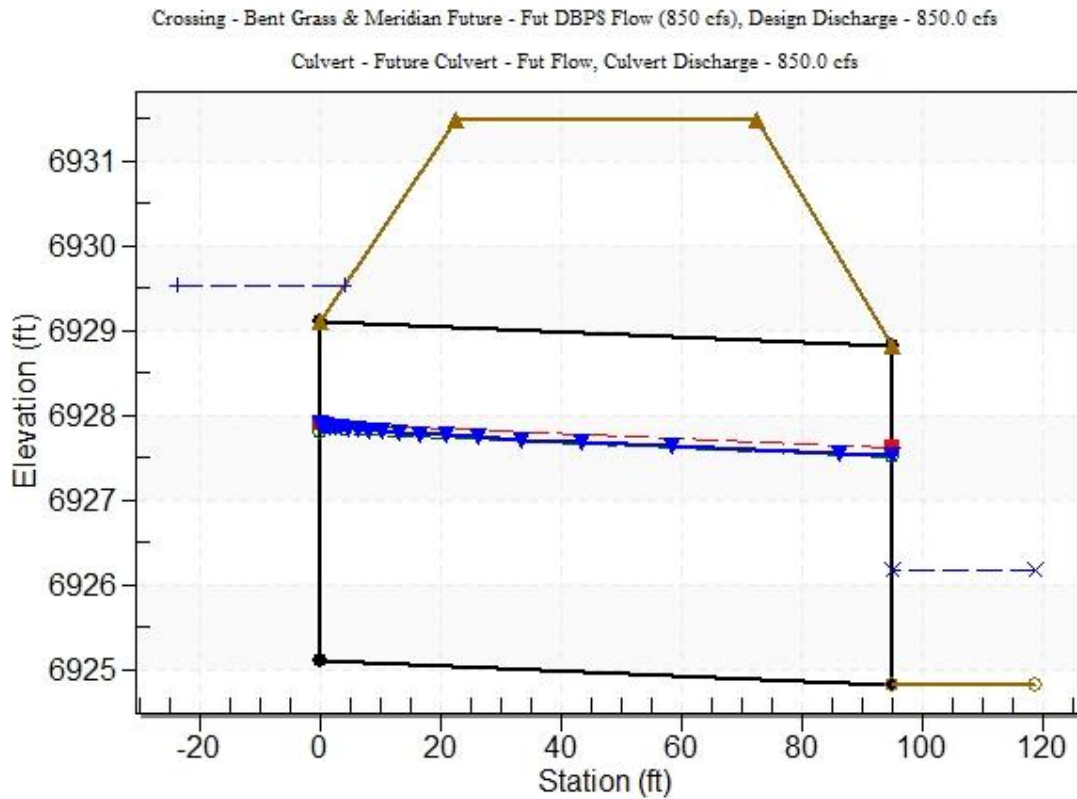
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Culvert Performance Curve Plot: Future Culvert - Fut Flow





## Water Surface Profile Plot for Culvert: Future Culvert - Fut Flow



### Site Data - Future Culvert - Fut Flow

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 6925.11 ft

Outlet Station: 95.00 ft

Outlet Elevation: 6924.83 ft

Number of Barrels: 2

### Culvert Data Summary - Future Culvert - Fut Flow

Barrel Shape: Concrete Box

Barrel Span: 16.00 ft

Barrel Rise: 4.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0130

Culvert Type: Straight

Inlet Configuration: Square Edge (30-75° flare) Wingwall

Inlet Depression: None

**Table 3 - Downstream Channel Rating Curve (Crossing: Bent Grass & Meridian)**

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
298.00	6925.56	0.73	7.73	2.48	1.64
360.70	6925.65	0.82	8.30	2.78	1.67
423.40	6925.73	0.90	8.81	3.05	1.69
486.10	6925.80	0.97	9.27	3.31	1.71
548.80	6925.88	1.05	9.69	3.56	1.73
611.50	6925.94	1.11	10.08	3.79	1.75
674.20	6926.01	1.18	10.44	4.01	1.77
736.90	6926.07	1.24	10.78	4.23	1.78
799.60	6926.13	1.30	11.10	4.44	1.79
850.00	6926.18	1.35	11.35	4.60	1.80
925.00	6926.25	1.42	11.70	4.83	1.82

**Future - Fut DBPS Flow (850 cfs))****Tailwater Channel Data - Bent Grass & Meridian Future - Fut DBPS Flow (850 cfs)**

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 50.00 ft

Side Slope (H:V): 4.00 (\_:1)

Channel Slope: 0.0545

Channel Manning's n: 0.0350

Channel Invert Elevation: 6924.83 ft

**Roadway Data for Crossing: Bent Grass & Meridian Future - Fut DBPS Flow (850 cfs)**

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 80.00 ft

Crest Elevation: 6931.50 ft

Roadway Surface: Paved

Roadway Top Width: 50.00 ft

# **HY-8 Culvert Analysis Report**

**Future Culvert @ Owl Place**

### **Crossing Discharge Data**

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 248.6 cfs

Design Flow: 850 cfs

Maximum Flow: 925 cfs

**Table 1 - Summary of Culvert Flows at Crossing: Owl Place - Fut RCBC FutDBPS**

Headwater Elevation (ft)	Total Discharge (cfs)	Fut 20 X 4 RCBC Discharge (cfs)	Roadway Discharge (cfs)	Iterations
6911.34	248.60	248.60	0.00	1
6911.83	316.24	316.24	0.00	1
6912.30	383.88	383.88	0.00	1
6912.76	451.52	451.52	0.00	1
6913.24	519.16	519.16	0.00	1
6913.75	586.80	586.80	0.00	1
6914.29	654.44	654.44	0.00	1
6914.88	722.08	722.08	0.00	1
6915.52	789.72	789.72	0.00	1
6916.14	850.00	850.00	0.00	1
6916.99	925.00	925.00	0.00	1
6917.00	926.05	926.05	0.00	Overtopping

**Flow (850 cfs)**

Rating Curve Plot for Crossing: Owl Place - Fut RCBC FutDBPS Flow (850 cfs)

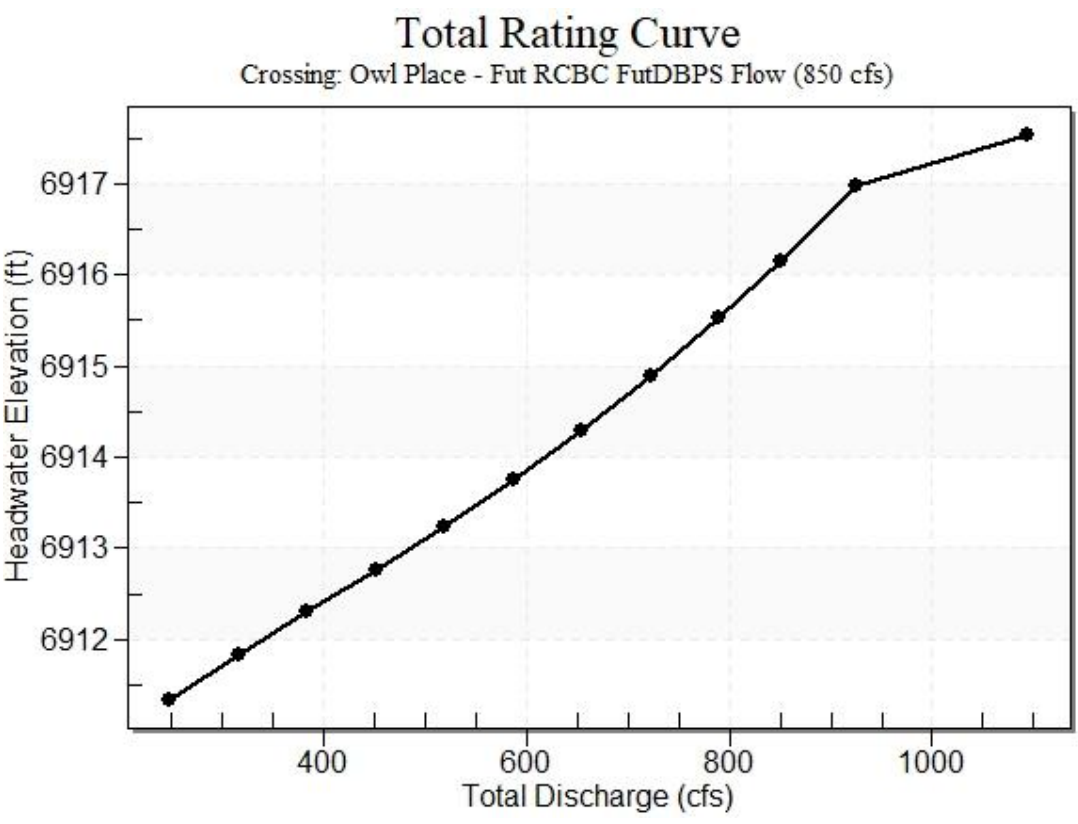


Table 2 - Culvert Summary Table: Fut 20 X 4 RCBC

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
248.60	248.60	6911.34	2.843	2.102	1-JS1t	1.044	1.687	2.361	2.361	5.265	4.055
316.24	316.24	6911.83	3.331	2.474	1-S2n	1.214	1.980	1.476	2.584	10.714	4.306
383.88	383.88	6912.30	3.797	2.853	1-S2n	1.371	2.253	1.700	2.779	11.287	4.520
451.52	451.52	6912.76	4.262	3.248	5-S2n	1.520	2.511	1.915	2.953	11.788	4.707
519.16	519.16	6913.24	4.740	3.662	5-S2n	1.661	2.756	2.122	3.112	12.232	4.874
586.80	586.80	6913.75	5.245	4.100	5-S2n	1.795	2.990	2.321	3.258	12.639	5.026
654.44	654.44	6914.29	5.789	4.564	5-S2n	1.925	3.216	2.514	3.394	13.018	5.165
722.08	722.08	6914.88	6.379	5.054	5-S2n	2.051	3.434	2.702	3.522	13.362	5.293
789.72	789.72	6915.52	7.022	5.754	5-S2n	2.173	3.645	2.885	3.642	13.688	5.413
850.00	850.00	6916.14	7.644	6.231	5-S2n	2.279	3.828	3.044	3.744	13.961	5.513
925.00	925.00	6916.99	8.487	6.835	5-S2n	2.407	4.000	3.238	3.864	14.285	5.631

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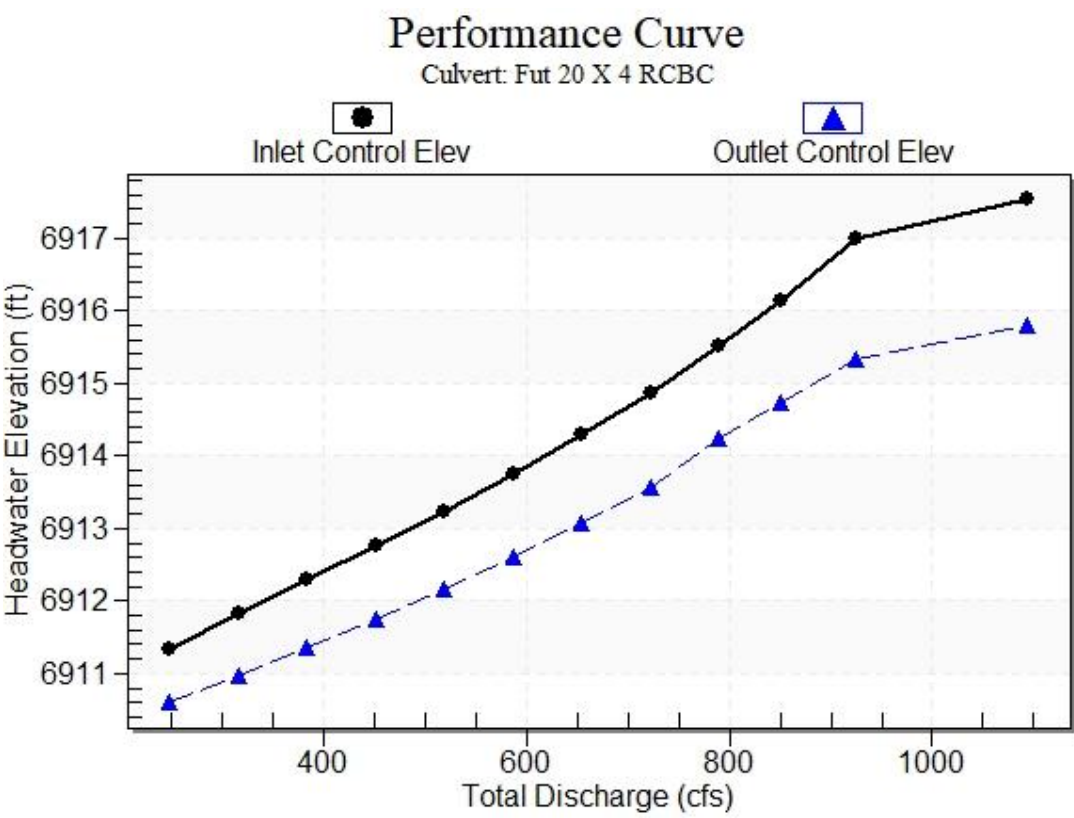
Straight Culvert

Inlet Elevation (invert): 6908.50 ft,    Outlet Elevation (invert): 6908.00 ft

Culvert Length: 50.50 ft,    Culvert Slope: 0.0099

\*\*\*\*\*

Culvert Performance Curve Plot: Fut 20 X 4 RCBC

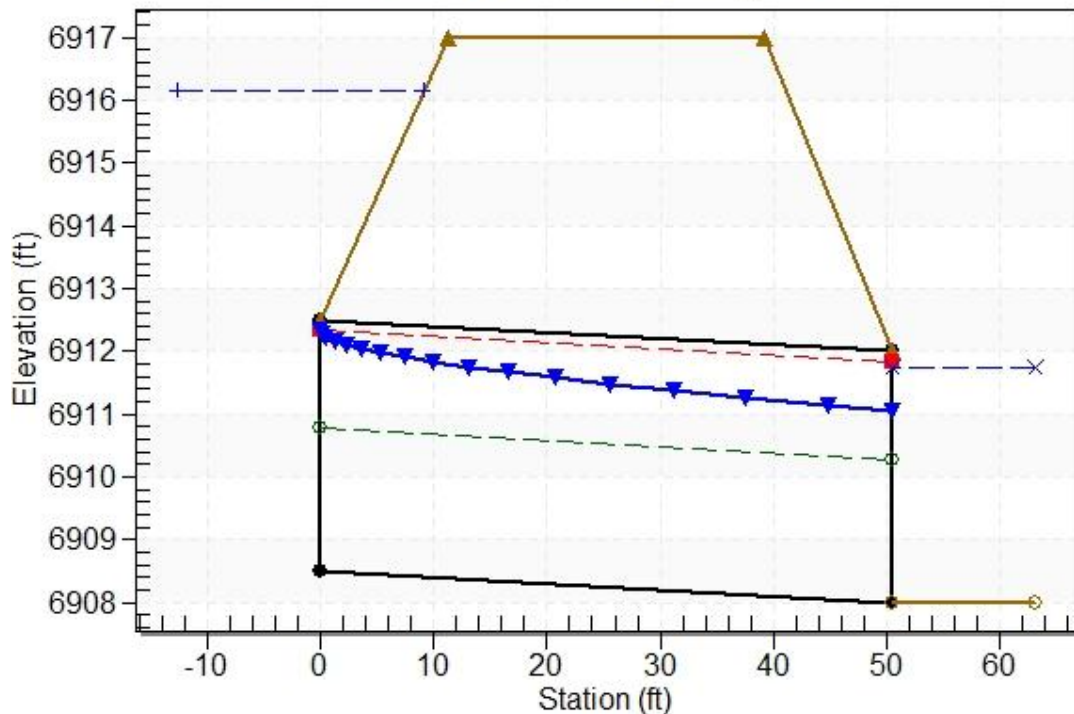




## Water Surface Profile Plot for Culvert: Fut 20 X 4 RCBC

Crossing - Owl Place - Fut RCBC FutDBPS Flow (850 cfs), Design Discharge - 850.0 cfs

Culvert - Fut 20 X 4 RCBC, Culvert Discharge - 850.0 cfs



### Site Data - Fut 20 X 4 RCBC

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 6908.50 ft

Outlet Station: 50.50 ft

Outlet Elevation: 6908.00 ft

Number of Barrels: 1

### Culvert Data Summary - Fut 20 X 4 RCBC

Barrel Shape: Concrete Box

Barrel Span: 20.00 ft

Barrel Rise: 4.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge (90 & 15° flare) Wingwall

Inlet Depression: None

**Table 3 - Downstream Channel Rating Curve (Crossing: Owl Place - Fut RCBC**

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
248.60	6910.36	2.36	4.05	2.21	0.66
316.24	6910.58	2.58	4.31	2.42	0.67
383.88	6910.78	2.78	4.52	2.60	0.68
451.52	6910.95	2.95	4.71	2.76	0.68
519.16	6911.11	3.11	4.87	2.91	0.69
586.80	6911.26	3.26	5.03	3.05	0.69
654.44	6911.39	3.39	5.16	3.18	0.70
722.08	6911.52	3.52	5.29	3.30	0.70
789.72	6911.64	3.64	5.41	3.41	0.71
850.00	6911.74	3.74	5.51	3.50	0.71
925.00	6911.86	3.86	5.63	3.62	0.71

**FutDBPS Flow (850 cfs))****Tailwater Channel Data - Owl Place - Fut RCBC FutDBPS Flow (850 cfs)**

Tailwater Channel Option: Triangular Channel

Side Slope (H:V): 11.00 (1:1)

Channel Slope: 0.0150

Channel Manning's n: 0.0500

Channel Invert Elevation: 6908.00 ft

**Roadway Data for Crossing: Owl Place - Fut RCBC FutDBPS Flow (850 cfs)**

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 6917.00 ft

Roadway Surface: Paved

Roadway Top Width: 28.00 ft

# **HY-8 Culvert Analysis Report**

**Future Culvert @ Owl Place & Private Driveway-West of  
Meridian Road (DBPS FLOWS)**

**Crossing Discharge Data**

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 50 cfs

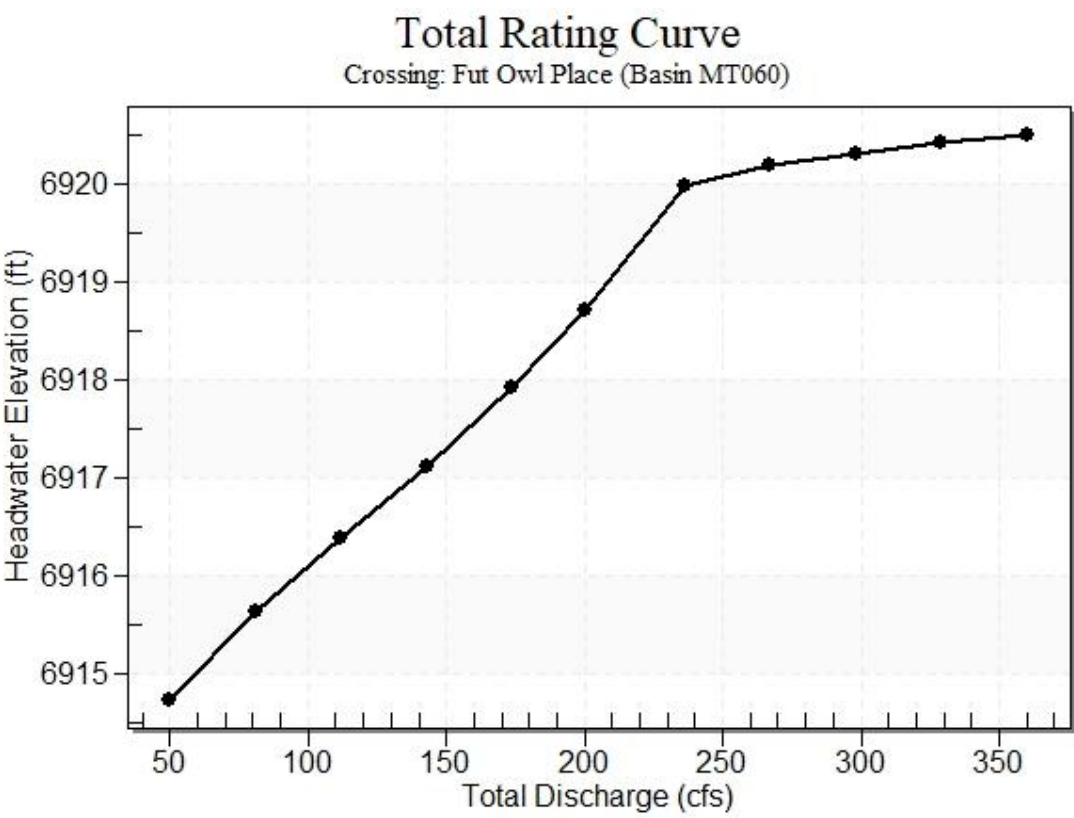
Design Flow: 200 cfs

Maximum Flow: 360 cfs

**Table 1 - Summary of Culvert Flows at Crossing: Fut Owl Place (Basin MT060)**

Headwater Elevation (ft)	Total Discharge (cfs)	Fut Owl Play & Private Drive (Basin MT060) Discharge (cfs)	Roadway Discharge (cfs)	Iterations
6914.74	50.00	50.00	0.00	1
6915.63	81.00	81.00	0.00	1
6916.38	112.00	112.00	0.00	1
6917.11	143.00	143.00	0.00	1
6917.92	174.00	174.00	0.00	1
6918.71	200.00	200.00	0.00	1
6919.98	236.00	236.00	0.00	1
6920.19	267.00	241.32	25.39	7
6920.32	298.00	244.36	53.28	5
6920.42	329.00	246.91	81.98	5
6920.51	360.00	249.14	110.62	4
6920.00	236.39	236.39	0.00	Overtopping

Rating Curve Plot for Crossing: Fut Owl Place (Basin MT060)



**Table 2 - Culvert Summary Table: Fut Owl Play & Private Drive (Basin MT060)**

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
50.00	50.00	6914.74	2.736	1.617	1-S2n	1.423	1.981	1.579	0.190	9.397	2.603
81.00	81.00	6915.63	3.629	2.407	1-S2n	1.831	2.549	2.076	0.253	10.511	3.148
112.00	112.00	6916.38	4.376	3.204	1-S2n	2.187	3.020	2.501	0.308	11.402	3.576
143.00	143.00	6917.11	5.110	4.042	5-S2n	2.517	3.426	2.884	0.356	12.191	3.934
174.00	174.00	6917.92	5.922	5.542	5-S2n	2.836	3.780	3.238	0.400	12.932	4.246
200.00	200.00	6918.71	6.706	6.201	5-S2n	3.104	4.037	3.518	0.435	13.548	4.482
236.00	236.00	6919.98	7.985	7.204	5-S2n	3.493	4.329	3.883	0.480	14.427	4.779
267.00	241.32	6920.19	8.194	7.361	5-S2n	3.553	4.366	3.936	0.517	14.556	5.012
298.00	244.36	6920.32	8.316	7.452	5-S2n	3.588	4.386	3.966	0.552	14.630	5.229
329.00	246.91	6920.42	8.419	7.529	5-S2n	3.618	4.403	3.991	0.585	14.696	5.432
360.00	249.14	6920.51	8.511	7.596	5-S2n	3.645	4.417	4.012	0.617	14.755	5.623

\*\*\*\*\*

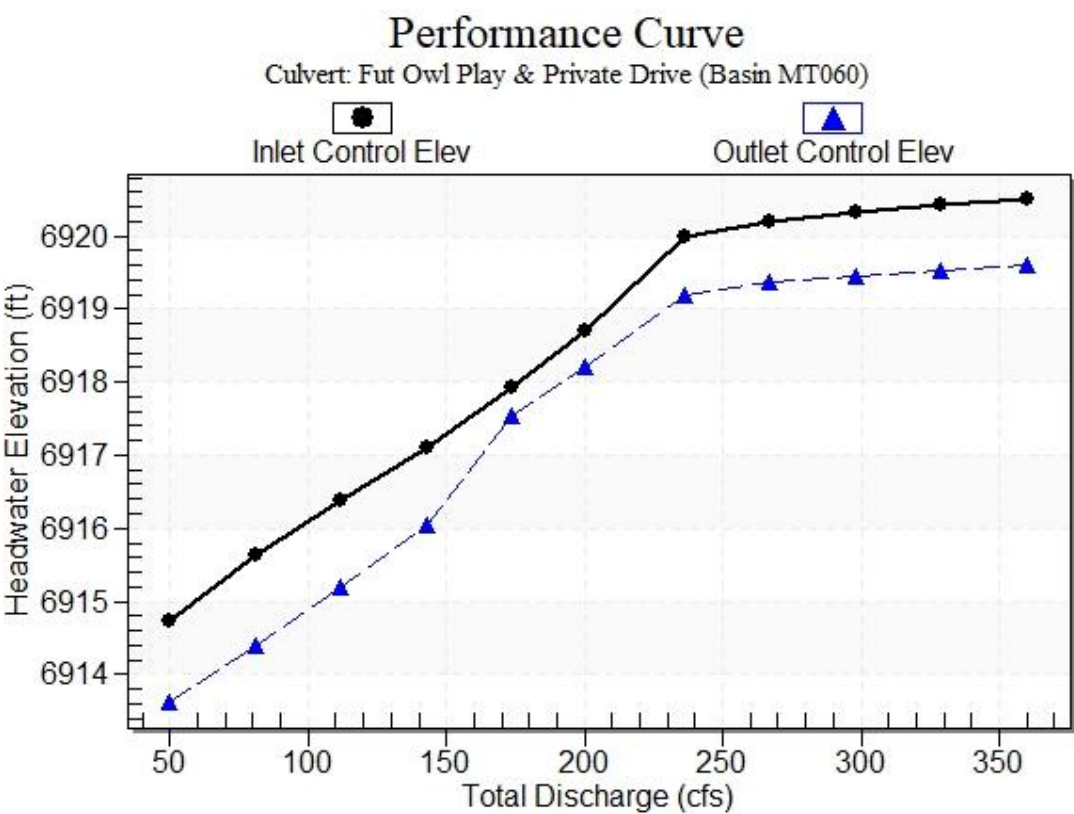
Straight Culvert

Inlet Elevation (invert): 6912.00 ft,    Outlet Elevation (invert): 6911.50 ft

Culvert Length: 50.00 ft,    Culvert Slope: 0.0100

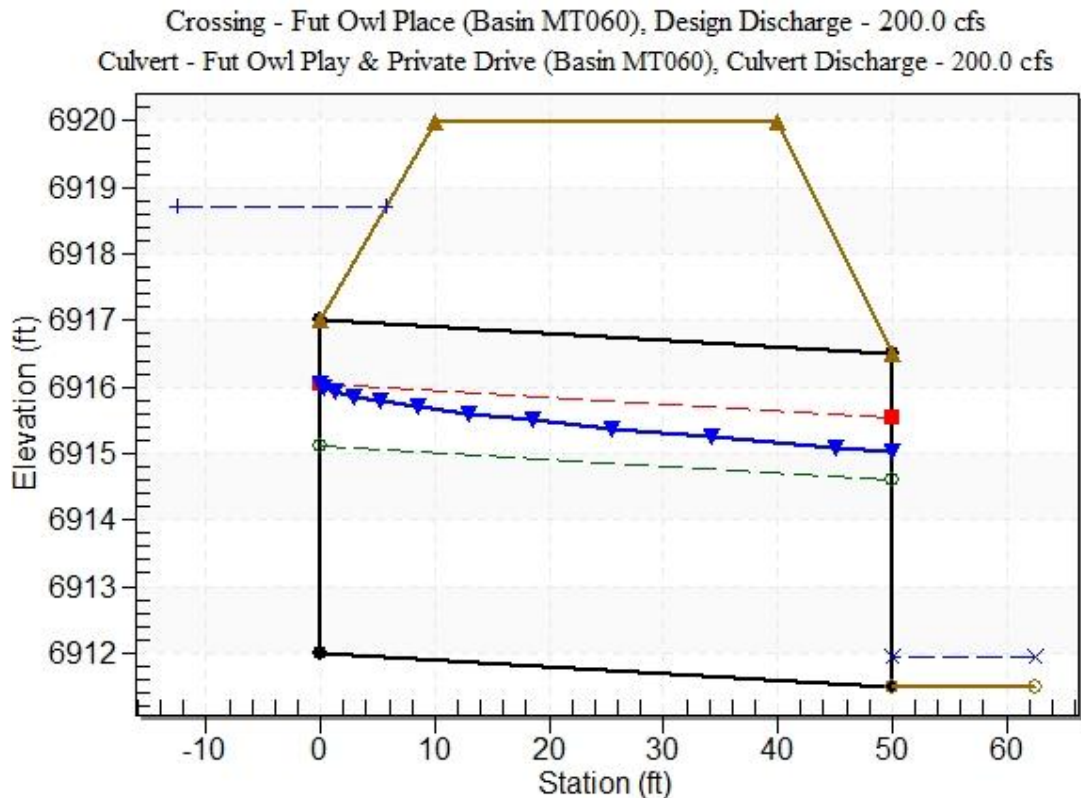
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Culvert Performance Curve Plot: Fut Owl Play & Private Drive (Basin MT060)





## Water Surface Profile Plot for Culvert: Fut Owl Play & Private Drive (Basin MT060)



### Site Data - Fut Owl Play & Private Drive (Basin MT060)

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 6912.00 ft

Outlet Station: 50.00 ft

Outlet Elevation: 6911.50 ft

Number of Barrels: 1

### Culvert Data Summary - Fut Owl Play & Private Drive (Basin MT060)

Barrel Shape: Circular

Barrel Diameter: 5.00 ft

Barrel Material:

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Grooved End Projecting

Inlet Depression: None

**Table 3 - Downstream Channel Rating Curve (Crossing: Fut Owl Place (Basin MT060))**

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
50.00	6911.69	0.19	2.60	0.41	1.06
81.00	6911.75	0.25	3.15	0.55	1.11
112.00	6911.81	0.31	3.58	0.67	1.15
143.00	6911.86	0.36	3.93	0.78	1.17
174.00	6911.90	0.40	4.25	0.87	1.20
200.00	6911.93	0.43	4.48	0.95	1.21
236.00	6911.98	0.48	4.78	1.05	1.23
267.00	6912.02	0.52	5.01	1.13	1.25
298.00	6912.05	0.55	5.23	1.20	1.26
329.00	6912.09	0.59	5.43	1.28	1.27
360.00	6912.12	0.62	5.62	1.35	1.28

**Tailwater Channel Data - Fut Owl Place (Basin MT060)**

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 100.00 ft

Side Slope (H:V): 6.00 (\_:1)

Channel Slope: 0.0350

Channel Manning's n: 0.0350

Channel Invert Elevation: 6911.50 ft

**Roadway Data for Crossing: Fut Owl Place (Basin MT060)**

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 6920.00 ft

Roadway Surface: Paved

Roadway Top Width: 30.00 ft

Conceptual

Added

## Channel P&P's and Details















DBPS CHANNEL P&P SHEETS ADDED BACK IN

DROP HEIGHT VARIES WITH CHANNEL SLOPE

EXISTING GRADE

ROCK CROSS VANE OR RIFFLE DROP STRUCTURE

**Profile**

100-YEAR FLOOD  $\nabla$

LOW FLOW CHANNEL

**Section**



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Colorado Springs, CO 80920  
Phone 719-575-0100  
Fax 719-575-0208

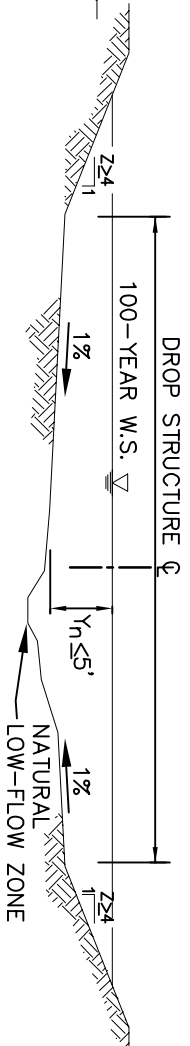


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PLOT DATE: Wed Dec 21, 2011 3:03pm

**Natural Channel with  
Grade Control Structures**

**Figure 5-4**



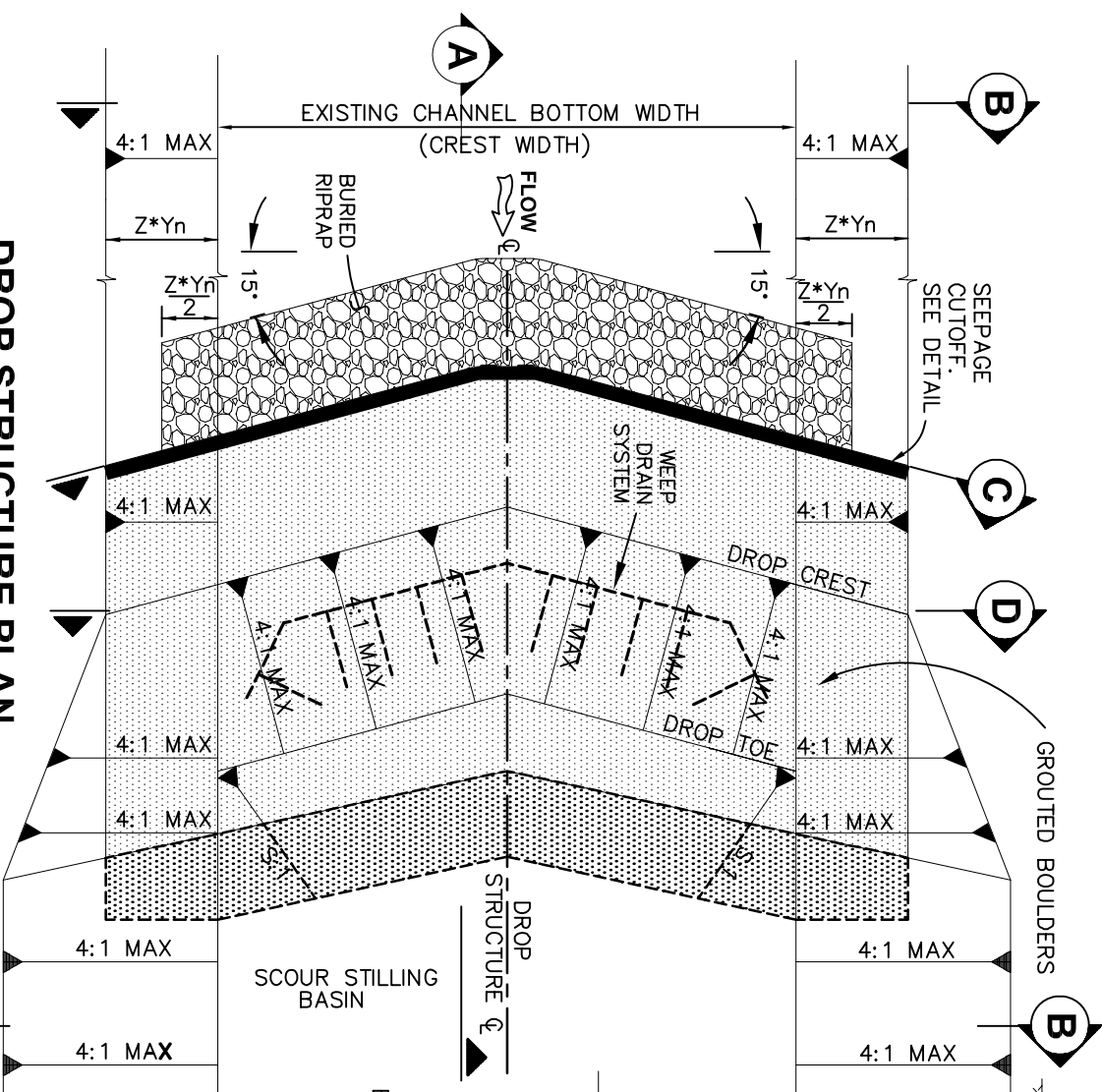


**TYPICAL CHANNEL SECTION  
(UPSTREAM AND DOWNSTREAM OF DROP)**

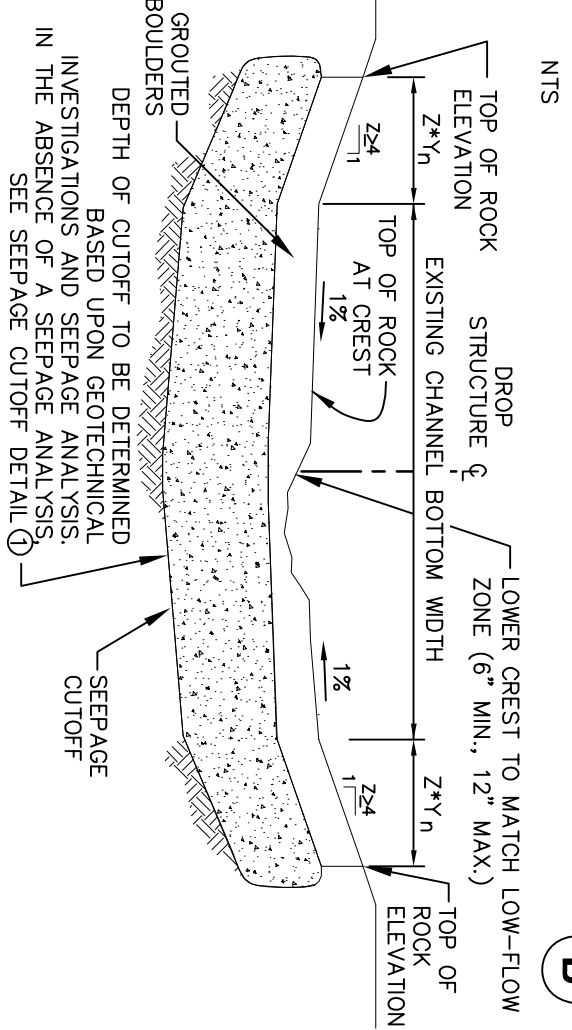
REACH	CREST WIDTH (FT)
RET020	18
RET030	21
RET040	23
RET100	28
RET110	28
RET152	29
RET156	30
RET162	30
RMTO50	23
RMTO62	20
RMTO64	24
RMTO102	27
RMTO104	15
RMTO106	27
RMTO112	27
RMTO114	27
RMTO54	22
RMTO80	19
RMTO92	25
RMTO94	26
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RMTO124	27
RMTO174	22
RMTO234	19
RMTO296	32
RMTO354	38
RMTO372	38



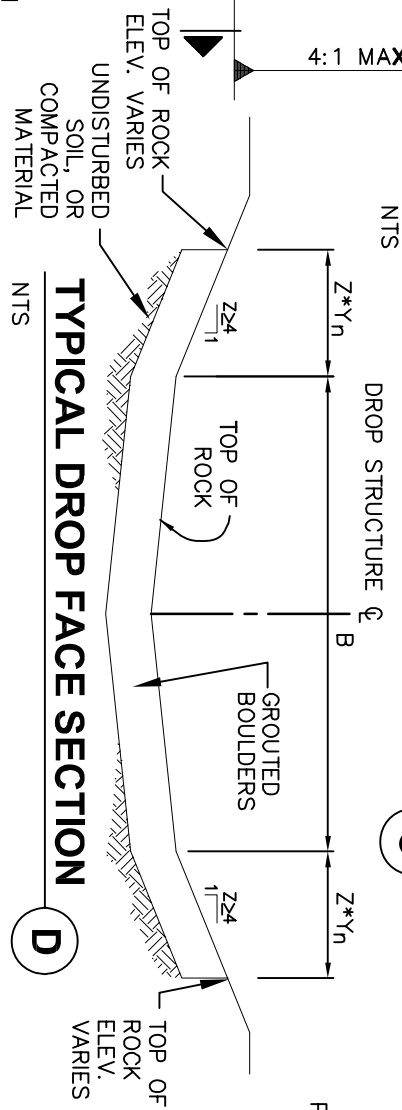
**CONSTRUCTED GROUDED SLOPING BOULDER  
DROP STRUCTURE**



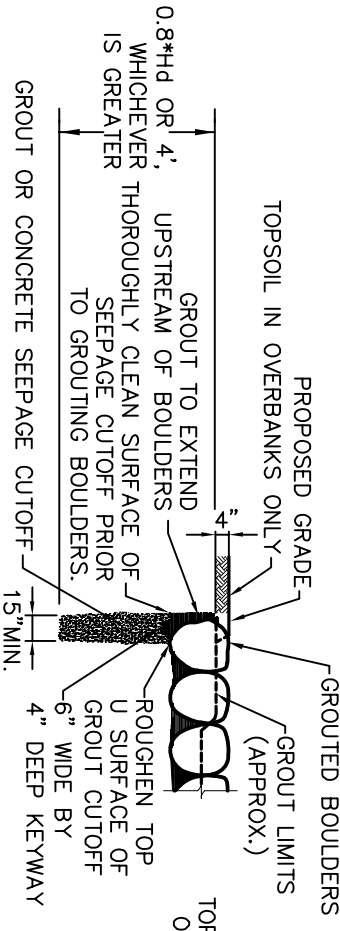
**DROP STRUCTURE PLAN**



**SEEPAGE CUTOFF SECTION**



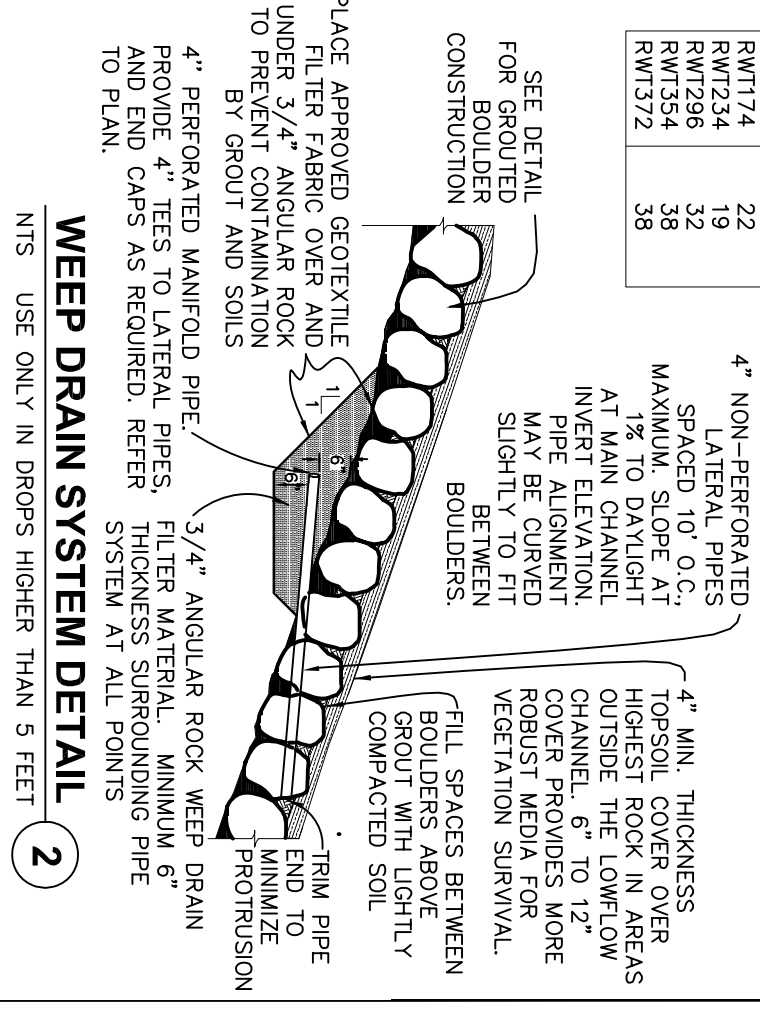
**TYPICAL DROP FACE SECTION**



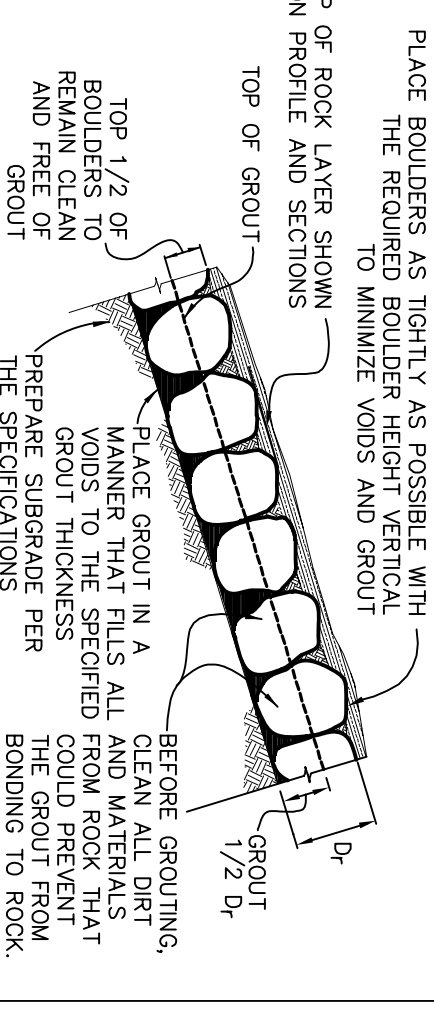
**SEEPAGE CUTOFF DETAIL**

**TYPICAL GROUDED SLOPING (GSB)**

**BOULDER DROP STRUCTURE**



**WEEP DRAIN SYSTEM DETAIL**



**GROUDED BOULDER PLACEMENT DETAIL**



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Fax 719-575-0208

NAME: S:\10122003 (Falcon DPRS)\DWG\EURY-GSBD5-AS FLOWsheet.dwg  
PLOT DATE: Tue Jun 18, 2013 11:38am

NOT FOR CONSTRUCTION



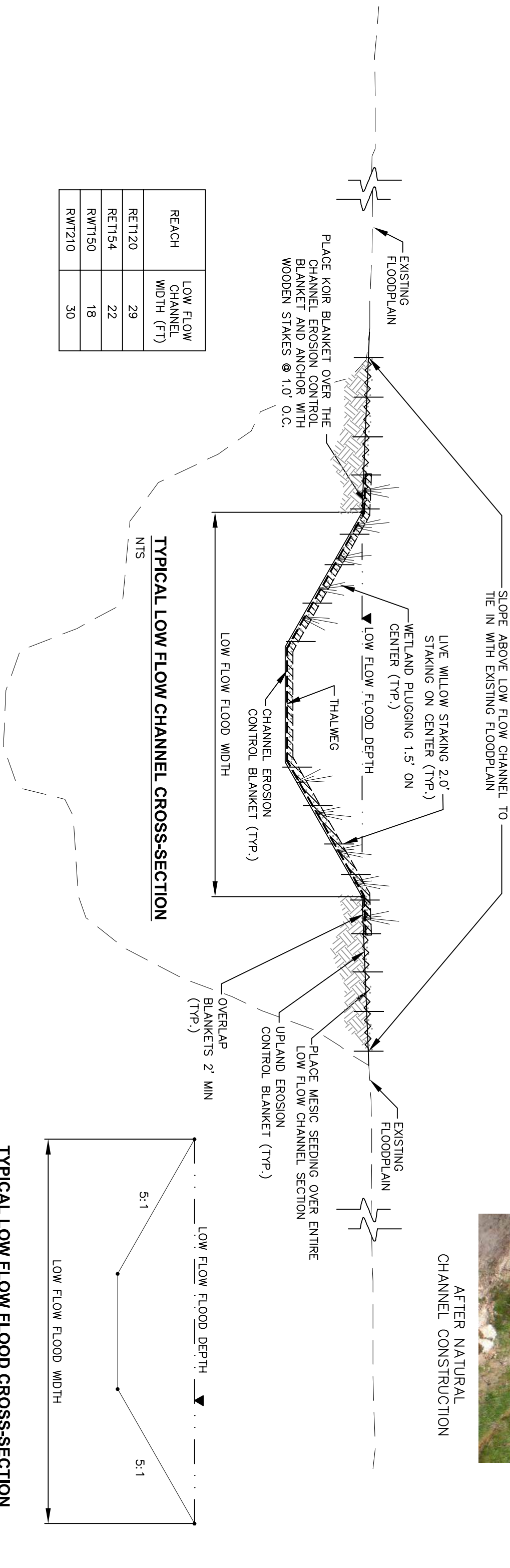
- NOTES:
- 1.) REACHES THAT ARE CURRENTLY DEGRADED MUST BE FILLED TO THE EXISTING FLOODPLAIN ELEVATION. THE LOW FLOW CHANNEL SHALL THEN BE CUT OUT OF THE FILL MATERIAL.
  - 2.) DIMENSIONS SHOWN ARE TYPICAL AND VARY WITH THE LOW FLOW CHANNEL WIDTH.
  - 3.) ALL CHANNEL CROSS-SECTIONS SHALL HAVE A LOW FLOW FLOOD WIDTH TO DEPTH RATIO (W/D) OF 23.
  - 4.) CHANNEL CAPACITY VARIES WITH THE LOW FLOW CHANNEL WIDTH AND SLOPE.
  - 5.) THESE CROSS-SECTIONS SHALL ONLY BE APPLIED TO "NATURAL CHANNEL DESIGN" REACHES.



BEFORE NATURAL  
CHANNEL CONSTRUCTION

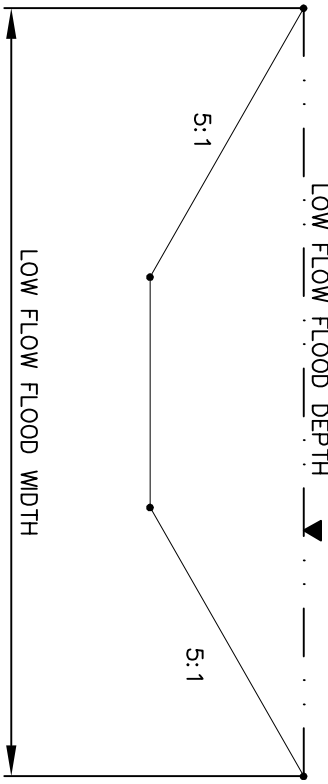


AFTER NATURAL  
CHANNEL CONSTRUCTION



REACH	LOW FLOW CHANNEL WIDTH (FT)
RET120	29
RET154	22
RWT150	18
RWT210	30

TYPICAL LOW FLOW FLOOD CROSS-SECTION



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NAME: S:\10122\003 (Falcon DBPS)\DWG\XSEC-RCVANE-ROSEamb1.dwg  
POP: Morkacib  
PLOT DATE: Tue Jun 18, 2013 11:46pm

# TYPICAL NATURAL CHANNEL CROSS-SECTIONS

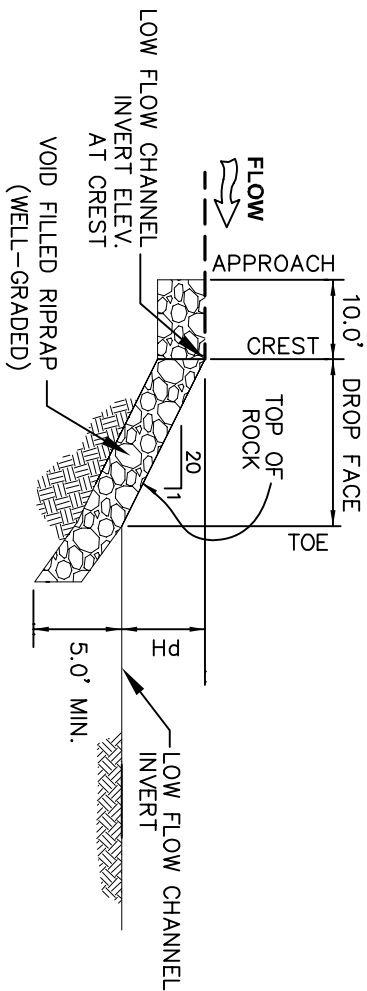
FOR USE IN NATURAL CHANNEL DESIGN REACHES

NOT FOR CONSTRUCTION





CONSTRUCTED RIFFLE DROP STRUCTURE

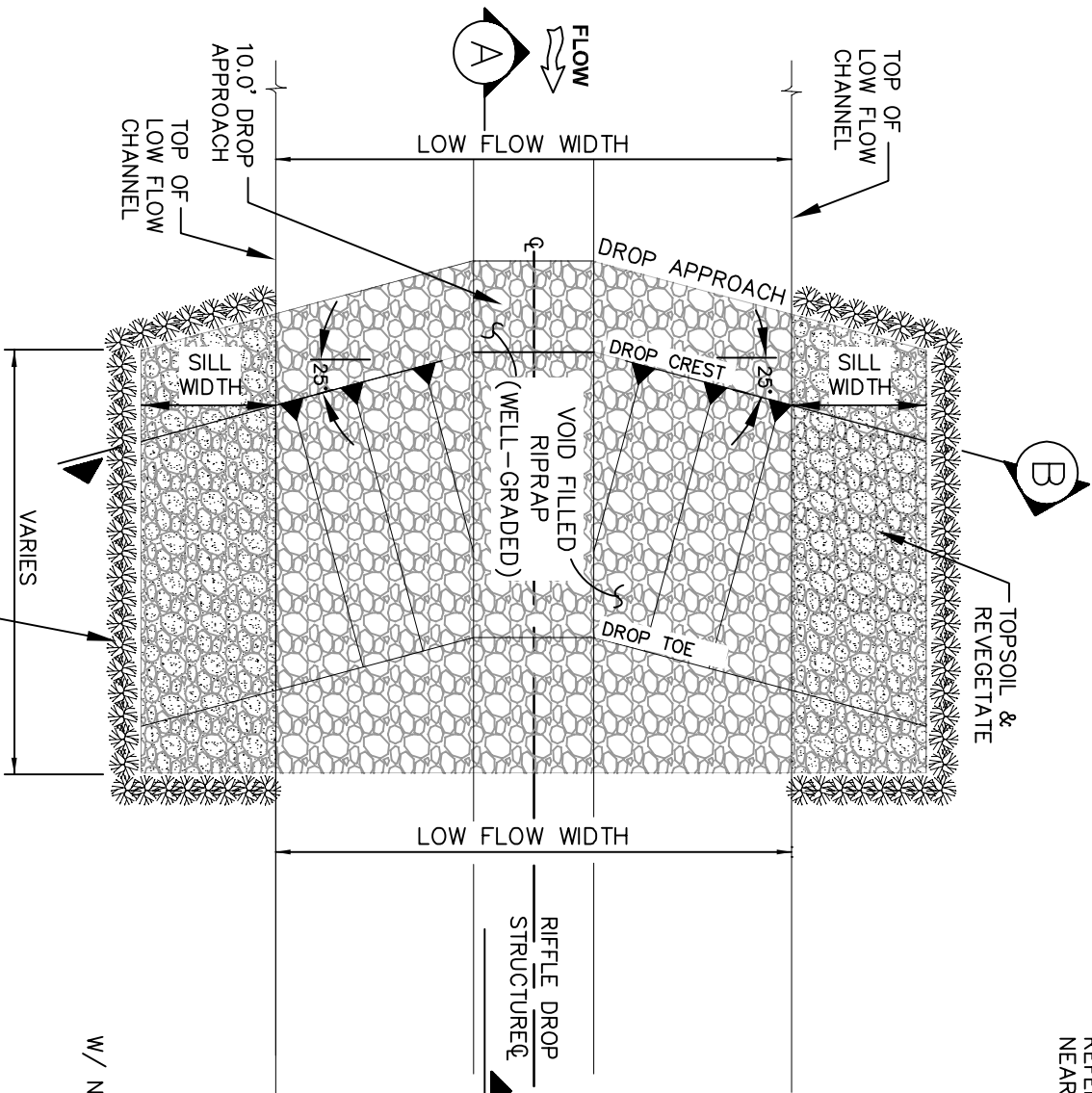


NOTE:  
REFER TO EROSION CONTROL  
BLANKET DETAIL FOR  
BLANKET INSTALLATION.

NOTE:  
REFER TO EROSION CONTROL BLANKET DETAIL FOR BLANKET INSTALLATION  
NEAR STRUCTURES.

### RIFFLE DROP STRUCTURE PROFILE A

NTS

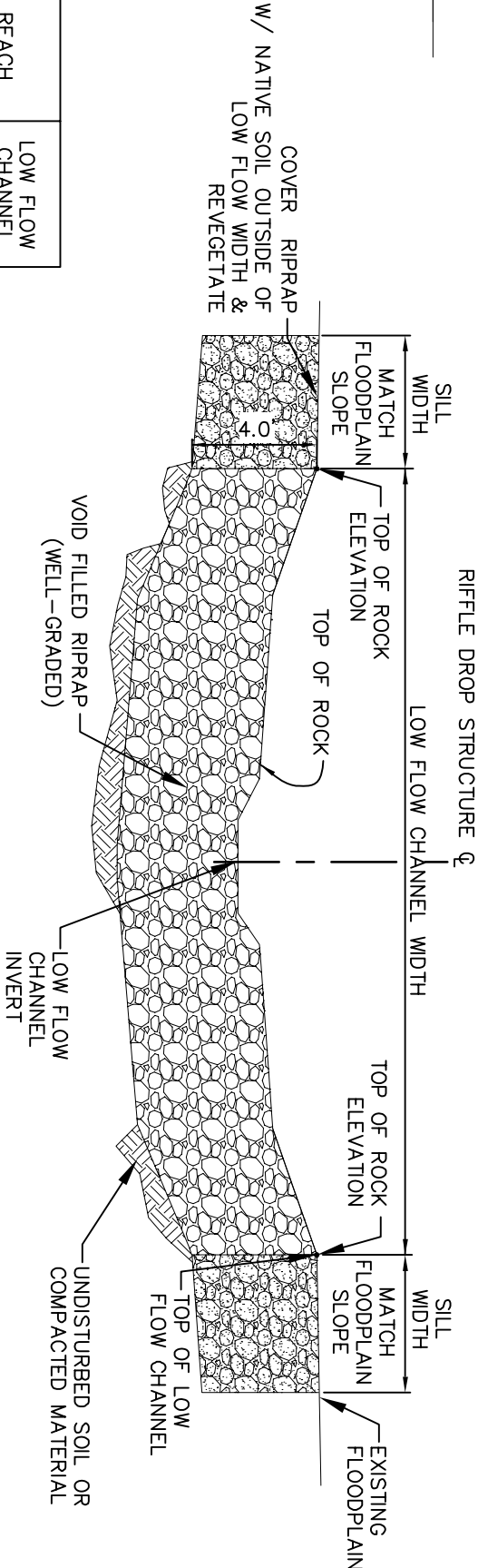


RIFFLE DROP  
STRUCTURE

REACH	LOW FLOW CHANNEL WIDTH (FT)
RET1120	29
RET1154	22
RWT150	18
RWT210	30

### RIFFLE DROP STRUCTURE SECTION B

NTS



RIFFLE DROP STRUCTURE SECTION

NTS

### RIFFLE DROP STRUCTURE PLAN

NTS

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PLOT DATE: Tue Jun 18, 2013 1:49pm



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Colorado Springs, CO 80920  
Phone 719-575-0100  
Fax 719-575-0208

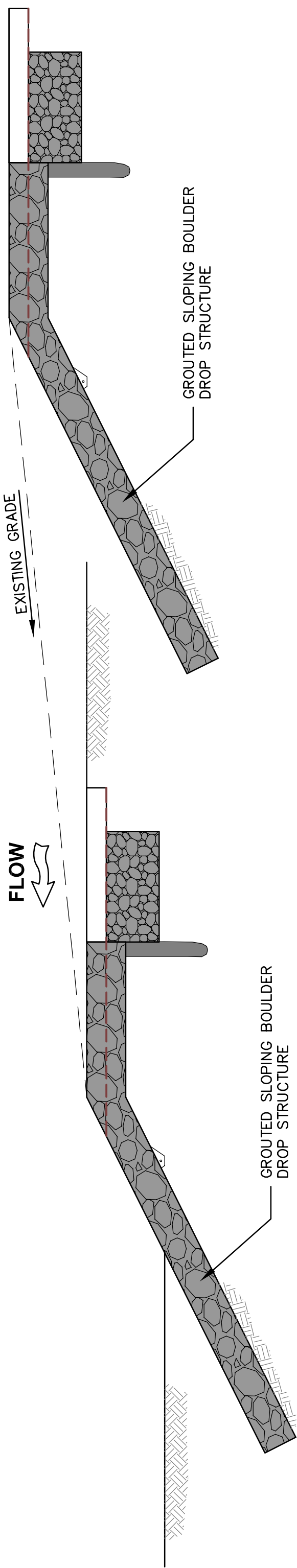
**TYPICAL RIFFLE DROP STRUCTURE**  
FOR USE IN NATURAL CHANNEL DESIGN REACHES

NOT FOR CONSTRUCTION

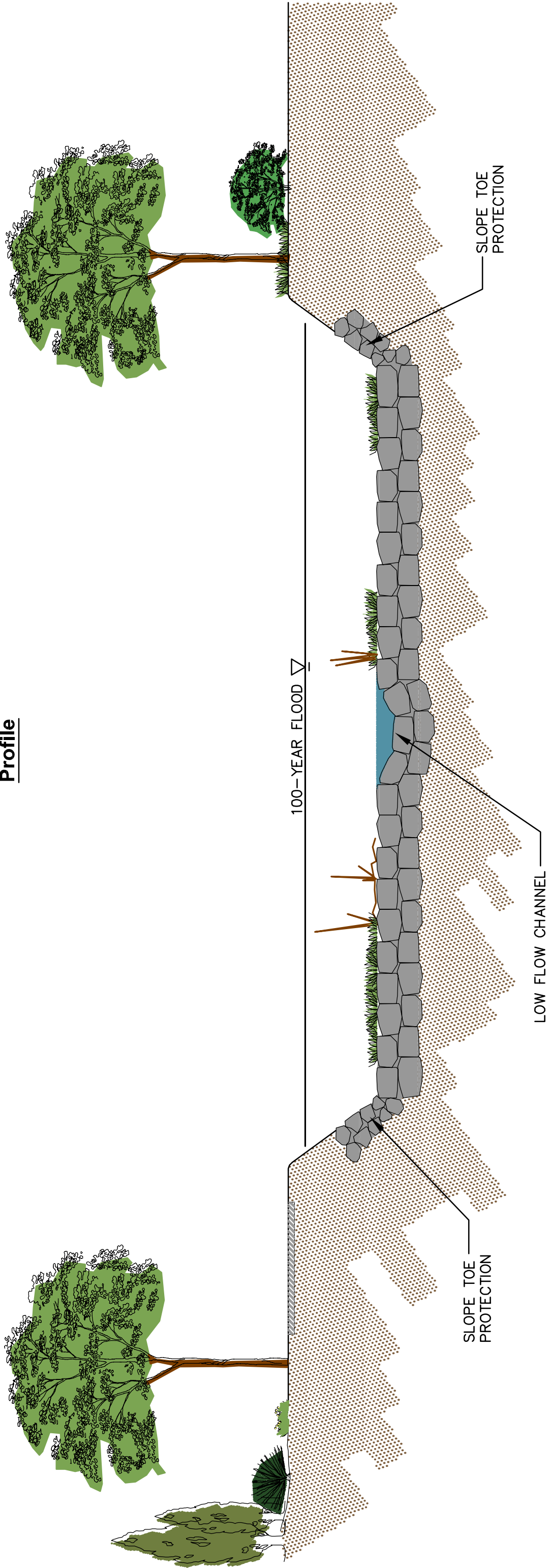









**Profile**




**Section**

NAME: S:\10.122.003 (Falcon DBPS)\DMC\Channel\_sec-pro\_exhibit.dwg  
PCP: Matrix.ctb  
PLOT DATE: Wed Dec 21, 2011 3:03pm



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Colorado Springs, CO 80920  
Phone 719-575-0100  
Fax 719-575-0208

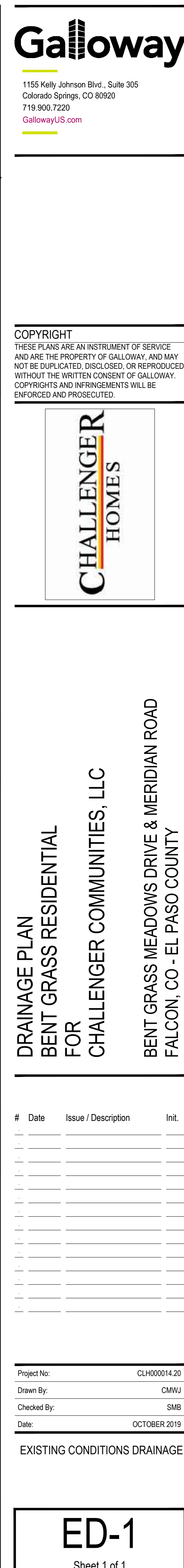


**Small Drop Structures  
with Toe Protection**

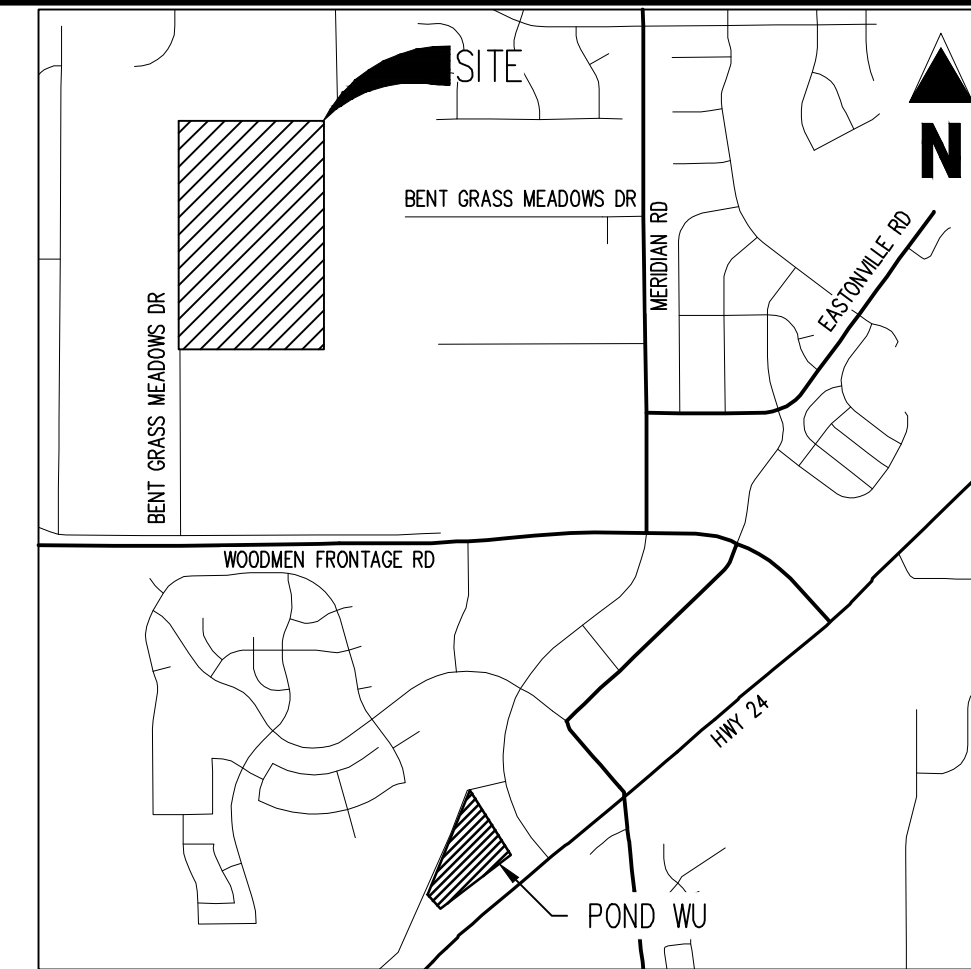
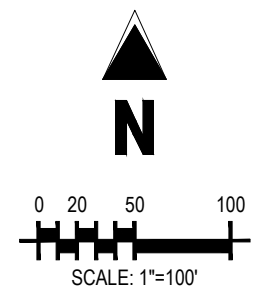
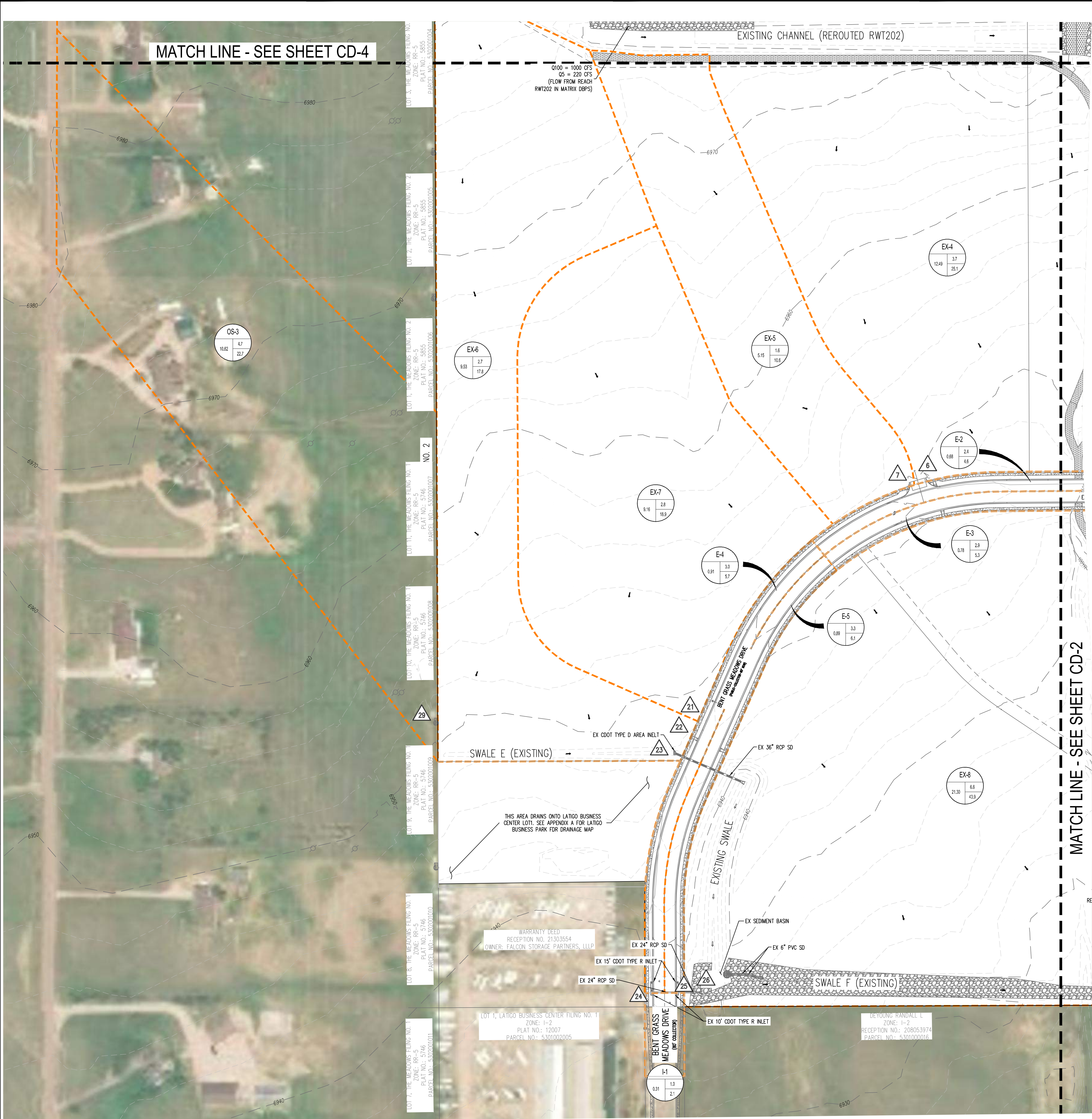
**Figure 5-5**

**APPENDIX D**  
**Drainage Maps**

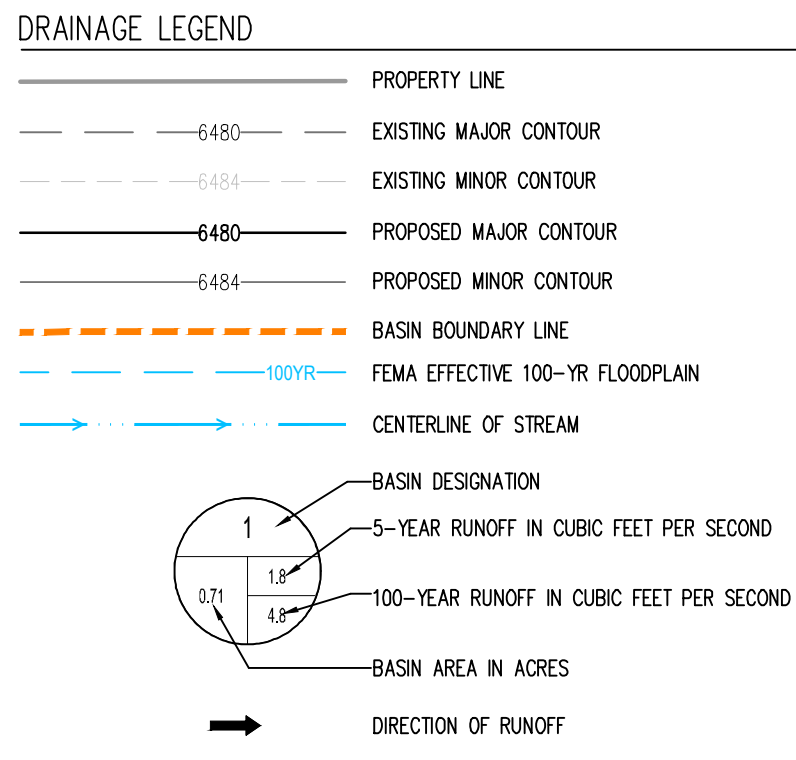








VICINITY MAP  
1"=2,000'



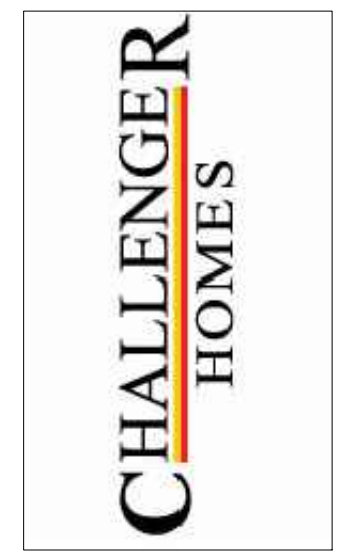
RUNOFF SUMMARY TABLE

Basin ID	Area (acres)	Q <sub>5</sub> (cfs)	Q <sub>100</sub> (cfs)
RWT202	1574.40	220.0	1000.0
RWT204	38.40	7.0	43.0
WT200	192.00	52.0	190.0
OS-2	20.08	9.0	43.4
OS-3	10.62	4.7	22.7
OS-25	14.13	5.1	29.0
OS-26	5.81	1.9	12.6
H5	11.30	2.1	13.1
OS-22	4.42	1.5	9.7
OS-23	10.24	3.3	22.5
C1a	0.48	1.8	3.4
C1b	0.88	3.3	6.2
C1c	1.09	4.1	7.8
D1a	0.56	1.6	3.5
D1b	0.68	2.0	4.2
D1c	1.20	3.2	6.6
D1d	2.79	6.7	13.6
C2a	1.20	2.9	6.0
C2b	0.99	3.3	6.0
D2a	1.00	1.8	4.8
D2b	0.41	1.0	2.3
H1a	0.40	1.0	2.3
H1b	2.52	4.3	9.9
H1c	0.16	0.4	0.9
H2a	1.09	1.7	4.2
H2b	0.15	0.3	0.7
F	1.37	2.6	5.9
G	1.70	2.7	5.6
H3	1.54	3.2	6.4
H4	0.42	1.0	1.9
H	3.00	6.6	13.2
I2	1.70	3.9	7.7
J	1.64	3.0	6.8
K	1.00	1.8	4.2
L	5.90	18.5	33.2
M1	1.56	5.9	10.4
M2	0.44	1.9	3.5
N	1.32	5.3	9.4
D	0.41	1.8	3.0
OS-1	32.28	15.1	85.1
OS-4	4.46	5.6	14.0
OS-5	0.46	1.1	2.3
OS-6	1.17	2.0	4.3
A-1	2.70	3.3	8.6
A-2	1.19	1.5	4.2
A-3	1.57	2.1	5.0
A-4	2.24	2.9	7.5
C-1	1.35	2.6	5.9
C-2	6.80	7.1	18.5
C-3	2.38	3.3	7.8
C-4	3.61	5.3	12.0
C-5	7.86	10.9	24.9
C-6	5.54	7.0	16.9
C-7	0.89	0.3	2.1
C-8	0.42	0.2	1.0
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
E-6	0.44	0.6	1.6
F-2	0.55	1.5	3.1
G-1	1.47	1.3	4.5
H-1	0.52	0.2	1.4
H	0.31	1.0	2.1
EX-1	1.19	0.4	2.5
EX-2	1.56	0.5	3.7
EX-3	0.62	0.2	1.5
EX-4	12.49	3.7	25.1
EX-5	5.15	1.6	10.6
EX-6	9.53	2.7	17.8
EX-7	9.16	2.8	18.9
EX-8	21.30	6.6	43.9
P-1	2.03	4.2	8.7

DESIGN POINT SUMMARY TABLE

Design Point	Q <sub>5</sub> (cfs)	Q <sub>100</sub> (cfs)
40	277.8	1226.8
1	3.1	8.6
2	4.3	11.9
3	5.9	15.9
4	8.3	22.3
5	1.5	10.5
6	3.5	34.4
7	2.9	5.5
8	11.2	32.7
9	0.7	1.5
10	1.0	3.9
11	5.3	13.9
12	1.9	4.4
13	7.1	17.9
14	8.1	23.8
15	18.3	54.1
15A	12.2	37.0
AA	268.8	1181.4
BB	268.3	1176.5
16	12.7	30.2
17	8.1	20.5
18	10.6	32.2
19	9.5	29.7
20	1.3	4.6
20A	18.6	58.7
21	21.3	66.0
28	8.6	42.8
29	12.2	60.9
21	2.7	18.7
22	2.5	29.6
23	11.5	57.6
24	3.2	18.0
25	3.3	10.7
26	15.1	73.2
27A	6.3	43.7
27B	0.2	1.0
CC	278.8	1224.7
30	2.7	63.4
31	5.1	80.9
32	6.5	65.0
32-N	6.5	33.2
32-S	0.6	33.2
BG 1a-OS	0.0	0.0
BG 1a-OSw	0.0	0.0
BG 1a-OSw	0.0	0.0
BG 4a	0.4	0.9
BG 1b	0.8	1.7
BG 1c	2.1	4.4
BG 1	5.2	11.0
BG 2a	1.8	5.0
BG 2w	1.0	2.4
BG 2	2.8	7.3
BG 4a	0.4	0.9
BG 4w	2.4	5.7
BG 4	2.6	6.1
BG 5a	0.3	0.7
BG 5w	1.7	4.2
BG 5	1.9	4.7
BG 3	7.6	18.6
BG 6	3.5	8.4
BG POND1	0.5	22.0
BG 14a	13.0	63.8
BG 15a	12.6	62.2
BG 50	280.0	850.0
BG 20	303.7	961.8
BG 14a	1.5	36.4
BG 15a	3.0	38.5
BG 21	306.3	1007.0
BG 32	2.6	6.1
BG 33	2.9	7.0
BG 7	3.1	6.4
BG 8	1.0	2.0
BG 9	6.5	13.4
BG 10	3.8	7.9
BG 11	13.5	27.8
BG 12	5.8	10.7
BG 13	7.0	13.0
BG 14	12.3	22.8
BG 15	42.2	82.0
BG POND2	0.4	10.0
BG 30	3.0	5.0
BG 31	1.8	3.1
BG 25	255.5	837.4

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**DRAINAGE PLAN**  
**BENT GRASS RESIDENTIAL FILING NO. 2**  
**FOR**  
**CHALLENGER COMMUNITIES, LLC**  
**BENT GRASS MEADOWS DRIVE & MERIDIAN ROAD**  
**FALCON, CO - EL PASO COUNTY**

#	Date	Issue / Description	Init.
1			
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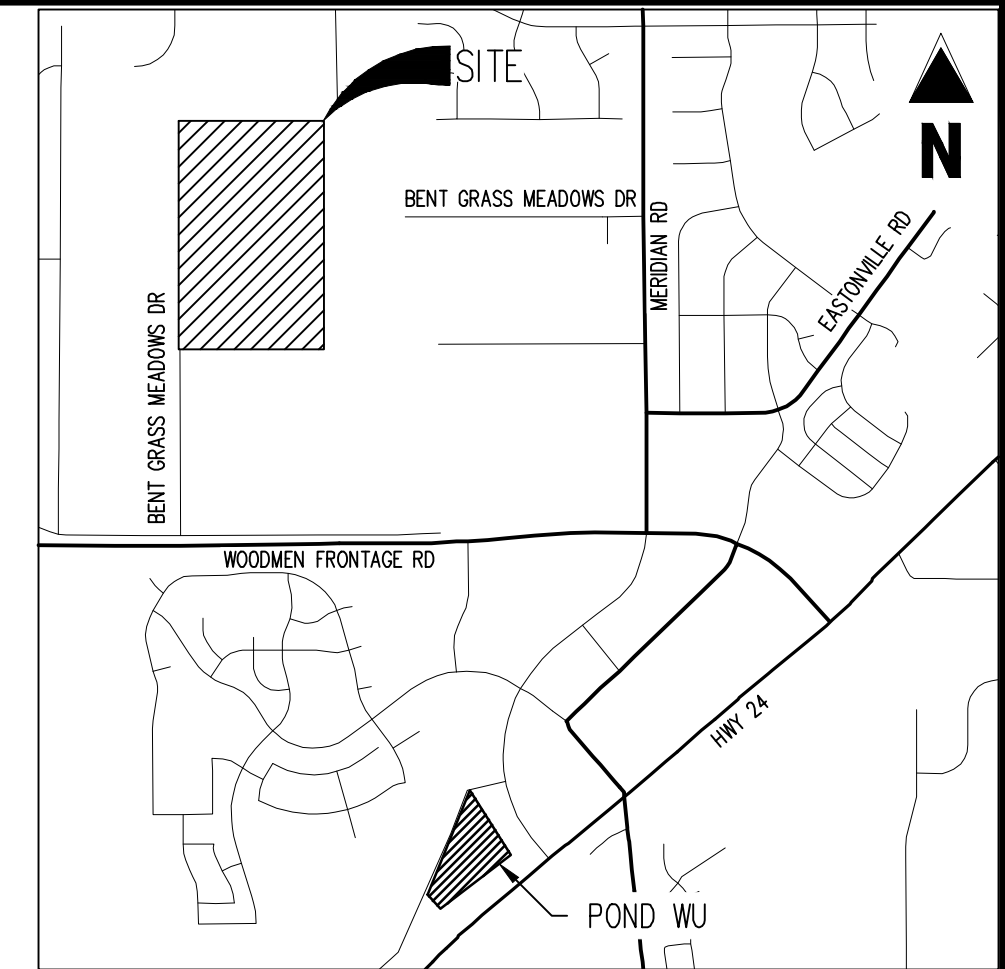
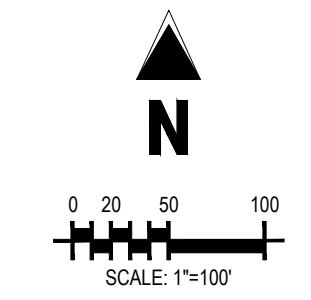
Project No: CLH000014.20  
Drawn By: CMWJ  
Checked By: SMB  
Date: OCTOBER 2019

CURRENT CONDITIONS DRAINAGE MAP

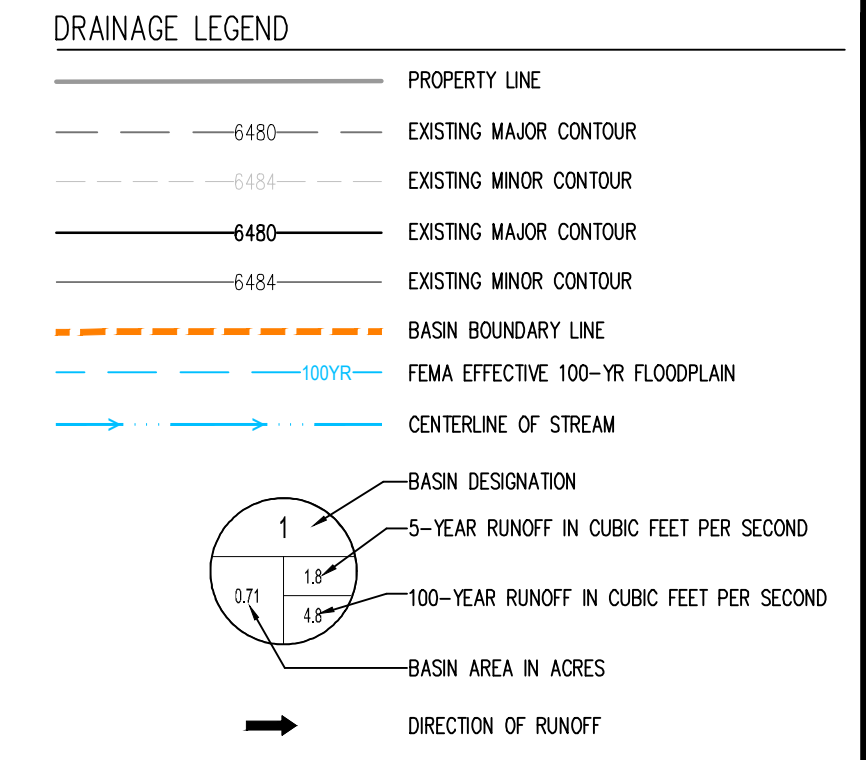








VICINITY MAP  
1"=2,000'



RUNOFF SUMMARY  
TABLE

Basin	ID	Area (acres)	Q <sub>s</sub> (cfs)	Q <sub>100</sub> (cfs)
RWT202	157.4	40	277.8	1228.6
RWT204	38.40	7.0	43.0	
WT200	192.00	52.0	190.0	
OS-2	20.08	9.0	43.4	
OS-3	10.62	4.7	22.7	
OS-25	14.13	5.1	29.0	
OS-26	5.81	1.9	12.6	
H5	11.30	2.1	13.1	
OS-22	4.42	1.5	9.7	
OS-23	10.24	3.3	22.5	
C1a	0.48	1.8	3.4	
C1b	0.88	3.3	6.2	
C1c	1.09	4.1	7.8	
D1a	0.56	1.6	3.5	
D1b	0.68	2.0	4.2	
D1c	1.20	3.2	6.6	
D1d	2.79	6.7	13.6	
C2a	1.26	2.9	6.0	
C2b	0.99	3.3	6.0	
D2a	1.00	1.8	4.8	
D2b	0.41	1.0	2.3	
H1a	0.40	1.0	2.3	
H1b	2.52	4.3	9.9	
H1c	0.16	0.4	0.9	
H2a	1.09	1.7	4.2	
H2b	0.15	0.3	0.7	
F	1.37	2.6	5.9	
G	1.70	2.7	5.6	
H3	1.54	3.2	6.4	
H4	0.42	1.0	1.9	
H	3.00	6.6	13.2	
I2	1.70	3.9	7.7	
J	1.64	3.0	6.8	
K	1.00	1.8	4.2	
L	5.90	18.5	33.2	
M1	1.56	5.9	10.4	
M2	0.44	1.9	3.5	
N	1.32	5.3	9.4	
D	0.41	1.8	3.0	
OS-1	32.28	15.1	65.1	
OS-4	4.46	5.6	14.0	
OS-5	0.46	1.1	2.3	
OS-6	1.17	2.0	4.3	
A-1	2.70	3.3	8.6	
A-2	1.19	1.5	4.2	
A-3	1.57	2.1	5.0	
A-4	2.24	2.9	7.5	
C-1	1.35	2.6	5.9	
C-2	6.80	7.1	18.5	
C-3	2.38	3.3	7.8	
C-4	3.61	5.3	12.0	
C-5	7.96	10.9	24.9	
C-6	5.54	7.0	16.9	
C-7	0.89	0.3	2.1	
C-8	0.42	0.2	1.0	
E-1	1.71	3.6	7.7	
E-2	0.88	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	
F-1	0.44	0.6	1.6	
F-2	0.55	1.5	3.1	
G-1	1.47	1.3	4.5	
H-1	0.52	0.2	1.4	
H-1	0.31	1.0	2.1	
EX1	1.19	0.4	2.5	
EX2	1.56	0.5	3.7	
EX3	0.62	0.2	1.5	
EX4	12.49	3.7	25.1	
EX5	5.15	1.6	10.6	
EX6	9.53	2.7	17.8	
EX7	9.16	2.8	18.9	
EX8	21.30	6.6	43.9	
P-1	2.03	4.2	8.7	

DESIGN POINT  
SUMMARY TABLE

Design Point	Q <sub>s</sub> (cfs)	Q <sub>100</sub> (cfs)
40	277.8	1228.6
1	3.1	8.6
2	4.3	11.9
3	5.9	15.9
4	8.3	22.3
5	1.5	10.5
6	3.5	34.4
7	2.9	5.5
8	11.2	32.7
9	0.7	1.5
10	1.0	3.9
11	5.3	13.9
12	1.9	4.4
13	7.1	17.9
14	8.1	23.8
15	18.3	54.1
15A	12.2	37.0
AA	268.8	1181.4
BB	268.3	1176.5
16	12.7	30.2
17	8.1	20.5
18	10.6	32.2
19	9.5	29.7
20	1.3	4.6
20A	18.6	58.7
20B	21.3	66.0
28	8.6	42.8
29	12.2	60.9
21	2.7	18.7
22	2.5	29.6
23	11.5	57.6
24	3.2	18.0
25	3.3	10.7
26	15.1	73.2
27A	6.3	43.7
27B	0.2	1.0
CC	278.8	1224.7
30	2.7	63.4
31	5.1	60.9
32	6.5	65.0
32N	6.5	33.2
32S	0.6	33.2
BG 1a-0s	0.0	0.0
BG 1a-0sw	0.0	0.0
BG 1a-0sw	0.0	0.0
BG 4a	0.4	0.9
BG 1b	0.8	1.7
BG 1c	2.1	4.4
BG 1	5.2	11.0
BG 2e	1.8	5.0
BG 2w	1.0	2.4
BG 2	2.8	7.3
BG 4e	0.4	0.9
BG 4w	2.4	5.7
BG 4	2.6	6.1
BG 5e	0.3	0.7
BG 5w	1.7	4.2
BG 5	1.9	4.7
BG 3	7.6	16.6
BG 1	3.5	8.4
BG POND1	0.5	22.0
BG 14n	13.0	63.8
BG 15n	12.6	62.2
BG 50	280.0	850.0
BG 20	303.7	961.8
BG 14s	1.5	38.4
BG 15s	3.0	38.5
BG 21	306.3	1007.0
BG 32	2.6	6.1
BG 33	2.9	7.0
BG 7	3.1	6.4
BG 8	1.0	2.0
BG 9	6.5	13.4
BG 10	3.8	7.9
BG 11	13.5	27.8
BG 12	5.8	10.7
BG 13	7.0	13.0
BG 14	12.3	22.8
BG 15	42.2	82.0
BG POND2	0.4	10.0
BG 30	3.0	5.0
BG 31	1.8	3.1
BG 25	255.5	837.4

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Colorado Springs, CO 80920  
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**DRAINAGE PLAN**  
BENT GRASS RESIDENTIAL FILING NO. 2  
FOR  
CHALLENGER COMMUNITIES, LLC  
BENT GRASS MEADOWS DRIVE & MERIDIAN ROAD  
FALCON, CO - EL PASO COUNTY

#	Date	Issue / Description	Init.
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Project No: CLH000014.20  
Drawn By: CMWJ  
Checked By: SMB  
Date: OCTOBER 2019

CURRENT CONDITIONS DRAINAGE MAP

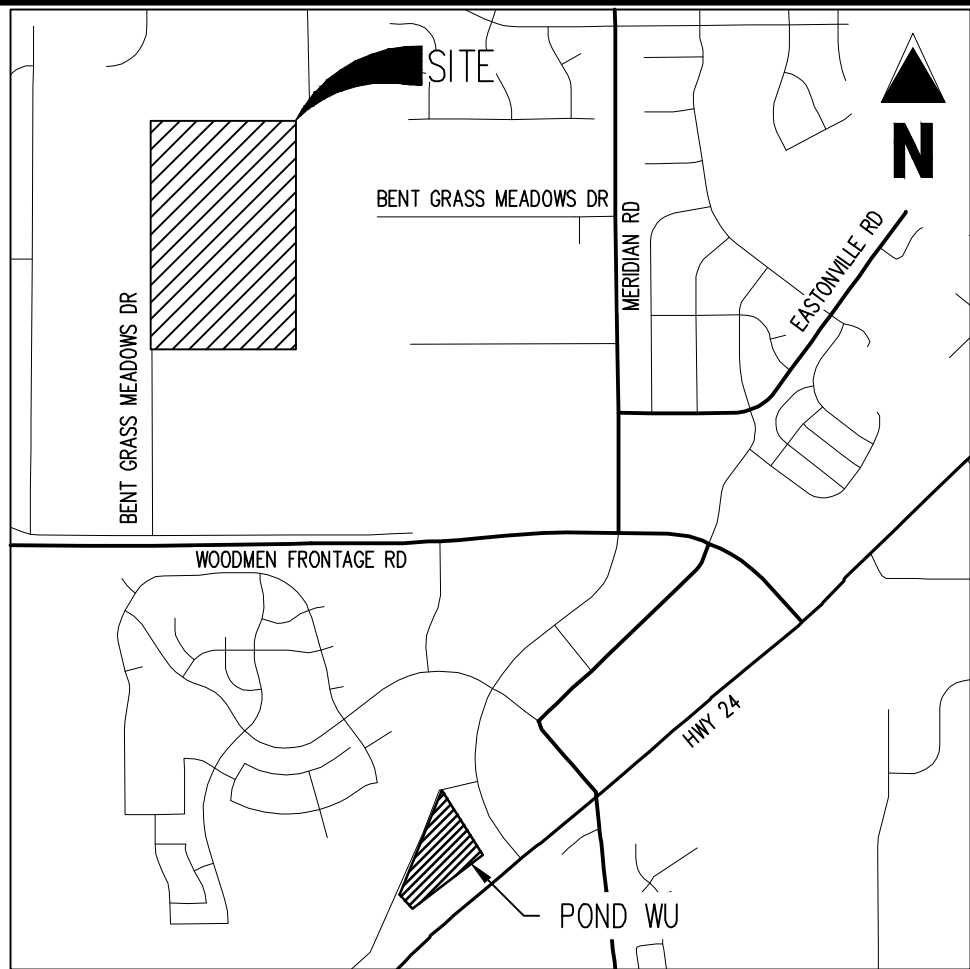
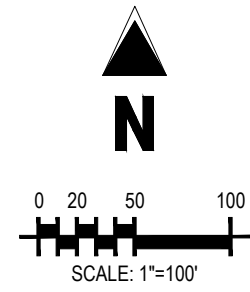
**CD-3**  
Sheet 3 of 5



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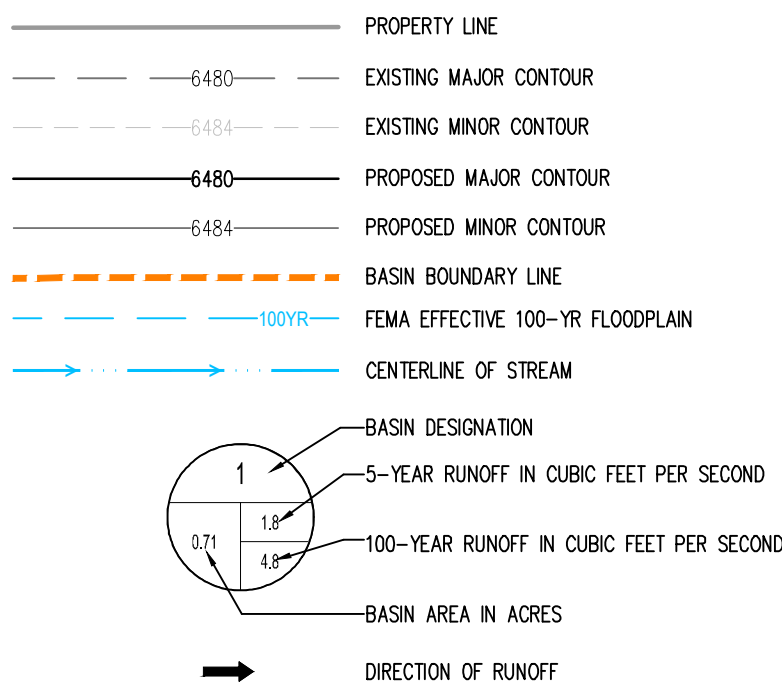


MATCH LINE - SEE SHEET CD-5



VICINITY MAP  
1"=2,000'

DRAINAGE LEGEND



RUNOFF SUMMARY  
TABLE

Basin ID	Area (acres)	Q <sub>s</sub> (cfs)	Q <sub>100</sub> (cfs)
RWT202	1574.40	220.0	1000.0
RWT204	38.40	7.0	43.0
WT200	192.00	52.0	190.0
OS-2	20.08	9.0	43.4
OS-3	10.62	4.7	22.7
OS-25	14.13	5.1	29.0
OS-26	5.81	1.9	12.6
H5	11.30	2.1	13.1
OS-22	4.42	1.5	9.7
OS-23	10.24	3.3	22.5
C1a	0.48	1.8	3.4
C1b	0.88	3.3	6.2
C1c	1.09	4.1	7.8
D1a	0.56	1.6	3.5
D1b	0.68	2.0	4.2
D1c	1.20	3.2	6.6
D1d	2.79	6.7	13.6
C2a	1.26	2.9	6.0
C2b	0.99	3.3	6.0
D2a	1.00	1.8	4.8
D2b	0.41	1.0	2.3
H1a	0.40	1.0	2.3
H1b	2.52	4.3	9.9
H1c	0.16	0.4	0.9
H2a	1.09	1.7	4.2
H2b	0.15	0.3	0.7
F	1.37	2.6	5.9
G	1.70	2.7	5.6
H3	1.54	3.2	6.4
H4	0.42	1.0	1.9
H	3.00	6.6	13.2
I2	1.70	3.9	7.7
J	1.64	3.0	6.8
K	1.00	1.8	4.2
L	5.90	18.5	33.2
M1	1.56	5.9	10.4
M2	0.44	1.9	3.5
N	1.32	5.3	9.4
D	0.41	1.8	3.0
OS-1	32.28	15.1	85.1
OS-4	4.46	5.6	14.0
OS-5	0.46	1.1	2.3
OS-6	1.17	2.0	4.3
A-1	2.70	3.3	8.6
A-2	1.19	1.5	4.2
A-3	1.57	2.1	5.0
A-4	2.24	2.9	7.5
C-1	1.35	2.6	5.9
C-2	6.80	7.1	18.5
C-3	2.38	3.3	7.8
C-4	3.61	5.3	12.0
C-5	7.86	10.9	24.9
C-6	5.54	7.0	16.9
C-7	0.89	0.3	2.1
C-8	0.42	0.2	1.0
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
F-1	0.44	0.6	1.6
F-2	0.55	1.5	3.1
G-1	1.47	1.3	4.5
H-1	0.52	0.2	1.4
H-1	0.31	1.0	2.1
EX-1	1.19	0.4	2.5
EX-2	1.56	0.5	3.7
EX-3	0.62	0.2	1.5
EX-4	12.49	3.7	25.1
EX-5	5.15	1.6	10.6
EX-6	9.53	2.7	17.8
EX-7	9.16	2.8	18.9
EX-8	21.30	6.6	43.9
P-1	2.03	4.2	8.7

DESIGN POINT  
SUMMARY TABLE

Design Point	Q <sub>s</sub> (cfs)	Q <sub>100</sub> (cfs)
40	277.8	1224.8
1	3.1	8.6
2	4.3	11.9
3	5.9	15.9
4	8.5	22.3
5	1.5	10.5
6	3.5	34.4
7	2.9	5.5
8	11.2	32.7
9	0.7	1.5
10	1.0	3.9
11	5.3	13.9
12	1.9	4.4
13	7.1	17.9
14	8.1	23.8
15	18.3	54.1
15A	12.2	37.0
2A	268.8	1181.4
BB	268.3	1176.5
16	12.7	30.2
17	8.1	20.5
18	10.5	32.2
19	9.5	29.7
20	1.3	4.6
20A	18.6	58.7
20B	21.3	66.0
28	8.6	42.8
29	12.2	60.9
21	2.7	18.7
22	2.5	29.6
23	11.5	57.6
24	3.2	18.0
25	3.3	10.7
26	15.1	73.2
27A	6.3	43.7
27B	0.2	1.0
CC	278.8	1224.7
30	2.7	63.4
31	5.1	80.9
32	6.5	65.0
32-N	6.5	33.2
32-S	0.6	33.2
BG 1a-OS	0.0	0.0
BG 1a-OSw	0.0	0.0
BG 1a-OSw	0.0	0.0
BG 4a	0.4	0.9
BG 1b	0.8	1.7
BG 1c	2.1	4.4
BG 1	5.2	11.0
BG 2a	1.8	5.0
BG 2w	1.0	2.4
BG 2	2.8	7.3
BG 4a	0.4	0.9
BG 4w	2.4	5.7
BG 4	2.6	6.1
BG 5a	0.3	0.7
BG 5w	1.7	4.2
BG 5	1.9	4.7
BG 3	7.6	16.6
BG 6	3.5	8.4
BG POND1	0.5	22.0
BG 14n	13.0	63.8
BG 15n	12.6	62.2
BG 50	280.0	850.0
BG 20	303.7	961.8
BG 14s	1.5	36.4
BG 15s	3.0	38.5
BG 21	306.3	1007.0
BG 32	2.6	6.1
BG 33	2.9	7.0
BG 7	3.1	6.4
BG 8	1.0	2.0
BG 9	6.5	13.4
BG 10	3.8	7.9
BG 11	13.5	27.8
BG 12	5.8	10.7
BG 13	7.0	13.0
BG 14	12.3	22.8
BG 15	42.2	82.0
BG POND2	0.4	10.0
BG 30	3.0	5.0
BG 31	1.8	3.1
BG 25	235.5	837.4

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**CHALLENGER  
HOMES**

**DRAINAGE PLAN  
BENT GRASS RESIDENTIAL FILING NO. 2  
FOR  
CHALLENGER COMMUNITIES, LLC**

**BENT GRASS MEADOWS DRIVE & MERIDIAN ROAD  
FALCON, CO - EL PASO COUNTY**

#	Date	Issue / Description	Init.
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Project No: CLH000014.20  
Drawn By: CMWJ  
Checked By: SMB  
Date: OCTOBER 2019

CURRENT CONDITIONS DRAINAGE MAP

**CD-4**

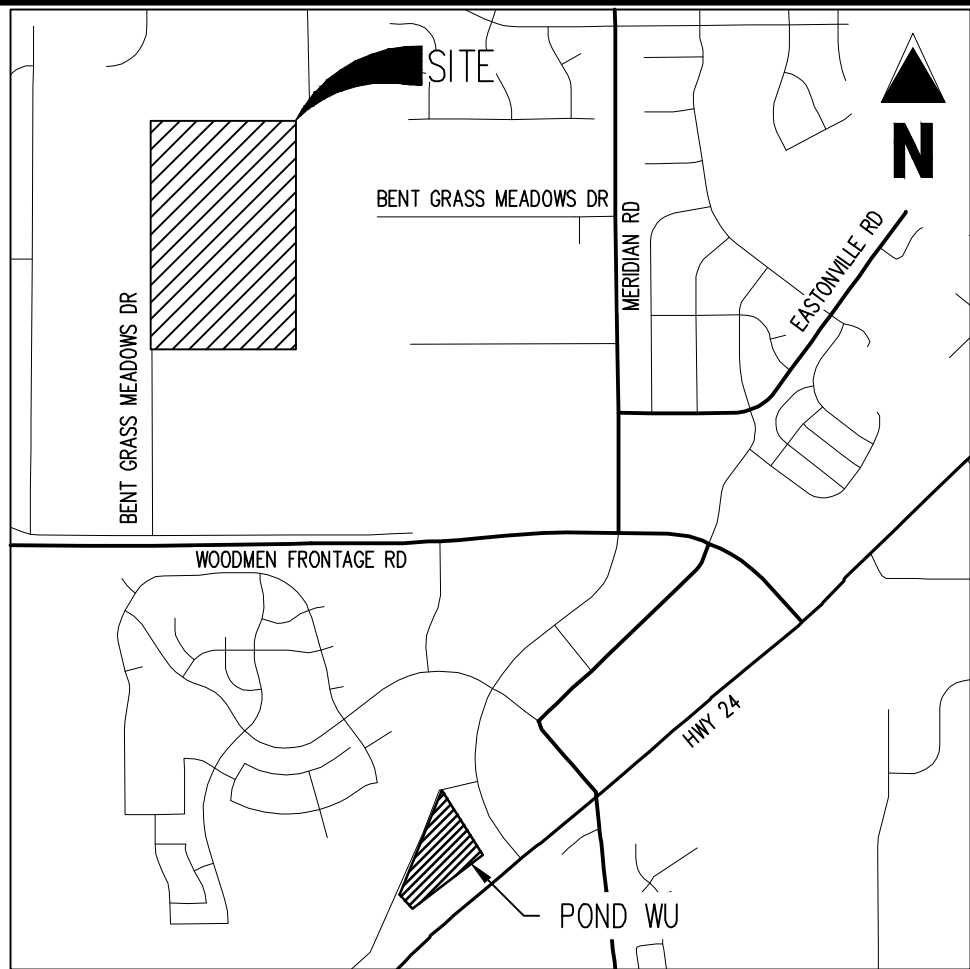
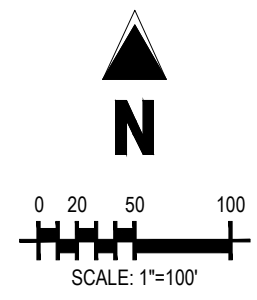
Sheet 4 of 5





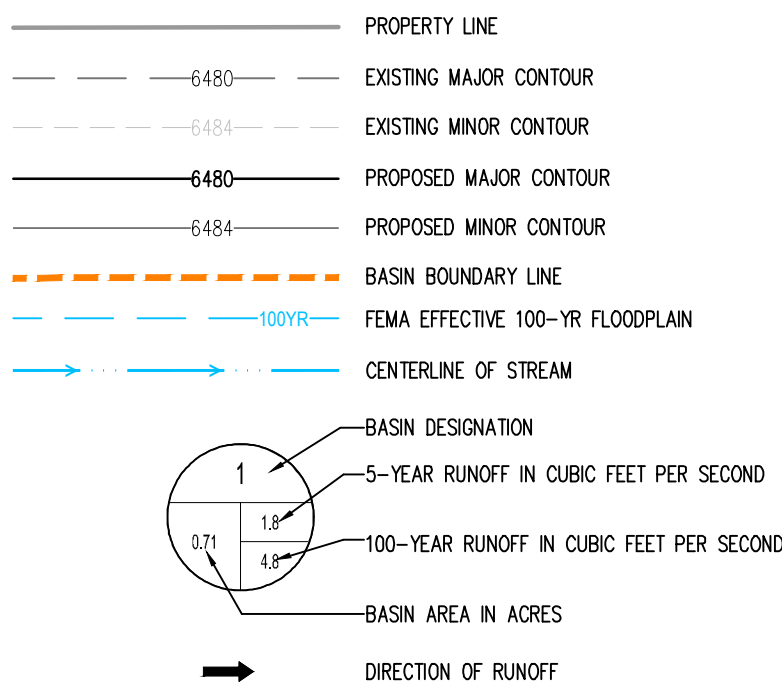
MATCH LINE - SEE SHEET CD-4

MATCH LINE - SEE SHEET CD-2



VICINITY MAP  
1"=2,000'

DRAINAGE LEGEND



RUNOFF SUMMARY  
TABLE

Basin ID	Area (acres)	Q <sub>5</sub> (cfs)	Q <sub>100</sub> (cfs)
RW1202	1574.40	220.0	1000.0
RW1204	38.40	7.0	43.0
W1200	192.00	52.0	190.0
OS-2	20.08	9.0	43.4
OS-3	10.82	4.7	22.7
OS-25	14.13	5.1	29.0
OS-26	5.81	1.9	12.6
H5	11.30	2.1	13.1
OS-22	4.42	1.5	9.7
OS-23	10.24	3.3	22.5
C1a	0.48	1.8	3.4
C1b	0.88	3.3	6.2
C1c	1.09	4.1	7.8
D1a	0.56	1.6	3.5
D1b	0.68	2.0	4.2
D1c	1.20	3.2	6.6
D1d	2.79	6.7	13.6
C2a	1.28	2.9	6.0
C2b	0.99	3.3	6.0
D2a	1.00	1.8	4.8
D2b	0.41	1.0	2.3
H1a	0.40	1.0	2.3
H1b	2.52	4.3	9.9
H1c	0.16	0.4	0.9
H2a	1.09	1.7	4.2
H2b	0.15	0.3	0.7
F	1.37	2.6	5.9
G	1.70	2.7	5.6
H3	1.54	3.2	6.4
H4	0.42	1.0	1.9
I	3.00	6.6	13.2
I2	1.70	3.9	7.7
J	1.64	3.0	6.8
K	1.00	1.8	4.2
L	5.90	18.5	33.2
M1	1.56	5.9	10.4
M2	0.44	1.9	3.5
N	1.32	5.3	9.4
D	0.41	1.8	3.0
OS-1	32.28	15.1	65.1
OS-4	4.46	5.6	14.0
OS-5	0.46	1.1	2.3
OS-6	1.17	2.0	4.3
A1	2.70	3.3	8.6
A2	1.19	1.5	4.2
A3	1.57	2.1	5.0
A4	2.24	2.9	7.5
C1	1.35	2.6	5.9
C2	6.80	7.1	18.5
C3	2.38	3.3	7.8
C4	3.61	5.3	12.0
C5	7.86	10.9	24.9
C6	5.54	7.0	18.9
C7	0.89	0.3	2.1
C8	0.42	0.2	1.0
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
F-1	0.44	0.6	1.6
F-2	0.55	1.5	3.1
G-1	1.47	1.3	4.5
H-1	0.52	0.2	1.4
I-1	0.31	1.0	2.1
EX1	1.19	0.4	2.5
EX2	1.56	0.5	3.7
EX3	0.62	0.2	1.5
EX4	12.49	3.7	25.1
EX5	5.15	1.6	10.9
EX6	9.53	2.7	17.8
EX7	9.16	2.8	18.9
EX8	21.30	6.6	43.9
P-1	2.03	4.2	8.7

DESIGN POINT  
SUMMARY TABLE

Design Point	Q <sub>5</sub> (cfs)	Q <sub>100</sub> (cfs)
40	277.9	1226.8
1	3.1	8.6
2	4.3	11.9
3	5.9	15.9
4	8.3	22.3
5	1.5	10.5
6	3.5	34.4
7	2.9	5.5
8	11.2	32.7
9	0.7	1.5
10	1.0	3.9
11	5.3	13.9
12	1.9	4.4
13	7.1	17.9
14	8.1	23.8
15	18.3	54.1
15A	12.2	37.0
AA	268.8	1161.4
BB	268.3	1176.5
16	12.7	30.2
17	8.1	20.5
18	10.6	32.2
19	9.5	29.7
20	1.3	4.8
20A	18.6	58.7
20B	21.3	66.0
26	8.6	42.8
29	12.2	60.9
21	2.7	18.7
22	2.5	29.6
23	11.5	57.6
24	3.2	18.0
25	3.3	10.7
26	15.1	73.2
27A	6.3	43.7
27B	0.2	1.0
CC	278.8	1224.7
30	2.7	63.4
31	5.1	60.9
32	6.5	65.0
32-N	6.5	33.2
32-S	0.6	33.2
BG 1a-0s	0.0	0.0
BG 1a-0sw	0.0	0.0
BG 1a-0sw	0.0	0.0
BG 4a	0.4	0.9
BG 1b	0.8	1.7
BG 1c	2.1	4.4
BG 1	5.2	11.0
BG 2a	1.8	5.0
BG 2w	1.0	2.4
BG 2	2.8	7.3
BG 4e	0.4	0.9
BG 4w	2.4	5.7
BG 4	2.6	6.1
BG 5a	0.3	0.7
BG 5w	1.7	4.2
BG 5	1.9	4.7
BG 3	7.6	16.8
BG 6	3.5	8.4
BG POND1	0.5	22.0
BG 14a	13.0	63.5
BG 15a	12.6	62.2
BG 50	280.0	850.0
BG 20	303.7	961.8
BG 14a	1.5	36.1
BG 15a	3.0	38.5
BG 21	306.3	1007.0
BG 32	2.6	6.1
BG 33	2.9	7.0
BG 7	3.1	6.4
BG 8	1.0	2.0
BG 9	6.5	13.4
BG 10	3.8	7.9
BG 11	13.5	27.8
BG 12	5.8	10.7
BG 13	7.0	13.0
BG 14	12.3	22.8
BG 15	42.2	82.0
BG POND2	0.4	10.0
BG 30	3.0	5.0
BG 31	1.8	3.1
BG 25	255.5	837.4

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**CHALLENGER  
HOMES**

**DRAINAGE PLAN**  
**BENT GRASS RESIDENTIAL FILING NO. 2**  
**FOR**  
**CHALLENGER COMMUNITIES, LLC**  
**BENT GRASS MEADOWS DRIVE & MERIDIAN ROAD**  
**FALCON, CO - EL PASO COUNTY**

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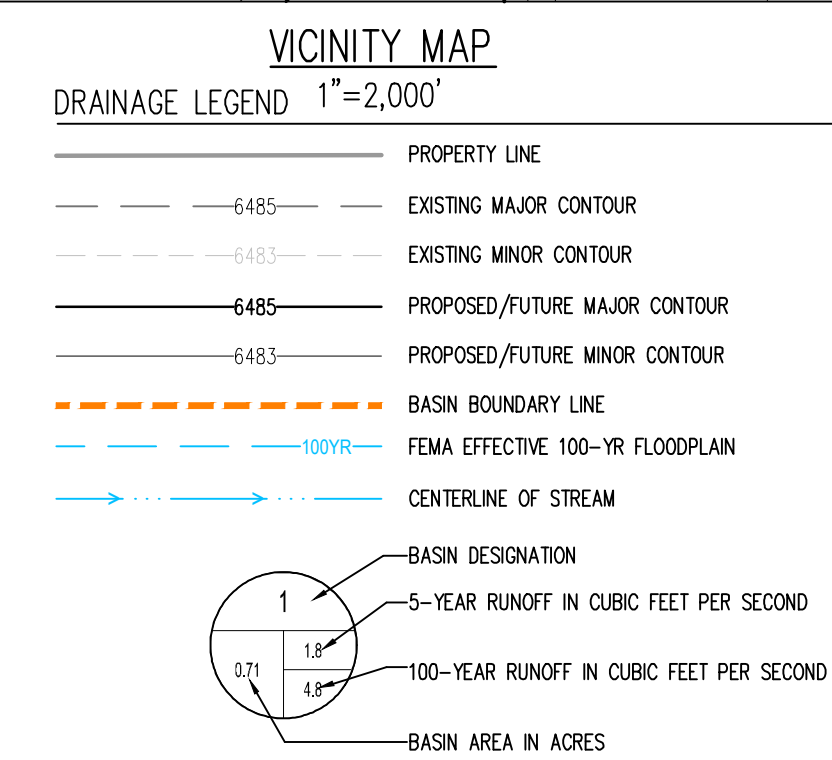
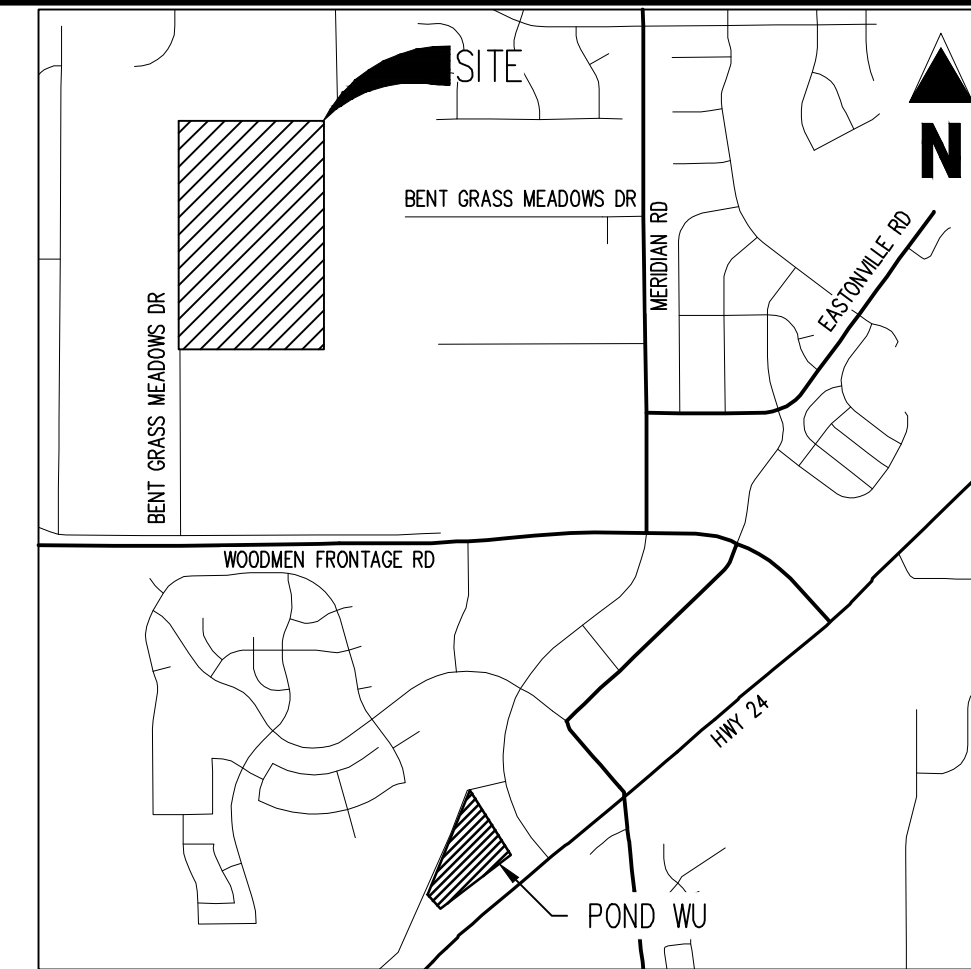
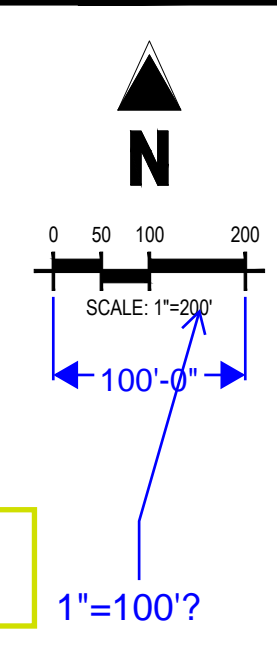
Project No: CLH000014.20  
Drawn By: CMWJ  
Checked By: SMB  
Date: OCTOBER 2019

CURRENT CONDITIONS DRAINAGE MAP

**CD-5**

Sheet 5 of 5





Please add a thick/visible linetype (or shading/hatching) for delineating areas tributary to each pond, so it is visually very clear where all runoff is conveyed to (onsite and offsite WQ/detention facilities). And label what each area represents. Also delineate areas that will not be captured by a pond (not to exceed 1ac) and/or areas utilizing runoff reduction.

Added exhibit showing what flows to each pond

Provide DPs for the inlets  
DP 12 & 15 added for inlets.

RUNOFF SUMMARY TABLE				
Basin ID	Area (acres)	Q <sub>5</sub> (cfs)	Q <sub>100</sub> (cfs)	Q <sub>100</sub> (cfs)
RW1202	1574.40	220.0	1000.0	1000.0
RW1204	38.40	7.0	43.0	43.0
WT1200	192.00	52.0	190.0	190.0
OS-2	20.06	9.0	43.4	43.4
OS-3	10.62	4.7	22.7	22.7
OS-25	18.74	6.3	35.8	35.8
OS-26	5.81	1.9	12.6	12.6
H5	6.37	3.2	15.1	15.1
OS-22	4.42	1.5	9.7	9.7
OS-23	10.24	3.3	22.5	22.5
C1a	0.48	1.8	3.4	3.4
C1b	0.88	3.3	6.2	6.2
C1c	1.09	4.1	7.8	7.8
D1a	0.56	1.6	3.5	3.5
D1b	0.68	2.0	4.2	4.2
D1c	1.20	3.2	6.6	6.6
D1d	2.79	6.7	13.6	13.6
C2a	1.26	2.9	6.0	6.0
C2b	0.99	3.3	6.0	6.0
D2a	1.00	1.8	4.8	4.8
D2b	0.41	1.0	2.3	2.3
H1a	0.40	1.0	2.3	2.3
H1b	2.52	4.3	9.9	9.9
H1c	0.16	0.4	0.9	0.9
H2a	1.09	1.7	4.2	4.2
H2b	0.15	0.3	0.7	0.7
F	1.37	2.6	5.9	5.9
G	1.70	2.7	5.6	5.6
H3	1.54	3.2	6.4	6.4
H4	0.42	1.0	2.3	2.3
I1	3.00	6.6	13.2	13.2
I2	1.70	3.9	7.7	7.7
J	1.64	3.0	6.8	6.8
K	1.00	1.8	4.2	4.2
L	4.50	18.5	33.2	33.2
M1	1.56	5.9	10.4	10.4
M2	0.44	1.9	3.5	3.5
N	1.32	5.3	9.4	9.4
D	0.41	1.8	3.0	3.0
OS-1	33.07	15.5	66.7	66.7
OS-4	4.46	5.6	14.0	14.0
OS-5	0.46	1.1	2.3	2.3
OS-6	1.17	2.0	4.3	4.3
A-1	2.70	3.3	8.6	8.6
A-2	1.19	1.5	4.2	4.2
A-3	1.57	2.1	5.0	5.0
A-4	2.24	2.9	7.5	7.5
C-1	1.35	2.6	5.9	5.9
C-2	6.80	7.1	18.5	18.5
C-3	2.38	3.3	7.8	7.8
C-4	3.61	5.3	12.0	12.0
C-5	7.86	10.9	24.9	24.9
C-6	5.54	7.0	16.9	16.9
C-7	0.89	0.3	2.1	2.1
E-1	1.71	3.6	7.7	7.7
E-2	0.68	2.4	4.6	4.6
E-3	0.78	2.9	5.3	5.3
E-4	0.91	3.0	5.7	5.7
E-5	0.89	3.3	6.1	6.1
F-1	0.44	0.6	1.6	1.6
F-2	0.55	1.5	3.1	3.1
G-1	1.47	1.3	4.5	4.5
H-1	0.52	0.2	1.4	1.4
I-1	0.31	1.0	2.1	2.1
AA-1	2.57	4.2	9.9	9.9
AA-2	2.26	4.2	9.3	9.3
B-1	5.25	2.3	10.7	10.7
B-2	4.16	1.4	9.1	9.1
CC-1	9.07	16.9	38.0	38.0
CC-2	1.53	4.6	9.8	9.8
CC-3	1.88	6.4	12.1	12.1
CC-4	4.34	6.5	17.8	17.8
CC-5	0.45	0.2	1.4	1.4
D-1	0.07	1.2	26.6	26.6
D-2	7.42	15.5	32.2	32.2
D-3	2.03	0.8	2.3	2.3
D-4	4.38	7.8	16.6	16.6
D-5	1.06	2.2	4.6	4.6
D-6	4.01	8.2	17.2	17.2
D-7	6.39	3.2	14.8	14.8
D-8	1.69	1.3	4.5	4.5
P-1	2.03	4.2	8.7	8.7

DESIGN POINT SUMMARY TABLE				
Design Point	Q <sub>5</sub> (cfs)	Q <sub>100</sub> (cfs)	Q <sub>100</sub> (cfs)	Q <sub>100</sub> (cfs)
40	278.1	1227.8	1227.8	1227.8
1	3.1	8.6	8.6	8.6
2	4.3	11.9	11.9	11.9
3	5.9	15.9	15.9	15.9
4	8.3	22.3	22.3	22.3
9	1.1	2.4	2.4	2.4
11	6.0	15.5	15.5	15.5
12	7.6	19.0	19.0	19.0
5	10.9	27.1	27.1	27.1
6	4.1	9.4	9.4	9.4
7	2.9	5.5	5.5	5.5
8	25.3	62.1	62.1	62.1
13	19.3	43.0	43.0	43.0
10	19.3	43.5	43.5	43.5
10A	6.0	21.9	21.9	21.9
15	37.5	90.8	90.8	90.8
15A	12.2	37.0	37.0	37.0
AA	270.3	1188.7	1188.7	1188.7
BB	269.5	1186.4	1186.4	1186.4
16	16.6	39.4	39.4	39.4
17	10.6	26.8	26.8	26.8
18	13.5	39.2	39.2	39.2
19	9.5	29.7	29.7	29.7
20	1.3	4.6	4.6	4.6
20A	18.4	57.1	57.1	57.1
20B	21.3	60.0	60.0	60.0
28	8.6	42.8	42.8	42.8
29	12.2	60.9	60.9	60.9
21	15.0	32.5	32.5	32.5
22	10.5	26.0	26.0	26.0
23	12.2	59.7	59.7	59.7
24	2.1	15.9	15.9	15.9
25	3.3	10.7	10.7	10.7
26	8.0	41.7	41.7	41.7
42	7.5	16.5	16.5	16.5
43	10.0	21.8	21.8	21.8
44	1.2	4.5	4.5	4.5
45	53.6	173.9	173.9	173.9
45A	1.1	45.8	45.8	45.8
CC	268.2	1183.4	1183.4	1183.4
30	2.1	63.5	63.5	63.5
31	5.8	67.4	67.4	67.4
32	6.5	64.6	64.6	64.6
32A	4.9	34.5	34.5	34.5
32A-N	4.9	33.2	33.2	33.2
32A-S	12.5	3.6	3.6	3.6
BG 1a-O5	0.0	0.0	0.0	0.0
BG 1a-O6	0.0	0.0	0.0	0.0
BG 1a-O9	0.0	0.0	0.0	0.0
BG 4a	0.6	1.5	1.5	1.5
BG 1b	1.3	2.8	2.8	2.8
BG 1c	3.3	7.1	7.1	7.1
BG 1	8.3	17.6	17.6	17.6
BG 2a	1.8	5.0	5.0	5.0
BG 2b	1.0	2.4	2.4	2.4
BG 2	2.8	7.3	7.3	7.3
BG 4b	0.4	0.9	0.9	0.9
BG 4c	3.8	9.0	9.0	9.0
BG 4	4.0	9.5	9.5	9.5
BG 5a	0.3	0.7	0.7	0.7
BG 5b	1.7	4.2	4.2	4.2
BG 5	1.9	4.7	4.7	4.7
BG 3	16.2	58.7	58.7	58.7
BG 6	5.4	13.2	13.2	13.2
BG POND1	0.3	2.9	2.9	2.9
BG 14n	9.2	42.7	42.7	42.7
BG 15n	8.8	40.9	40.9	40.9
BG 50	280.0	850.0	850.0	850.0
BG 20	282.5	909.3	909.3	909.3
BG 14b	15.0	7.8	7.8	7.8
BG 15b	16.8	12.4	12.4	12.4
BG 21	304.6	915.3	915.3	915.3
BG 32	2.6	6.1	6.1	6.1
BG 33	2.9	7.0	7.0	7.0
BG 7	3.1	6.4	6.4	6.4
BG 8	1.0	2.0	2.0	2.0
BG 9	6.5	13.4	13.4	13.4
BG 10	3.8	7.8	7.8	7.8
BG 11	13.5	27.8	27.8	27.8
BG 12	5.8	10.7	10.7	10.7
BG 13	7.0	13.0	13.0	13.0
BG 14	12.3	22.6	22.6	22.6
BG 15	42.2	82.0	82.0	82.0
BG POND2	0.4	10.0	10.0	10.0
BG 30	3.0	5.0	5.0	5.0
BG 31	1.8	3.1	3.1	3.1
BG 25	252.0	751.4	751.4	751.4

# Galloway

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## CHALLENGER HOMES

**DRAINAGE PLAN**  
BENT GRASS DEVELOPMENT  
FOR  
CHALLENGER COMMUNITIES, LLC

FALCON, CO - EL PASO COUNTY

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Project No: CLH000014.20

Drawn By: CMWJ

Checked By: SMB

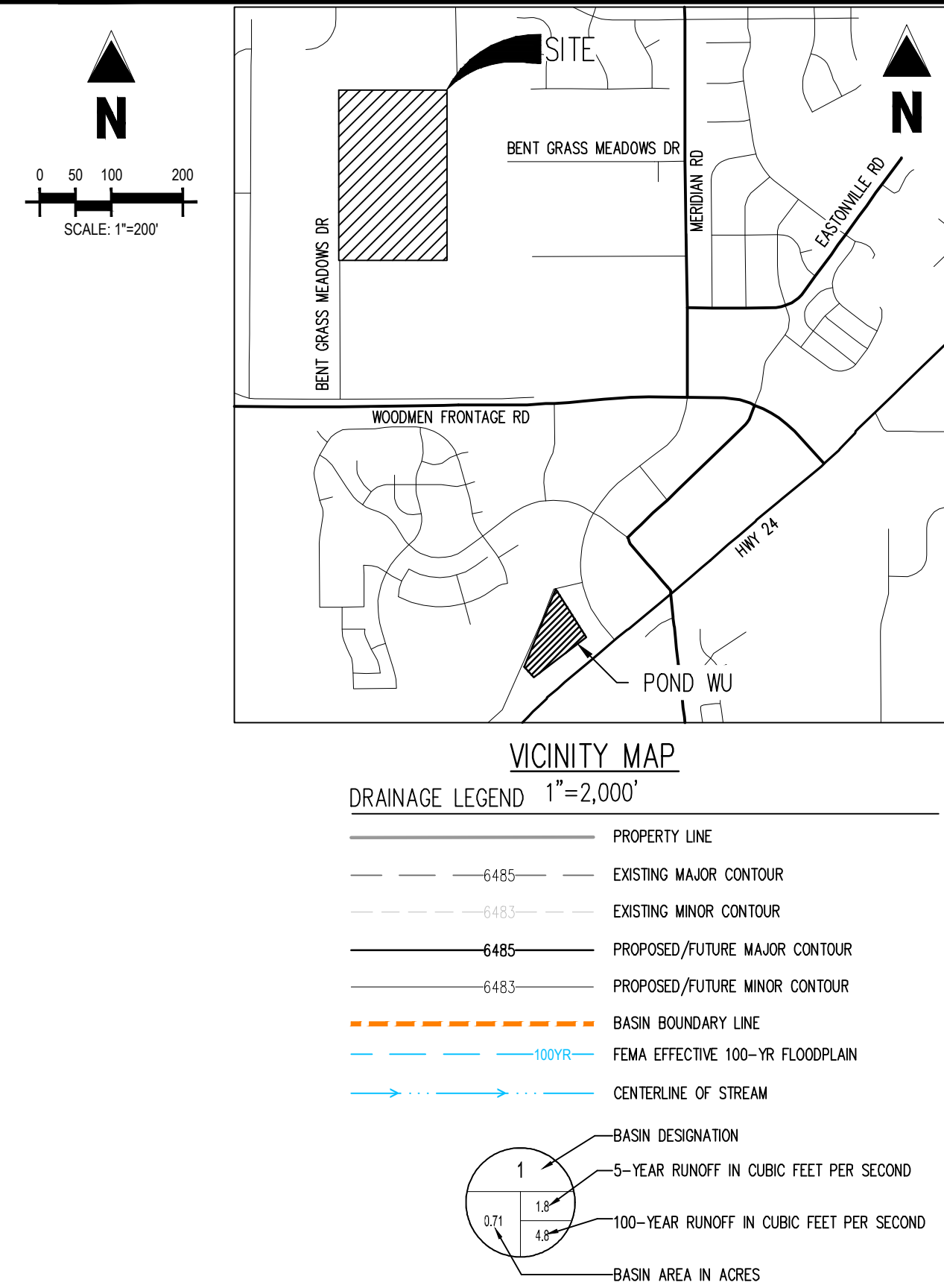
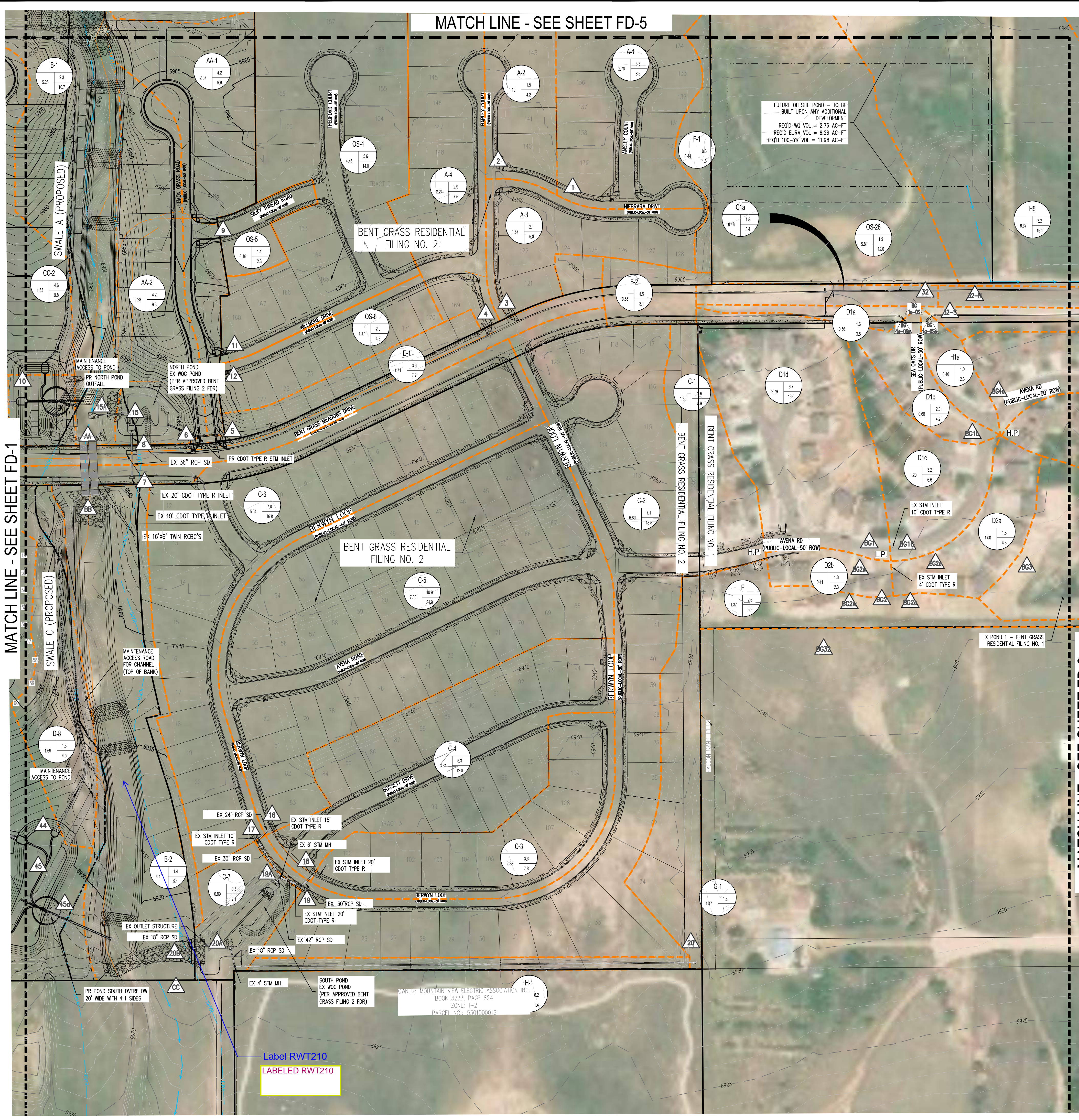
Date: OCTOBER 2019

**FD-1**

Sheet 1 of 5

**FUTURE CONDITIONS DRAINAGE MAP**





VICINITY MAP  
DRAINAGE LEGEND 1"=2,000'

RUNOFF SUMMARY TABLE				DESIGN POINT SUMMARY TABLE			
Basin ID	Area (acres)	Q <sub>1</sub> (cfs)	Q <sub>100</sub> (cfs)	Design Point	Q <sub>1</sub> (cfs)	Q <sub>100</sub> (cfs)	
RW1202	1574.40	220.0	1000.0	40	278.1	1227.8	
RW1204	38.40	7.0	43.0	1	3.1	8.6	
WT200	192.00	52.0	190.0	2	4.3	11.9	
OS-2	20.08	9.0	43.4	3	5.9	15.9	
OS-3	10.62	4.7	22.7	4	8.3	22.3	
OS-25	18.74	6.3	35.8	9	1.1	2.4	
OS-26	5.81	1.9	12.6	11	6.0	15.5	
H5	6.37	3.2	15.1	12	7.6	19.0	
OS-22	4.42	1.5	9.7	5	10.9	27.1	
OS-23	10.24	3.3	22.5	6	4.1	9.4	
C1a	0.48	1.8	3.4	7	2.9	5.5	
C1b	0.88	3.3	6.2	8	25.3	62.1	
C1c	1.09	4.1	7.8	13	19.3	43.0	
D1a	0.56	1.6	3.5	10	19.3	43.5	
D1b	0.68	2.0	4.2	10A	6.0	21.9	
D1c	1.20	3.2	6.6	15	37.5	90.8	
D1d	2.79	6.7	13.6	15A	12.2	30.0	
C2a	1.28	2.9	6.0	AA	270.3	1188.7	
C2b	0.99	3.3	6.0	BB	269.5	1186.4	
D2a	1.00	1.8	4.8	16	16.6	39.4	
D2b	0.41	1.0	2.3	17	10.6	26.8	
H1a	0.40	1.0	2.3	18	13.5	38.2	
H1b	2.52	4.3	9.9	19	9.5	29.7	
H1c	0.16	0.4	0.9	20	1.3	4.6	
H2a	1.09	1.7	4.2	20A	18.4	57.1	
H2b	0.15	0.3	0.7	20B	21.3	60.0	
F	1.37	2.6	5.9	28	8.6	42.8	
G	1.70	2.7	5.6	29	12.2	60.9	
H3	1.54	3.2	6.4	21	15.0	32.5	
H4	0.42	1.0	1.4	22	10.5	26.0	
I1	3.00	6.6	13.2	23	12.2	59.7	
I2	1.70	3.9	7.7	24	2.1	15.9	
J	1.64	3.0	6.8	25	3.3	10.7	
K	1.00	1.8	4.2	26	8.0	41.7	
L	5.90	18.5	33.2	42	7.5	16.5	
M1	1.58	5.9	10.4	43	10.0	21.8	
M2	0.44	1.9	3.5	44	1.2	4.5	
N	1.32	5.3	9.4	45	53.8	173.9	
D	0.41	1.8	3.0	45A	1.1	45.8	
OS-1	33.07	15.5	66.7	CC	268.2	1183.1	
OS-4	4.46	5.6	14.0	30	2.1	63.5	
OS-5	0.46	1.1	2.3	31	5.8	67.4	
OS-6	1.17	2.0	4.3	32	6.5	64.8	
A-1	2.70	3.3	8.6	32A	4.9	34.5	
A-2	1.19	1.5	4.2	32A-N	4.9	33.2	
A-3	1.57	2.1	5.0	32A-S	12.5	3.6	
A-4	2.24	2.9	7.5	BG 1a-Os	0.0	0.0	
C-1	1.35	2.6	5.9	BG 1a-Ob	0.0	0.0	
C-2	6.80	7.1	18.5	BG 1a-Of	0.0	0.0	
C-3	2.38	3.3	7.8	BG 4a	0.6	1.5	
C-4	3.61	5.3	12.0	BG 1b	1.3	2.8	
C-5	7.86	10.9	24.9	BG 1c	3.3	7.1	
C-6	5.54	7.0	16.9	BG 1	8.3	17.6	
C-7	0.89	0.3	2.1	BG 2a	1.8	5.0	
E-1	1.71	3.6	7.7	BG 2w	1.0	2.4	
E-2	0.68	2.4	4.6	BG 2	2.8	7.3	
E-3	0.78	2.9	5.3	BG 4b	0.4	0.9	
E-4	0.91	3.0	5.7	BG 4w	3.8	9.0	
E-5	0.89	3.3	6.1	BG 4	4.0	9.5	
F-1	0.44	0.6	1.6	BG 5a	0.3	0.7	
F-2	0.55	1.5	3.1	BG 5w	1.7	4.2	
G-1	1.47	1.3	4.5	BG 5	1.9	4.7	
H-1	0.52	0.2	1.4	BG 3	16.2	58.7	
I-1	0.31	1.0	2.1	BG 6	5.4	13.2	
AA-1	2.57	4.2	9.9	BG POND1	0.3	2.9	
AA-2	2.26	4.2	9.3	BG 14n	9.2	42.7	
B-1	5.25	2.3	10.7	BG 15n	8.8	40.9	
B-2	4.16	1.4	9.1	BG 50	280.0	850.0	
CC-1	9.67	16.9	38.0	BG 20	282.5	959.3	
CC-2	1.53	4.6	9.8	BG 14s	15.0	7.8	
CC-3	1.88	6.4	12.1	BG 15s	16.8	12.4	
CC-4	4.34	6.5	17.8	BG 21	304.6	915.3	
CC-5	0.45	0.2	1.4	BG 32	2.6	6.1	
D-1	0.97	11.2	26.6	BG 33	2.9	7.0	
D-2	7.42	15.5	32.2	BG 7	3.1	6.4	
D-3	2.03	0.8	2.3	BG 8	1.0	2.0	
D-4	4.38	7.8	16.6	BG 9	6.5	13.4	
D-5	4.06	2.2	4.6	BG 10	3.8	7.9	
D-6	4.01	8.2	17.2	BG 11	13.5	27.8	
D-7	6.39	3.2	14.8	BG 12	5.8	10.7	
D-8	1.69	1.3	4.5	BG 13	7.0	13.0	
P-1	2.03	4.2	8.7	BG 14	12.3	22.8	
				BG 15	42.2	82.0	
				BG POND2	0.4	10.0	
				BG 30	3.0	5.0	
				BG 31	1.8	3.1	
				BG 25	252.0	751.4	

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ADDED COLUMN FOR HMS FLOWS FROM REVISED MODEL

use model values for SCS calculations

doesn't match HMS sheet (1113)

DRAINAGE PLAN  
BENT GRASS DEVELOPMENT  
FOR  
CHALLENGER COMMUNITIES, LLC

FALCON, CO - EL PASO COUNTY

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

FUTURE CONDITIONS DRAINAGE MAP

FD-2  
Sheet 2 OF 5

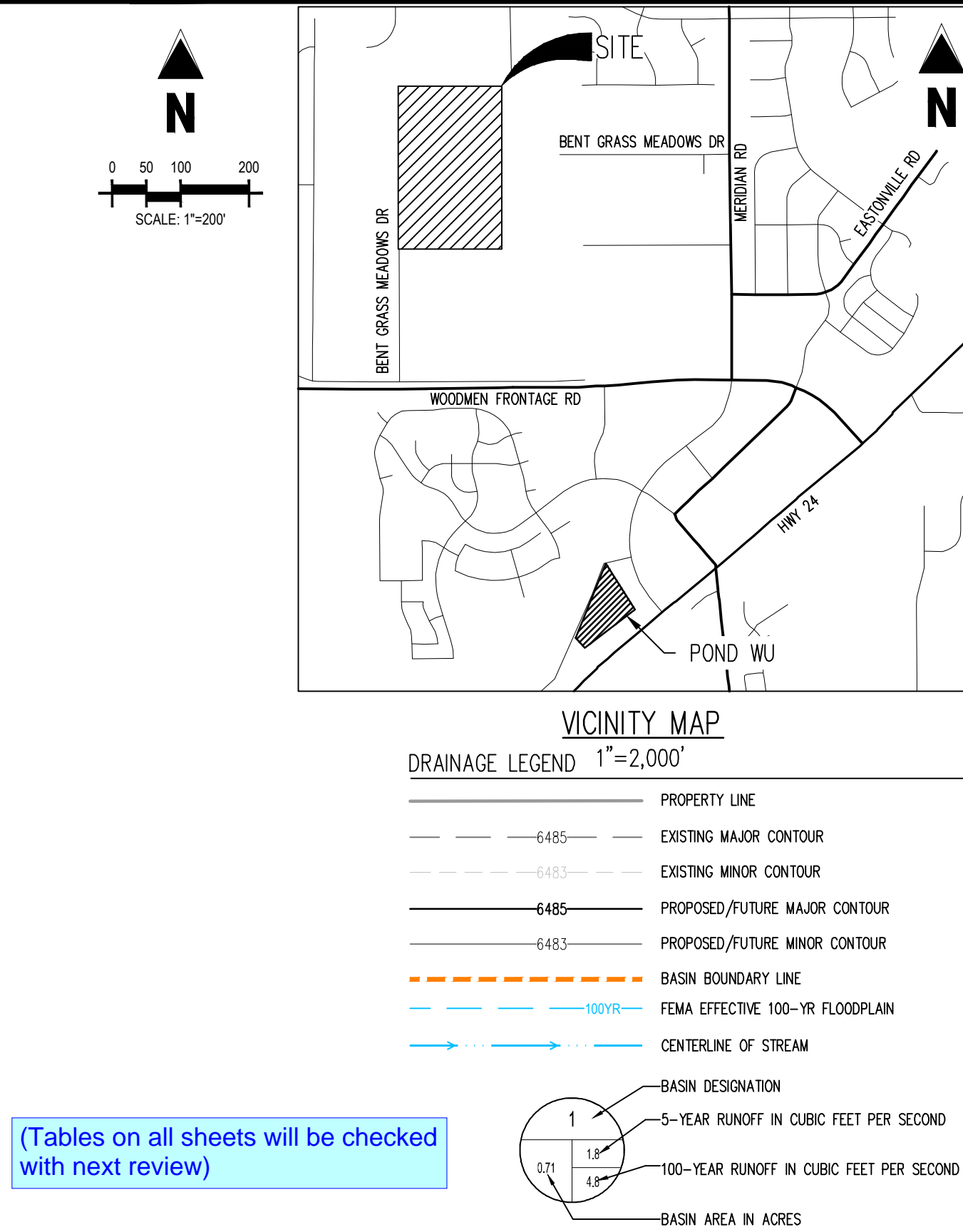












(Tables on all sheets will be checked with next review)

RUNOFF SUMMARY TABLE					DESIGN POINT SUMMARY TABLE		
Basin ID	Area (acres)	Q <sub>s</sub> (cfs)	Q <sub>100</sub> (cfs)		Design Point ID	Q <sub>s</sub> (cfs)	Q <sub>100</sub> (cfs)
RWT202	1574.40	220.0	1000.0		40	278.1	1227.8
RWT204	38.40	7.0	43.0		1	3.1	8.6
WT200	192.00	52.0	190.0		2	4.3	11.9
OS-2	20.06	9.0	43.4		3	5.9	15.9
OS-3	10.62	4.7	22.7		4	8.3	22.3
OS-25	18.74	6.3	35.8		9	1.1	2.4
OS-26	5.81	1.9	12.6		11	6.0	15.5
H5	6.37	3.2	15.1		12	7.6	19.0
OS-22	4.42	1.5	9.7		5	10.9	27.1
OS-23	10.24	3.3	22.5		6	4.1	9.4
C1a	0.48	1.8	3.4		7	2.9	5.5
C1b	0.88	3.3	6.2		8	25.3	62.1
C1c	1.09	4.1	7.8		13	19.3	43.0
D1a	0.56	1.6	3.5		10	19.3	43.5
D1b	0.68	2.0	4.2		10A	6.0	21.9
D1c	1.20	3.2	6.6		15	37.5	90.8
D1d	2.79	6.7	13.6		D1A	12.2	37.0
C2a	1.26	2.9	6.0		AA	270.3	1188.7
C2b	0.99	3.3	6.0		BB	269.5	1186.4
D2a	1.00	1.8	4.8		16	16.6	39.4
D2b	0.41	1.0	2.3		17	10.6	26.8
H1a	0.40	1.0	2.3		18	13.5	39.2
H1b	2.52	4.3	9.9		19	9.5	29.7
H1c	0.16	0.4	0.9		20	1.3	4.6
H2a	1.09	1.7	4.2		20A	18.4	57.1
H2b	0.15	0.3	0.7		20B	21.3	66.0
F	1.37	2.6	5.9		28	8.6	42.8
G	1.70	2.7	5.6		29	12.2	60.9
H3	1.54	3.2	6.4		21	15.0	32.5
H4	0.42	1.0	1.9		22	10.5	26.0
I1	3.00	6.6	13.2		23	12.2	59.7
I2	1.70	3.9	7.7		24	2.1	15.9
J	1.64	3.0	6.8		25	3.3	10.7
K	1.00	1.8	4.2		26	8.0	41.7
L	5.90	18.5	33.2		42	7.5	16.5
M1	1.56	5.9	10.4		43	10.0	21.8
M2	0.44	1.9	3.5		44	1.2	4.5
N	1.32	5.3	9.4		45	53.6	173.9
D	0.41	1.8	3.0		45A	1.1	45.8
OS-1	33.07	15.5	66.7		CC	268.2	1183.4
OS-4	4.46	5.6	14.0		30	2.1	63.5
OS-5	0.46	1.1	2.3		31	5.8	67.4
OS-6	1.17	2.0	4.3		32	6.5	64.8
A-1	2.70	3.3	8.6		32A	4.9	34.5
A-2	1.19	1.5	4.2		32A-N	4.9	33.2
A-3	1.57	2.1	5.0		32A-S	12.5	3.6
A-4	2.24	2.9	7.5		BG 1a-Os	0.0	0.0
C-1	1.35	2.6	5.9		BG 1a-Osw	0.0	0.0
C-2	6.80	7.1	18.5		BG 1a-Osw	0.0	0.0
C-3	2.38	3.3	7.8		BG 4a	0.6	1.5
C-4	3.61	5.3	12.0		BG 1b	1.3	2.8
C-5	2.86	10.9	24.9		BG 1c	3.3	7.1
C-6	5.54	7.0	16.9		BG 1	8.3	17.6
C-7	0.89	0.3	2.1		BG 2a	1.8	5.0
E-1	1.71	3.6	7.7		BG 2w	1.0	2.4
E-2	0.68	2.4	4.6		BG 2	2.8	7.3
E-3	0.78	2.9	5.3		BG 4b	0.4	0.9
E-4	0.91	3.0	5.7		BG 4w	3.8	9.0
E-5	0.89	3.3	6.1		BG 4	4.0	9.5
F-1	0.44	0.6	1.6		BG 5w	0.3	0.7
F-2	0.55	1.5	3.1		BG 5w	1.7	4.2
G-1	1.47	1.3	4.5		BG 5	1.9	4.7
H-1	0.52	0.2	1.4		BG 3	16.2	58.7
L1	0.31	1.0	2.1		BG 6	5.4	13.2
AA-1	2.57	4.2	9.9		BG POND1	0.3	2.9
AA-2	2.26	4.2	9.3		BG 14n	9.2	42.7
B-1	5.25	2.3	10.7		BG 15n	8.8	40.9
B-2	4.16	1.4	9.1		BG 50	280.0	850.0
CC-1	9.07	16.9	38.0		BG 20	282.5	909.3
CC-2	1.53	4.6	9.8		BG 14s	15.0	7.8
CC-3	1.88	6.4	12.1		BG 15s	16.8	12.4
CC-4	4.34	6.5	17.8		BG 21	304.6	915.3
CC-5	0.45	0.2	1.4		BG 32	2.6	6.1
D-1	9.07	11.2	26.6		BG 33	2.9	7.0
D-2	7.42	15.5	32.2		BG 7	3.1	6.4
D-3	2.03	0.8	2.3		BG 8	1.0	2.0
D-4	4.38	7.8	16.6		BG 9	6.5	13.4
D-5	4.06	2.2	4.6		BG 10	3.8	7.9
D-6	4.01	8.2	17.2		BG 11	13.5	27.8
D-7	6.39	3.2	14.8		BG 12	5.8	10.7
D-8	1.69	1.3	4.5		BG 13	7.0	13.0
P-1	2.03	4.2	8.7		BG 14	12.3	22.8
					BG 15	42.2	62.0
					BG POND2	0.4	10.0
					BG 30	3.0	5.0
					BG 31	1.8	3.1
					BG 25	252.0	751.4

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## CHALLENGER HOMES

**DRAINAGE PLAN**  
BENT GRASS DEVELOPMENT  
FOR  
CHALLENGER COMMUNITIES, LLC  
FALCON, CO - EL PASO COUNTY

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

# FD-5

Sheet 5 OF 5

**FUTURE CONDITIONS DRAINAGE MAP**



[illegible]

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

SPLIT FLOW EXHIBIT  
BENT GRASS RES FILING NO. 1

EXH-1

Sheet 1 of 1

