



## The Clubhouse at Flying Horse North Final Drainage Report

May 2025

**Prepared For:**

Mr. Drew Balsick  
Vice President / Project Manager  
Flying Horse Country Club, LLC  
2138 Flying Horse Club Drive  
Colorado Springs, CO 80921  
(719) 785-3237

**Prepared By:**

HR Green Development, LLC  
Contact: Richie Lyon, PE  
[Richie.Lyon@hrgreen.com](mailto:Richie.Lyon@hrgreen.com)  
719-318-0871

PCD File No. PPR-259

## Table of Contents

Engineer's Statement.....	1
Developer's Statement.....	1
El Paso County: .....	1
I. General Purpose, Location and Description .....	2
a. Purpose and Scope .....	2
b. DBPS Investigations .....	3
c. Stakeholder Process.....	4
d. Agency Jurisdictions .....	4
e. General Project Description.....	4
f. Data Sources .....	5
g. Applicable Criteria and Standards .....	5
II. Project Characteristics .....	6
a. Site Characteristics .....	6
b. Compliance with DBPS and Previous Reports.....	7
c. Soil Characteristics .....	7
d. Major Drainage Ways and Structures.....	7
III. Hydrologic Analysis.....	8
a. Major Basins and Sub-basins .....	8
Major Basin Description .....	8
Existing Subbasin Description .....	8
Proposed Subbasin Description .....	9
b. Water Quality and Detention Facilities.....	12
c. Methodology .....	13
IV. Hydraulic Analysis.....	14
a. Major Drainageways .....	14
b. Storm Sewer Infrastructure and Culvert Pipes .....	14
V. Environmental Evaluations.....	14
a. Significant Existing or Potential Wetland and Riparian Areas Impacts .....	14
Stormwater Quality Considerations and Proposed Practices.....	14
c. Permitting Requirements .....	14
d. 4-Step Process .....	15





VI.	Drawings .....	16
VII.	Drainage and Bridge Fees .....	16
VIII.	Deviations .....	17
IX.	Summary .....	17
X.	References .....	18

## Appendices

- A. Maps & Exhibits
- B. Hydrology Calculations
- C. Hydraulic Calculations
- D. Pond Calculations
- E. Referenced Report Excerpts
- F. Site Drainage Maps



## Engineer's Statement

This report and plan for the drainage design of the development, Clubhouse at Flying Horse North, was prepared by me (or under my direct supervision) and is correct to the best of my knowledge and belief. Said report and plan has been prepared in accordance with the *El Paso County Drainage Criteria* Manual and is in conformity with the master plan of the drainage basin. I understand that El Paso County does not and will not assume liability for drainage facilities designed by others. I accept responsibility for any liability caused by any negligent acts, errors or omissions on my part in preparing this report.

Richie Lyon, PE

Date

State of Colorado No. 53921

For and on behalf of HR Green Development, LLC

Sign and stamp

## Developer's Statement

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

Flying Horse Country Club, LLC

Drew Balsick

Date

Vice President / Project Manager

Flying Horse Country Club, LLC

2138 Flying Horse Club Drive

Colorado Springs, CO 80921

## El Paso County:

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

Joshua Palmer, P.E.

Date

County Engineer/ECM Administrator

## I. General Purpose, Location and Description

### a. Purpose and Scope

The purpose of this Final Drainage Report (FDR) is to identify specific solutions to drainage concerns for onsite and offsite tributary areas resulting from the development of a portion of Tract K of Flying Horse North Filing No. 1 (The Clubhouse at Flying Horse North). This FDR will describe the onsite and offsite drainage patterns, existing and proposed storm infrastructure as it relates to water quality and stormwater detention for any proposed or existing facilities, and planned storm water management for The Clubhouse at Flying Horse North.

*PCD File No. SF-18-001: Preliminary Drainage Report for Flying Horse North Preliminary Plan and Final Drainage Report for Flying Horse North Filing No. 1* is a combined Preliminary Drainage Report (PDR) and Final Drainage Report (FDR) that was developed by Classic Consulting, latest revision June 2018. The combined PDR/FDR was approved by the County in September of 2018 and relevant excerpts are included in Appendix F. The approved report identifies the proposed Filing No. 3 area (including the clubhouse) for the PDR and Preliminary Plan portion of the report and the Filing No. 1 area for the FDR portion. The Classic report plans for the entirety of the Clubhouse site to ultimately be conveyed to a private pond proposed with the Filing 1 development (Pond 12). A future onsite permanent extended detention basin for water quality and full spectrum detention of the final clubhouse development was anticipated to release flows to Pond 12 under the Classic PDR/FDR. The report analyzes drainage tributary to this pond under the NRCS Method.

*PCD File No. SF-17-012 and SF-18-001: Final Drainage Report Addendum No. 1 Preliminary Drainage Report for Flying Horse North Preliminary Plan and Final Drainage Report for Flying Horse North Filing No. 1* describes the existing onsite drainage for the clubhouse. The existing clubhouse was planned and built per this addendum as a temporary clubhouse and event lawn with a temporary onsite sediment pond for water quality treatment that was planned to remain in place until the ultimate clubhouse development.

This FDR prescribes implementation of a private and public storm system that drains to the existing Filing No. 3 Full Spectrum Detention Pond A instead of an onsite permanent control measure so that an onsite water quality or detention pond is not required.

*PCD File No. SF-2326: Flying Horse North Filing No. 3 Final Drainage Report* is a Final Drainage Report (FDR) that was developed by HR Green Development, LLC, dated June 2024. The FDR was approved by the County on July 8<sup>th</sup>, 2024. This approved report identifies drainage patterns and associated infrastructure for the Filing No. 3 area and delineates a portion of The Clubhouse site that is conveyed to a private pond proposed with the Filing No. 3 development (Pond A).

The items discussed in this FDR include improvements, land uses, and drainage patterns for The Clubhouse at Flying Horse North, herein referred to as the 'Site'. Included in this report are final hydrologic and hydraulic drainage calculations and design as required for the final design of the development of the clubhouse area. This report references the aforementioned reports to compare and contrast findings in the final design to ensure that existing infrastructure and facilities are not negatively impacted by this development.

## **b. DBPS Investigations**

The site is split by the Arkansas River Basin and South Platte Basin. Within each of those river basins, the site stretches across the Black Squirrel Drainage Basin (tributary to the Arkansas River Basin) and the Cherry Creek Drainage Basin (tributary to the South Platte Basin).

### **Black Squirrel Creek Drainage Basin**

Approximately 10% of the site drains to the Black Squirrel Creek Drainage Basin. The stormwater runoff for areas of proposed development within the Black Squirrel Creek basin convey undeveloped runoff via sheet flow to an existing pond built as a part of Filing No. 1 (Pond 6). The Black Squirrel Drainage Basin Planning Study (DBPS) Preliminary Design Report prepared by URS Corporation was reviewed to determine existing plans and constraints that would influence the design of the Flying Horse North Development. A Preliminary Drainage Report and Final Drainage Report for this area were prepared in June 2018 by Classic Consulting and approved by El Paso County in September of 2018, that analyzed the portion of the site draining to existing private Pond 6 under the NRCS Curve Number Method. A subsequent Final Drainage Report was developed by HR Green Development, LLC, dated June 2024 that analyzed flows from the development site using the Rational Method. The previous plans for Flying Horse North Filing No. 3 are in general conformance with the DBPS, therefore, the portion of the site draining into this basin will remain in compliance by proving that flows released to downstream infrastructure are less than existing. Further analysis within this FDR demonstrates compliance with hydraulic analysis of the existing infrastructure and pond that capture, convey, and detain the stormwater from the site.

### **Cherry Creek Drainage Basin**

For the portion of the site which lies within the East Cherry Creek Drainage Basin, a DBPS does not currently exist. Approximately 90% of the site is within the Cherry Creek Drainage Basin. The stormwater runoff for areas of proposed development within the East Cherry Creek basin drain to existing private Pond A and private Pond 12. The eastern half of Allen Ranch Road drains north to existing Pond 13, constructed with Filing No. 1. The site's major drainage basins are delineated along a high point in existing Allen Ranch Road that directs a portion of the site's stormwater north towards an existing private pond (Pond 12). The portion of the site draining south is directed to another existing private pond (Pond A). The Preliminary Drainage Report and Final Drainage Report prepared in June 2018 by Classic Consulting established release rates for Pond 12 using the NRCS Curve Number method. This report also established release rates for an onsite pond on the Clubhouse at Flying Horse North property. The Final Drainage Report developed by HR Green Development, LLC, dated June 2024 analyzed and established release rates for the portion of the development site draining south to Pond A within Filing No. 3.

A notable discrepancy was discovered that the entirety of the site within the Cherry Creek Basin was analyzed under Classic's report to drain north to existing Pond 12, while the subsequent Final Drainage Report prepared by HR Green assumed the southern half of the site drain south to existing Pond A. Based on current topographical data, the latter has been determined most accurate for considerations of this report.

The portion of The Clubhouse development draining into this basin will remain in compliance with the 2018 Classic report by proving that flows released to downstream infrastructure are less than anticipated.

### **Interbasin Transfer**

A portion of the subject site (0.27 acres) that was anticipated to drain into the Black Squirrel Creek Drainage Basin is now conveyed into the Cherry Creek Drainage Basin, generating an interbasin transfer. This basin, **Basin PR-1**, is comprised of the proposed clubhouse's rooftop, which will be directed southeast and conveyed to the proposed parking lot of **Basin EX-1** via roof drains. Ultimately, flows reach existing private Pond A within the Cherry Creek Basin. In the existing condition this basin was undeveloped and was conveyed southwest to the golf course via sheet flow, ultimately reaching existing Pond 6 of the Filing 3 development within the Black Squirrel Creek Basin.

Negative impacts are not anticipated with this transfer as release rates within the Cherry Creek Basin are maintained below existing via Pond A, and impervious and total area tributary to the Black Squirrel Creek Basin are reduced. Fees have been analyzed in the sections below.

### **c. Stakeholder Process**

There are no amendments to the current DBPS.

### **d. Agency Jurisdictions**

Listed below are the jurisdictions that this project will conform to:

El Paso County

Federal Emergency Management Agency

### **e. General Project Description**

The Clubhouse at Flying Horse North is located in the El Paso County jurisdiction within the larger Flying Horse North subdivision in a portion of platted Tract K within Filing No. 1. The site is bordered by the existing golf course within Filing No. 3 to the south and west, existing paved Allen Ranch Road to the east, and large lot single family residential lots to the north. The project contains approximately 9.07 acres within the northeast quarter of Section 36, Township 11 South, Range 66 West of the Sixth Principal Meridian. The acreage of this project is delineated from the remaining golf course area of Tract K on the western side by a metro district boundary.

This FDR covers The Clubhouse at Flying Horse North to analyze existing and proposed drainageways and facilities. Existing features on the development site include a clubhouse, paved parking lot, and cart storage building. The proposed development features improvement of Allen Ranch Road to an urbanized cross section, establishing one roadway access to Allen Ranch Road, an upgraded two-story clubhouse building, proposed storm extension, and paved parking lot while maintaining the cart storage building. There are four onsite basins tributary to an existing pond within Filing 3 (Pond A), two offsite basins comprised by Allen Ranch Road tributary to existing Pond 12 and the existing Jurisdictional Irrigation Reservoir (Pond 13) within Filing 1, and two onsite sub-basins within the Black Squirrel Creek Basin that are tributary to an existing detention facility in Filing No. 1 (Pond 6). Offsite basins to the south, tributary to Pond A were analyzed in the Filing 3 FDR using the Rational Method. Offsite basins to the north tributary to Pond 12 were analyzed with Classic's combined PDR and FDR using the NRCS Curve Number Method and are not incorporated in this analysis. An onsite private pond was anticipated with the 2018 Classic Report but is not proposed with this development due to topographical constraints, and subsequently aesthetics. Instead, the existing Pond A was assessed and determined adequate for treatment and detention of the entire Site (WQCV Exclusions discussed in the following sections).

The Filing No. 3 area south of the development was previously assessed in the approved 2018 Classic Consulting report with a similar land use plan that included 2-acre single-family residential estate lots and roadways. The approved Filing 3 FDR by HR Green assesses the lots as 2.5-acre lots. The layout shown in the existing conditions hydrology map of this report matches the 2.5-acre lots in the approved FDR by HR Green.

The existing vegetative cover is 90 percent as evidenced by a field survey and aerial imagery on unpaved areas. The existing vegetation includes native grasses and weeds, shrubs, and pine trees.

#### **f. Data Sources**

Listed Below are the technical resources reviewed in the preparation of this FDR:

El Paso County Drainage Criteria Manual (DCM)

Mile High Flood District

NOAA Atlas 14

NRCS Soil Survey for El Paso County Area, Colorado

FEMA FIRM 08041C0315G (eff. 12/7/2018)

El Paso County Assessor Property Records

Preliminary Drainage Report for Flying Horse North Preliminary Plan and Final Drainage Report for Flying Horse North Filing No. 1 prepared by Classic Consulting – June 2018

Flying Horse North Filing No. 3 Final Drainage Report prepared by HR Green Development LLC.  
– June 2024.

#### **g. Applicable Criteria and Standards**

Per the previous reports and El Paso County Criteria Manual, flows from the proposed site will be limited to historic flows to maintain the stability of the existing infrastructure within the drainage basins. Criteria within the County manuals default to the Mile High Flood District manuals where no detail or procedure is specified.

A distinct difference in the 2018 FDR/PDR and this report are the hydrologic methodologies utilized to compute peak runoff values. The 2018 Classic Consulting report utilized the NRCS Curve Number method in order to be consistent with their previous MDDP for the greater Flying Horse North master development. The NRCS Curve Number method was used for Filing No. 1 and the anticipated development of Filing No. 3 for sub-basins that did not exceed 100 acres. Typically, the Rational Method is used for hydrologic computations when basin analysis is under 100 acres due to the NRCS Curve Number method yielding smaller minor and major storm event peak runoff values. Because of the discrepancy between methodologies of the NRCS Curve Number and Rational Method's, existing hydrology calculations were completed on the subbasins within the Filing 1 area using the rational method. This was done to determine if any downstream mitigation was needed, which are discussed in the Filing 3 report.

HR Green has previously discussed this discrepancy in hydrologic methodology with El Paso County engineering staff for the Filing No. 3 development and it has been expressed that the chosen method for hydrologic computations is the Rational Method to ensure sound design of the storm infrastructure capacities.

Subbasins of consideration regarding the above analysis include the section of Allen Ranch Road north of the high point that are being conveyed to the existing roadside ditches along Allen Ranch Road. The notable conclusion of these basins is that flows have been decreased or remain the same at these design points utilizing the updated Rational hydrologic calcs under the existing versus proposed conditions.

## II. Project Characteristics

### a. Site Characteristics

The Clubhouse at Flying Horse North is located within both the Black Squirrel Drainage Basin and Cherry Creek Basin. A large portion of the development is located within the Cherry Creek Drainage Basin, while the remaining portion is encompassed in the Black Squirrel Creek Drainage Basin. The Black Squirrel Creek drainage basin encompasses 10.9 square miles of mostly forested area, generally slopes from east to west, outfalls into Monument Creek, and is a sub-basin of the Arkansas River. There is not a current planning study of the Cherry Creek Drainage Basin, but generally it slopes from southwest to northeast. The basin eventually flows into the South Platte River.

The existing Clubhouse at Flying Horse North site is being used as a temporary clubhouse with an asphalt paved parking lot and grass event lawn. Remaining portions of the site include landscaping and vegetation consisting of sparse native grasses, weeds, and pine trees. A temporary sediment basin exists on site and is planned to remain until construction of the ultimate clubhouse development. The existing Allen Ranch Road is a Rural Local roadway with roadside ditches.

The proposed Clubhouse at Flying Horse North development will include a new permanent clubhouse and parking lot, with remaining portions of the site including landscaping, permeable pavers, and existing vegetation consisting of sparse native grasses, weeds, and pine trees. The 2018 Classic report designated a future detention pond on-site to establish predevelopment release rates from the clubhouse site to the existing private Pond 12 to the north. An onsite pond is not proposed with this development, however, the flows to the existing private off-site Pond 12, Pond 13, and Pond 6 are decreased or remain unchanged compared to predevelopment conditions. This is achieved via diversion of stormwater through a proposed on-site private storm sewer system and a proposed public sewer system within the public right of way of Allen Ranch Road which connects to the existing public storm system constructed with the Filing No. 3. The storm sewer system ultimately directs flows to a modified version of the existing off-site Pond A within Filing No. 3, which captures and slowly releases the increased WQCV and 100-year volume from this development. Allen Ranch Road is proposed to be extended as a Modified Urban Local roadway with a detached sidewalk. This roadway section is an extension of the as-built roadway in the adjacent Filing 3 stretch of Allen Ranch Road to the south. The summary of discharge points and methods of compliance analysis are summarized below:

- The southwest portion of the site is conveyed to existing Pond 6 in Black Squirrel Creek Drainage Basin, previously studied in the Filing No. 3 FDR. Proposed flows are less to this pond due to roof drainage of the proposed clubhouse being directed southeast. Extents of the modifications to existing Basins BS-21.3 and BS-20 are analyzed to the Metro District Boundary of the subject site, as this portion is approximately less than 5% of the overall basin area.
- Allen Ranch Road is proposed to be extended as a modified urban roadway with attached sidewalk. A rip rap rundown on each side of the road allows flows from the proposed Allen Ranch Road extension to culminate in the existing roadway's typical cross section consisting of the lined



roadside ditch. Ultimately flows released in this ditch are less than or equal to the existing analyzed using the Rational Method.

- The southern portion of the site's stormwater is conveyed south to existing private Pond A, previously designed with the Filing No. 3 FDR. A majority of the northern portion of the site's stormwater is conveyed north to a proposed private 15' Type R sump inlet, where all flows are captured and redirected south to existing private Pond A. A slight interbasin transfer occurs where the proposed clubhouse roof convey flows southeast from the Black Squirrel Creek Basin to the Cherry Creek Drainage Basin. The increase in imperviousness area within the Cherry Creek Basin is mitigated via Pond A, which ultimately establishes lower flows than existing at the outfall. Pond A is privately maintained by the Flying Horse North Metropolitan District.

A detailed breakdown of drainage delineation to these key design points is described in the following sections. This Clubhouse at Flying Horse North FDR utilizes a similar naming convention for the sub-basins for comparison to the 2018 Classic Consulting FDR/PDR and Filing No. 3 report, where basins remain unmodified. Onsite flows analyzed to be released from the site to existing Pond 12 and Pond 13 were previously studied using the NRCS method under Classic's 2018 report. Flows tributary to these ponds have been re-analyzed to this point using the Rational Method as typical of sites under 100 acres, along with the corrected acreage of the site tributary the northern discharge point. This updated analysis of the existing condition was used to accurately compare drainage characteristics to the proposed condition.

Additionally, as seen in Appendix B, the total flowrates being released off-site into both Black Squirrel Creek Basin and Cherry Creek basin at the design points have been reduced overall. As a result negative impacts to downstream are not anticipated.

## **b. Compliance with DBPS and Previous Reports**

This FDR is in general conformance with the guidelines outlined in the Black Squirrel DBPS that were later refined with the Filing 3 FDR, and current established drainage flows released from the site to the Cherry Creek Basin via the 2018 report by Classic. The Clubhouse at Flying Horse North utilizes two private, full spectrum detention facilities to treat stormwater, minimize the effects of development, and mimic natural flow patterns. Intermediate flow conveyance has been considered and is discussed in the sections below.

Existing downstream infrastructure includes public downstream swales, public culvert, private ponds, storm sewer system, and a natural drainage channel that were designed and constructed per the approved 2018 Classic Construction Drawings. The existing public storm sewer system was constructed with the Filing 3 Construction Drawings. The site follows the DBPS and subsequent drainage reports and restricts offsite flow rates to not exceed historic flow rates. The site's ultimate outfalls will follow the same historic tributaries.

## **c. Soil Characteristics**

Per the NRCS web soil survey, the site is made up entirely of moderately-well drained, Type B soils that have a moderate infiltration rate when thoroughly wet. The site is almost evenly split between Elbeth sandy loam and Peyton sandy loam. See Appendix A for the NRCS soil map.

Current ground cover is predominantly covered by pavement while the remaining portions of the site exhibit sparse pine trees among native weeds and grasses. This portion of the site has very few, if any, trees and a minimal number of shrubs are found on the site.

## **d. Major Drainage Ways and Structures**

No major drainage ways exist within the development.



Drainageways of note including roadside swales as described within this report with parameters to demonstrate compliance with open channel design criteria and capacities. Natural tertiary drainageways and roadside swales are prescribed matting products or rip rap lining where necessary in order to minimize erosion and sediment runoff downstream per hydraulic analysis.

### III. Hydrologic Analysis

#### a. Major Basins and Sub-basins

##### Major Basin Description

- Previous basin study: Black Squirrel Drainage Basin Planning Study refined with the Flying Horse Filing No. 3 FDR, Cherry Creek Basin release rates established with 2018 Classic FDR
- Per FEMA FIRM 08041C0315G (eff. 12/7/2018), there are no FEMA Floodplains within this Filing

The site has been divided into several major drainage basins where each basin is tributary to an existing full spectrum detention pond facility. These basins and associated sub-basins are described in more detail in the next section of this report.

This FDR utilizes a similar naming convention for the basins and sub-basin as the 2018 Classic Consulting PDR/FDR and Filing No. 3 FDR in order to more easily compare and contrast the final developed drainage conditions for the filing.

##### Existing Subbasin Description

The existing conditions for The Clubhouse at Flying Horse North are consistent with the proposed conditions and hydrology map presented within the approved Filing 3 report. The entire site was originally designed and accounted for downstream at existing private Pond 12 in the 2018 Classic report. The highpoint of Allen Ranch Road is observed to be slightly south of the previously analyzed location in the 2018 Classic Report and Filing 3 FDR. Flow modifications in the existing condition due to this change are modeled with the hydrologic rational calcs. In the Filing 3 FDR, a southern portion of the site was accounted for in existing, private Pond A. This assumption has been deemed most accurate therefore current onsite basin delineation follows this assumption. Basins tributary to each pond are analyzed in the next section. The previous report's developed conditions drainage maps are included in the appendix section of this report for reference. The developed conditions drainage map within the Filing No. 3 area are now the existing conditions of that area for this report. These conditions established the existing conditions drainage map for this report. Modified basins from these reports are discussed at the design points below.

##### Design Point 3 ( $Q_5 = 9.9$ cfs, $Q_{100} = 23.1$ cfs)

**Basin EX-2** comprises the northern 4.72 acres of the subject site that is tributary to Pond 12. It is comprised of a clubhouse, parking lot, storage cart building, and landscaped area. This onsite area was previously studied as **Basin CC-4C** in the 2018 Classic Report. **Basin OS-3** consists of 0.48 acres of the western half of Allen Ranch Road from the high point to the northern property line (Approximately 2.1% of Basin CC-5 from Classic's Report in its entirety). Flows from these basins combine at the design point and are conveyed north via sheet flow to the triangular, rolled erosion control product (North American Green SC150) lined ditch along the west side of existing, paved Allen Ranch Road (public). The ditch terminates at a low point along the west end of existing, paved Old Stagecoach Road (Public). Flows culminate at an existing, public 36" RCP culvert and are conveyed north under the road, ultimately reaching existing private Pond 12 via natural unlined channel.

Design points from the 2018 Classic Report do not correspond directly to the location of Design Point 3, however, this area has been re-analyzed and compared to the proposed condition under the Rational Method.

**Design Point 4 ( $Q_5 = 2.2$  cfs,  $Q_{100} = 3.9$  cfs)**

**Basin OS-4** is comprised of 0.48 acres of the eastern half of Allen Ranch Road that is approximately 5.9% of **Basin CC-4B** studied in the 2018 Classic Report. This basin was analyzed at 100% imperviousness up to the Right of Way, as typical for a roadway section. Flows are conveyed northeast via sheet flow to the lined roadside ditch (North American Green SC150) at **Design Point 4**, ultimately reaching the existing jurisdictional irrigation reservoir (Pond 13).

Design points from the 2018 Classic Report do not correspond directly to the location of Design Point 4, however, this area has been re-analyzed and compared to the proposed condition under the Rational Method.

**Design Point 5 ( $Q_5 = 0.7$  cfs,  $Q_{100} = 20.3$  cfs)**

**Basin EX-3** is comprised of the western, undeveloped area of the site that slopes at approximately 5:1 towards the existing golf course within the Black Squirrel Creek Drainage Basin. This basin represents approximately 1% of **Basin BS-21.3** of the Filing No. 3 Final Drainage Report. Flows are conveyed to the golf course via sheet flow at the design point, ultimately reaching existing private Pond 6.

**Design Point 6 ( $Q_5 = 0.5$  cfs,  $Q_{100} = 21.3$  cfs)**

**Basin EX-4** is comprised of the southern, undeveloped area of the site that slopes at approximately 5:1 towards the existing golf course within the Black Squirrel Creek Drainage Basin. This basin represents approximately 5% of **Basin BS-20** of the Filing No. 3 Final Drainage Report. Flows are conveyed to the golf course via sheet flow at the design point, ultimately reaching existing private Pond 6.

### **Proposed Subbasin Description**

Areas analyzed at Design Points corresponding to basins previously studied with the Classic Report were broken down and reanalyzed using the Rational Method where necessary and compared to previous flows established with the NRCS method as well as updated rational calcs at that location. Existing Pond A has been assessed for detention volumes, drain times, and release rates as a result of contributions from the entire development of The Clubhouse at Flying Horse North. Existing intermediate infrastructure has been analyzed for capacity. Proposed onsite storm sewer tributary to and from this pond shall be private unless otherwise noted. Refer to the sections above for detailed information of the interbasin transfer.

The following design points are presented on the Proposed Conditions Drainage Map within the appendix and are described below:

**Design Point 1 ( $Q_5 = 2.9$  cfs,  $Q_{100} = 9.2$  cfs)**

**Design Point 1** represents the developed flows from **Basins PR-5 and CC-34.3**. Basin flows are captured at an existing public 15' Type R on grade inlet. The on-grade inlet is capable of capturing 2.9 CFS (100%) of the 5-year flow and 8.8 CFS (96%) of the 100-year flow, leaving a total of 0.0 & 0.4 CFS left as bypass, respectively, to be channelized in EPC type A curb and gutter in Allen Ranch Road and captured at **Design Point 1.1**. The captured flow will travel down to **Design Point 1.1** via public 30" RCP storm sewer. Bypass flow in the existing condition at this location was previously 0 and 1.4 cfs. Adequate street and inlet capacity has been verified and hydraulic calculations are included in Appendix C.

**Design Point 1.1 ( $Q_5 = 1.0$  cfs,  $Q_{100} = 5.6$  cfs)**

**Design Point 1.1** represents the developed direct basin flow from **Basin CC-34** as well as the bypass flow in **Design Point 1** and **Design Point 1.2**. These flows will be channelized into the streets curb and gutter to **Design Point 1.1** where they will be captured by an existing 5' CDOT type R sump inlet. Flows at this location have decreased compared to existing ( $Q_5=1.2$ ,  $Q_{100}=7.3$  cfs). All flows are captured and piped via existing public 24" RCP storm sewer to converge with flows captured at **Design Point 1.3**, then are conveyed to existing Pond A at **Design Point 2**. Adequate street and inlet capacity has been verified and hydraulic calculations are included in Appendix C.

**Design Point 1.2 ( $Q_5 = 7.9$  cfs,  $Q_{100} = 14.6$  cfs)**

**Design Point 1.2** represents the developed basin flows from **Basin CC-34.4**. Flows from this basin have been calculated to be conservative to account for future development and will be directed via EPC type A curb and gutter to be captured by an existing 15' CDOT type R on-grade inlet. The on-grade inlet is capable of capturing 7.7 CFS (97%) of the 5-year flow and 11.6 CFS (79%) of the 100-year flow, leaving a total of 0.2 CFS and 3.0 CFS left as bypass, respectively, to be channelized and captured at **Design Point 1.1**. The captured flow is conveyed to **Design Point 1.1** via existing public 24" RCP storm sewer. Captured flows remain the same at this location as previously analyzed in the Filing 3 FDR.

**Design Point 1.3 ( $Q_5 = 6.2$  cfs,  $Q_{100} = 11.0$  cfs)**

**Design Point 1.3** represents the developed basin flows from **Basins CC-34.2 & OS-2**. These basins represent the east side of the proposed roadway and are channelized via EPC type A curb and gutter. Channelized flows are directed to a low point at this design point and are captured by an existing 10' CDOT type R sump inlet. Captured runoff is combined with flows from **Design Point 1.1** and is routed to Pond A via existing public 36" RCP storm sewer. Captured flows in the 5 year event are slightly lower than previously analyzed in the Filing 3 FDR.

**Design Point 2 ( $Q_5 = 30.7$  cfs,  $Q_{100} = 79.1$  cfs)**

**Design Point 2** represents the developed flows from **DP1.3 and Basin CC-34.1** at the existing, private full spectrum detention pond (Pond A). **Basin CC-34.1** is conveyed to the pond via sheet flow. The public storm infrastructure conveys the runoff to Pond A for full spectrum detention. The rational flows at this design point are used for existing spillway design verification calculations. Design revisions to the original CD's have been incorporated into construction of the pond's outlet structure and spillway. The revisions are shown in Appendix E.

In order to meet WQCV, EURV, and 100 year drain times, pond regrading from 4:1 to 3:1 side slopes is proposed as well as an orifice plate swap. See Appendix D for Pond A calculations.

**Design Point 3 ( $Q_5 = 7.1$  cfs,  $Q_{100} = 13.3$  cfs)**

**Basin PR-3** comprises the northern portion of the site's stormwater that is tributary to the proposed 15' Type R sump inlet at the design point. It is comprised of the proposed permanent clubhouse, asphalt paved parking lot, existing storage cart building, and landscaped area. This onsite area was previously studied as **Basin CC-4C** in the 2018 Classic Report. The shortest pavement width of the parking lot is 28', similar to that of Allen Ranch Road. Therefore, the assumption was made that capacity through the parking lot is also proportional. Flows from this basin are conveyed south via proposed private 18" storm sewer to **DP9**. A low point utilizing an ~8 inch depth is graded in to keep peak flows onsite. See Appendix C for hydraulic calculations of the sump inlet capacity.

A portion of the private access east of the high point drains directly offsite. This area (portion of **Basin OS-3**) is treated as a WQCV exclusion and is detailed in the Four Step Process Section Below.

**Design Point 4 ( $Q_5 = 3.2$  cfs,  $Q_{100} = 5.8$  cfs)**

**Basin OS-3** consists of 0.48 acres of the western half of Allen Ranch Road from the high point nearly to Old Stagecoach Road. Runoff is conveyed north via proposed Type A curb and gutter of Allen Ranch Road, ultimately discharging into the existing roadside ditch from a rip rap rundown. The existing ditch is rectangular, rolled erosion control product (North American Green SC150) lined. This basin is treated as a WQCV exclusion and is detailed in the Four Step Process Section Below.

This ditch has been determined to have adequate capacity with the lining based on the decrease in flows from the reanalyzed Rational Calcs in the existing condition. Cross sections are provided in Appendix C. The rip rap utilized for the rundown shall conservatively be the same as the parking lot rundown.

**Design Point 5 ( $Q_5 = 2.2$  cfs,  $Q_{100} = 3.9$  cfs)**

**Basin OS-4** is comprised of 0.48 acres of the eastern half of Allen Ranch Road that is approximately 5.9% of **Basin CC-4B** studied in the 2018 Classic Report. This basin was analyzed at 100% imperviousness up to the Right of Way. Flows are conveyed north in the curb and gutter to the lined roadside ditch (North American Green SC150) via rip rap rundown at **Design Point 5**, ultimately reaching the existing jurisdictional irrigation reservoir (Pond 13). This basin is treated as a WQCV exclusion and is detailed in the Four Step Process Section Below.

This ditch has been determined to have capacity based on flows remaining the same as Rational Calcs in the existing condition. Cross sections of the existing ditch are included in Appendix C. The rip rap utilized for the rundown shall conservatively be the same as the parking lot rundown.

**Design Point 6 ( $Q_5 = 0.3$  cfs,  $Q_{100} = 18.7$  cfs)**

**Basin EX-3** is comprised of the western, undeveloped area of the site that slopes at approximately 5:1 towards the existing golf course within the Black Squirrel Creek Drainage Basin. This basin represents approximately 1% of **Basin BS-21.3** of the Filing No. 3 Final Drainage Report. Runoff from this basin is decreased since the proposed clubhouse roof will slope to the northeast (Existing  $Q_5 = 0.7$  cfs,  $Q_{100} = 20.3$  cfs). Due to this decrease and existing drainage patterns remaining, downstream infrastructure is determined to have adequate capacity as previously designed. Flows are conveyed to the golf course via sheet flow at the design point, ultimately reaching existing private Pond 6. The imperviousness of this basin has not increased, therefore the disturbed area does not contribute WQCV volume.

**Design Point 7 ( $Q_5 = 0.5$  cfs,  $Q_{100} = 21.3$  cfs)**

**Basin EX-4** is comprised of the southern, undeveloped area of the site that slopes at approximately 5:1 towards the existing golf course within the Black Squirrel Creek Drainage Basin. This basin represents approximately 5% of **Basin BS-20** of the Filing No. 3 Final Drainage Report. Runoff from this basin remains the same as previously studied in the Filing 3 FDR since the ridge that divided the major basins is maintained with site grading. Due to existing drainage patterns remaining and no change in runoff volume, downstream infrastructure has been determined to have adequate capacity as previously designed. Flows are conveyed to the golf course via sheet flow at the design point, ultimately reaching existing private Pond 6.

#### **Design Point 8 ( $Q_5 = 0.5$ cfs, $Q_{100} = 3.3$ cfs)**

**Basin PR-4** is comprised of 1.48 acres of the northern, undeveloped portion of the Site. This basin follows historic drainage patterns, sheet flowing to the Allen Ranch Road public roadside ditch and is conveyed ultimately to the existing public 36" RCP culvert (Filing 1) that crosses Old Stagecoach Road. Flows are decreased to this location since the remaining onsite flows are not conveyed to this ditch and culvert. The imperviousness of this basin is not increased and therefore contributes no volume to the WQCV.

#### **Design Point 9 ( $Q_5 = 5.7$ cfs, $Q_{100} = 10.9$ cfs)**

**Basin PR-1** consists of 0.27 acres of the proposed clubhouse roof that is directed to the southern parking lot area (**Basin PR-2**) via roof drains. **Basin PR-2** is comprised of 1.66 acres of the proposed parking lot that is split by a high point. Flows are conveyed southeast to a proposed rip rap lined channel that outfalls onsite to a proposed private Type D sump inlet. Captured runoff is directed south via proposed public 24" storm sewer under Allen Ranch Road. Capacity of the inlet at the design point can be viewed in Appendix C.

### **b. Water Quality and Detention Facilities**

The flows and WQCV to the existing off-site Pond 12 are decreased. Therefore, no improvements are recommended to the existing infrastructure. The flows to the existing off-site Pond 13 remain unchanged from the existing condition and therefore no volume is contributed to the WQCV and no improvements are recommended. The flows and WQCV to the existing off-site Pond 6 are decreased, so there are no recommended improvements to the existing infrastructure.

With the proposed changes in drainage pattern and peak runoff described in this report, some of the existing Filing No. 3 Pond A infrastructure including the trickle channel and outlet structure with 2.5-foot depth micropool are sufficient for the increased flows from the developed site without modification. The Flying Horse Filing No. 3 FDR sized the Pond A forebay per a now superseded MHFD EBD factsheet using volume of 3% of the WQCV. Per current criteria, MHFD now prescribes sizing the forebay with a volume of 1% of the WQCV. Therefore, it was calculated that the existing forebay has capacity for the increased WQCV. A 12' width maintenance path allows vehicular access to the bottom of pond to access forebays and outlet structures for continued maintenance. The pathway provides access from the public right-of-way and proper turning radii and longitudinal and cross slopes for a maintenance vehicle. The pond is privately maintained by the Flying Horse North Metropolitan District.

The increased flows and WQCV from the clubhouse development require the following modifications to Filing No. 3 Pond A in the developed condition. To sufficiently increase the storage volume of the pond and lower ponding depths, regrading the side slopes from 4:1 to 3:1 is proposed. The existing forebay notch width is to be resized by saw cut to maintain a drain time between 4 and 5 minutes. The orifice plate within the outlet structure is to be swapped to maintain required WQCV and EURV drain times. The emergency spillway is to be widened to maintain 3' of freeboard between from the 100 year undetailed flow and the top of pond. The calculations for this analysis and the modifications are provided in Appendix D.

The summary assessment of the existing downstream private pond (Pond A) is described in the table below. Calculations are provided in Appendix D. Notable conclusions include similar functionality of the pond with the increase in required volumes.

On GEC Plans, clearly label all of these mod's on plan views and provide details as well. See my comments on GEC Plans for more specifics.

**HRG Response:**  
Details of modification pond added to GEC.

Pond A Functionality Comparison								
	WQCV Volume	EURV Volume	100 Yr Volume	WQCV Drain Time	EURV Drain Time	100 Yr Drain Time	5 Yr Outflow	100 Yr Outflow
Existing	0.350 ac-ft	0.570 ac-ft	0.933 ac-ft	40 hrs	65 hrs	73 hrs	2.1 cfs	24.0 cfs
Proposed	0.403 ac-ft	0.669 ac-ft	1.063 ac-ft	41 hrs	63 hrs	77 hrs	0.5 cfs	23.2 cfs

The table below provides a summary of the flows to each of the existing off-site detention facilities.

Pond Flow Summary					
Pond	Filing	Ex Q <sub>5</sub> (cfs)	Ex Q <sub>5</sub> (cfs)	Pr Q <sub>100</sub> (cfs)	Pr Q <sub>100</sub> (cfs)
6	1	1.2	41.6	0.8	40
12	1	10.2	23.7	3.7	7.2
13	1	2.2	2.2	3.9	3.9
A	3	25.9	76.2	37.7	98.2

The Engineer of Record has verified that the existing off-site and on-site PCM's that the Clubhouse site is tributary to are functioning as intended and it is anticipated that the developed condition of the Clubhouse site will not adversely effect these PCM's.

### c. Methodology

Design rainfall was determined utilizing Table 6-2 from the City of Colorado Springs Drainage Criteria Manual to determine the 5-year and 100-year rainfall values for the 1-hour events. The 1-hour rainfall depths are 1.5 and 2.52 in/hr respectively.

Runoff coefficients and associated imperviousness were utilized per Table 6-6 of the County DCM. Existing golf course areas are to remain undisturbed and utilize a land use category of "lawn" with a percent imperviousness of 2%. Composite coefficients, rainfall intensities, and runoff flow rates are calculated on a Rational Method spreadsheet and provided within Appendix B. As discussed previously, the Rational Method used will typically result in higher peak flow rates for the minor and major storm events as compared to the 2018 Classic Consulting FDR/PDR which utilized the NRCS Curve Number Method, however, flows released at the respective design points are less than existing as studied under either method. Design points within The Clubhouse at Flying Horse North are strategically identified based on existing Filing No. 3 storm infrastructure, the 2018 Classic Report release location, and areas where the development improvement extents modify flow characteristics.

The MHFD UD-Detention spreadsheet is utilized for stormwater detention basin sizing and outlet structure design to meet standard release rates at or lower than historical drainage rates. The outlet structure orifice plate and restrictor plate for the proposed detention ponds located are designed to meet standard release rates of 40 hours for Water Quality Capture Volume (WQCV), between 40 and 72 hours for Excess Urban Runoff Volume (EURV), and between 72 and 120 hours for the 100-year storm volume. Reference to the 2018 Classic Consulting PDR/FDR and Filing 3 FDR calculations and spreadsheets are included in Appendix E to demonstrate compliance and consistency with the previously approved report which anticipated similar land uses and basin acreages tributary to existing stormwater facilities.



## IV. Hydraulic Analysis

### a. Major Drainageways

There are no major drainageways that exist within the development of The Clubhouse at Flying Horse North.

### b. Storm Sewer Infrastructure and Culvert Pipes

A storm system extension is proposed to capture and convey onsite flows to existing offsite Filing No. 3 Pond A. Proposed onsite storm shall be privately maintained by the Flying Horse North HOA. This storm system has been verified for capacity requirements, and StormCAD modeling excerpts are provided in Appendix C.

An existing public storm sewer system was constructed with Filing 3 that conveys flows from Allen Ranch Road to Pond A via several on-grade and sump CDOT Type R public inlets. This infrastructure has been evaluated due to the modifications in flows resulting from the proposed development, and updated StormCAD modeling is provided in Appendix C.

## V. Environmental Evaluations

### a. Significant Existing or Potential Wetland and Riparian Areas Impacts

Bristlecone Ecology, LLC previously performed environmental studies of the Filing 3 site that were provided with planning documents. Major information in the report concerning wetlands concludes that there is a wetland associated with Black Squirrel Creek. Black Squirrel Creek is classified as a jurisdictional stream. No environmental study for the Filing No. 1 area was discovered.

There are no improvements proposed for Black Squirrel Creek. The minimal impact to the stream will keep the natural habitat intact and the natural function of the Creek as it is to maintain the wetland habitat.

### Stormwater Quality Considerations and Proposed Practices

The facilities are designed using El Paso County criteria and provide stormwater quality by slowing the release of stormwater captured by the ponds and allowing solids to settle out.

On site practices for the Clubhouse include direct discharge of roof and hardscape runoff to the surrounding parking lot, which is conveyed offsite to the proposed 15' Type R sump inlet. Impervious areas are routed across the landscaped areas where feasible.

### c. Permitting Requirements

When work infringes upon the wetlands or floodplain a 404 Permit will be required. If the work within the waterways is minimal, it will likely be covered under a nationwide 404 permit; it is however possible that an individual permits will be required.

The Colorado Department of Public Health and Environment will require permits for any disturbance that exceeds 1 acre of land. Should groundwater be encountered, a dewatering permit will also be required.

El Paso County will require an Erosion and Stormwater Quality Control Permit and any other construction permits required to complete the construction of the site.

Should development occur which affects the floodplain, FEMA will require a permit for work within the floodplain prior to the commencement of any construction or development within any special flood hazard

area (SFHA). If the infrastructure is to be installed within the channel the designer shall route the design through the proper FEMA channels whether that be with a no rise certification or via the CLOMR/LOMR process should a more major improvement within the floodplain be proposed. This project does not propose any direct development within the floodplain.

#### **d. 4-Step Process**

In accordance with the Engineering Criteria Manual I.7.2.A and DCM V2, this site has implemented the four-step process to minimize adverse impacts of urbanization. The four-step process includes reducing runoff volumes, stabilizing drainageways, treating the water quality capture volume, and considering the need for Industrial Commercial BMPs.

**Step 1 – Reducing Runoff Volumes:** This project utilizes Level I MDCIA. Runoff across impervious areas is disconnected across the parking lot islands through landscaping and permeable pavers. Existing Pond A provides WQCV treatment for the disturbed areas that exhibit an increase in imperviousness. The disturbed areas that remain undeveloped do not contribute to the WQCV volume as the empirical equation has an imperviousness component built in. A summary of the water quality treatment exclusions are provided below and a table is provided in Appendix B. These areas are also hatched on the drainage map in the Appendices.

**ECM Exclusion I.7.1.B.2.2 (0.98 acres):** The extension of Allen Ranch Road is excluded from WQCV treatment as at the roadway redevelopment does not increase the pavement width by more than 8.25' at any point.

**ECM Exclusion I.7.1.B.7 (1.19 acres):** Disturbed areas that are undeveloped and will remain undeveloped after being disturbed account for 1.19 acres of the disturbed area and are excluded from WQCV treatment.

**ECM Exclusion I.7.1.C.1 (0.15 acres):** A portion of the proposed private access to Allen Ranch Road (0.13 acres) and the concrete pad on the west end of the site (0.02 acres) are excluded as impractical for treatment with this development due to natural/existing drainage patterns and topography. These areas are to daylight to match existing elevations within the site's property boundary and are to be landscaped. Total acreage from this exclusion is less than one acre and less than 20% of the disturbed area allowed by the County (~1.6% of total disturbance). This exclusion was not utilized with the original design of Filing No. 3 Pond A (SF2326).

**Step 2 – Stabilize Drainageways:** Roadside ditches are stabilized swales by way of compaction per the roadway typical section and are also prescribed any required seeding, rip rap lining, erosion control blanketing, and/or matting per the previous 2018 Classic Report and Filing 3 FDR. These improvements have been analyzed for their capacity to minimize erosion and sediment runoff as a stabilized drainageway. Notably, proposed flows to these locations have been reduced from existing.

**Step 3 – Provide WQCV:** Runoff from this development is treated through capture and slow release of the WQCV via existing offsite detention ponds. Existing offsite private full spectrum detention ponds 6, 12, and 13 within Filing No.1 provide water quality treatment for the areas of the site that are not excluded or tributary to Filing No. 3 Pond A without modification as developed flows and WQCV remain the same or are reduced compared to existing flows. Existing Pond A treats a remaining non-excluded area of disturbance of 7.05 acres with the modifications described in this report.

**Step 4 – Consider the need for Industrial and Commercial BMP's:** A site specific Grading & Erosion Control Plan and Stormwater Management Plan have been prepared in conjunction with this report. Site specific



temporary source control BMPs are detailed in this plan and narrative. Guidelines detailed in the El Paso DCM V2 4.2 pertaining to the covering and storage handline and spill containment and control shall be followed as necessary. This filing does not contain any commercial or industrial land uses, therefore, specialized BMP's are not being implemented.

## VI. Drawings

Refer to the appendices for the Vicinity Map, FEMA Floodplain Map, NRCS Soils Map, hydrology and hydraulic calculations, and drainage basin maps. Reference materials from previously approved reports are included in the appendix including the 2018 Classic Consulting FDR/PDR and Filing 3 FDR calculations and drainage maps.

## VII. Drainage and Bridge Fees

The subject site is platted as a portion of Tract K of Flying Horse North Filing No. 1. The East Cherry Creek Basin does not currently have a Drainage Basin Fee, however, drainage and bridge fees were paid for the Filing No. 1 platted areas within the Black Squirrel Creek Basin. A breakdown of the subject site's responsibility of fees is described below.

The acreage for Flying Horse North Filing No. 1 within the Black Squirrel Creek Drainage Basin is 342.7 acres which was broken into 2.5 acre lots at 11% imperviousness (including roads and tracts) and golf course areas at 2% imperviousness. The drainage fee portion of fees paid were reduced to 39.1% of the overall since the development utilized FSD Ponds within the drainage basin rather than claiming a reduction for low density lots. This reduction was based on the overall Filing 1 imperviousness. This percentage reduction has been applied proportionately to the subject site's total drainage fees paid. A detailed breakdown including the area of the subject site was not developed, therefore, it is assumed that the portion of the site residing within the Black Squirrel Creek Drainage Basin (southwest 2.33 acres) was paid for per the 2018 Drainage and Bridge Fees as follows:

2018 Drainage Fee For The Clubhouse at Flying Horse North (Tract K)						
Site Acreage	Imperviousness	Imp. Acres	Fee/Imp. Ac.	Fee Amount	Reduction	Fee Paid
2.33	2%	0.05	\$7,808.00	\$390.40	39.1%	\$152.65

2018 Bridge Fee For The Clubhouse at Flying Horse North (Tract K)						
Site Acreage	Imperviousness	Imp. Acres	Fee/Imp. Ac.	Fee Amount	Reduction	Fee Paid
2.33	2%	0.05	\$492.00	\$24.60	0.00%	\$24.60

A portion of the subject site (0.27 acres) that historically drained into the Black Squirrel Creek Drainage Basin is now conveyed into the Cherry Creek Drainage Basin (see Basin PR-1 description in the sections above), generating an interbasin transfer. Fees have been paid according to Black Squirrel Creek Drainage Basin fees during 2018. No drainage fees are present for the Cherry Creek Basin, therefore, no increase in drainage and bridge fees to this basin is proposed. No reclamation of the previously paid amount is made either.

## VIII. Deviations

A total of three deviations including velocities in existing pipes, pond side slopes, and a modified urban local roadway cross section are being requested and concurrently submitted with this project. These deviations and supporting justifications are summarized below:

1. The 100 year velocity in existing Pipe 35 has increased to 19.1 feet per second in the 100 year event due to onsite flow modifications, slightly exceeding the County's 18 feet per second maximum. The effects of this velocity have been determined to be negligible since the pipe span is a short 60 feet compared to the overall system, and the pipe immediately outfalls to a concrete forebay with an energy dissipator.
2. The 100 year velocity in existing Pipe 39 has decreased to ~1.8 feet per second in the 100 year event due to upstream flow modifications, and is below the County's 3.0 feet per second minimum. The effects of this velocity have been determined to be negligible since the pipe span is a short 17 feet compared to the overall system, and the upstream end of this pipe is an inlet. Turbulent inflow at the inlet during a varying magnitude of storm events is anticipated to provide means of natural cleansing within the pipe.
3. The Modified Urban Local Cross Section includes a detached 5' sidewalk rather than 5' attached sidewalk and 60-foot Right of Way versus a 50-foot Right of Way. This allows for more usable land for continuation of the previously approved cross section in Filing 3 and provides increased pedestrian safety via a detached walkway.

## IX. Summary

The Clubhouse at Flying Horse North is a 9.07-acre commercial lot development area that will contain one access to Allen Ranch Road, a paved parking lot, and two-story clubhouse. The modified urban local cross section of Allen Ranch Road will also be extended to the north to Old Stagecoach Road to prevent rural-to-urban breaks, subsequently eliminating the roadside ditches throughout this section. A rip rap rundown is proposed at the end of this transition to accommodate concentrated flows. One existing full spectrum detention facility (Pond A) will be modified to provide detention and water quality treatment for the developed area and release the stormwater below historical rates. Existing Pond A requires 3:1 side slopes and a swapped orifice plate to achieve the required increase in volume and release rates. A storm system is proposed onsite to adequately convey flows to existing Pond A from the site. The storm sewer system becomes public where it crosses the right of way, and onsite storm sewer shall be privately maintained by the Flying Horse North HOA. The intermediate pipes and junction structures to the existing pond have been evaluated for capacity and construction feasibility considering the increase in flow from this site. Flows released to other existing detention facilities (Pond 6, Pond 12, Pond 13) have been re-analyzed under the Rational Method where applicable. No modifications are required, as the ponds have adequate capacity and water treatment capability to handle the same or reduced flows compared to existing.

A total of three deviations including velocities in two existing pipes, and a modified urban local roadway cross section are being requested and concurrently submitted with this report. Preliminary descriptions and justifications for these variances are summarized above.

The existing infrastructure has been evaluated with current County and MHFD drainage design standards, therefore, it is anticipated that there will be no negative impacts to downstream and surrounding developments and facilities due to the development of The Clubhouse at Flying Horse North.

## X. References

El Paso County – Drainage Criteria Manual, 2014

City of Colorado Springs – Drainage Criteria Manual, May 2014

Urban Storm Drainage Criteria Manual, Urban Drainage Flood Control District, January 2018

Mile High Flood District Urban Storm Drainage Criteria Manual Volumes 1, 2, and 3; latest revisions

Mile High Flood District Software Resources and Tools (UD-Detention, UD-Inlet, UD-BMP)

United States Department of Agriculture National Resources Conservation Service Rock Chute Design Data Spreadsheet

Preliminary Drainage Report for Flying Horse North Preliminary Plan and Final Drainage Report for Flying Horse North Filing No. 1, Classic Consulting Engineers and Surveyors, November 2017, Revised June 2018

Final Drainage Report Addendum No. 1 “Preliminary Drainage Report for Flying Horse North Preliminary Plan and Final Drainage Report for Flying Horse North Filing No. 1”, Classic Consulting Engineers and Surveyors, January 2021

Flying Horse North Filing No. 3 Final Drainage Report, HR Green Development, LLC., June 2024

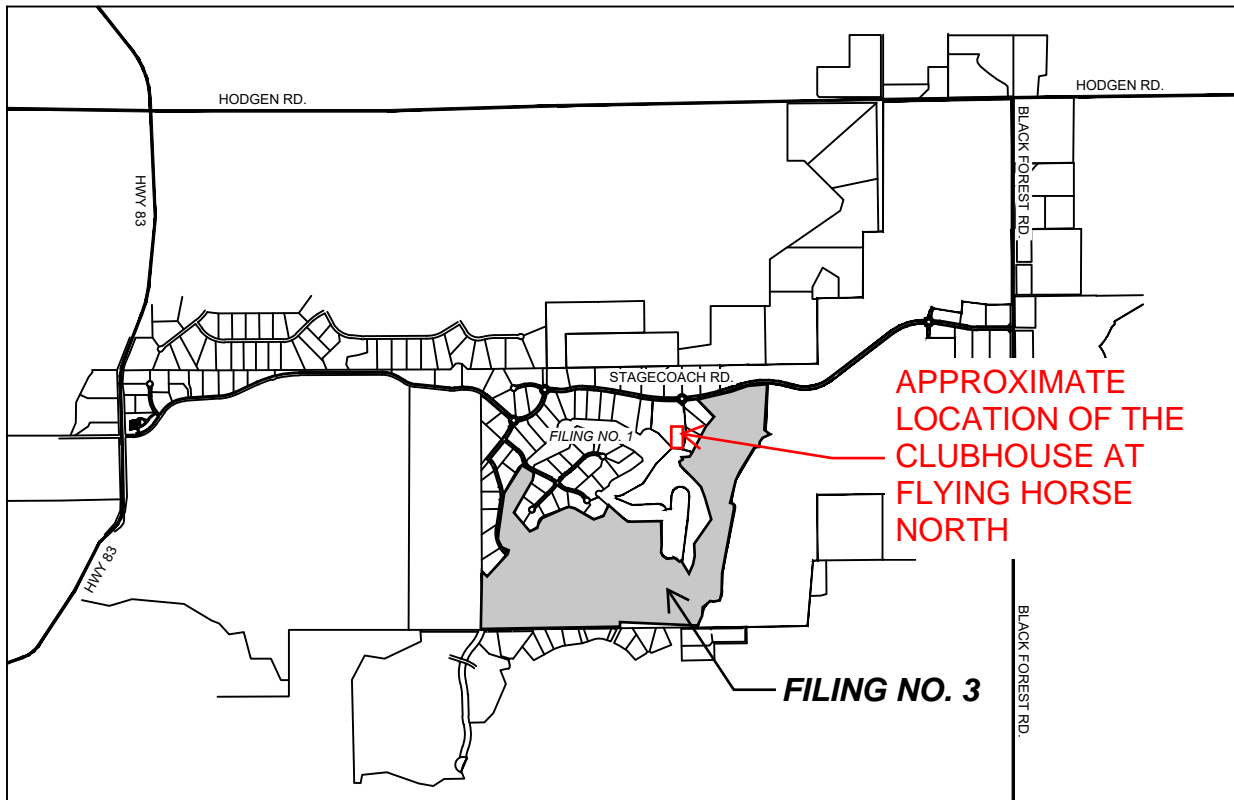
Black Squirrel Drainage Basin Planning Study (DBPS), URS Consultants, January 1989

## Appendix A: Maps & Exhibits

# VICINITY MAP

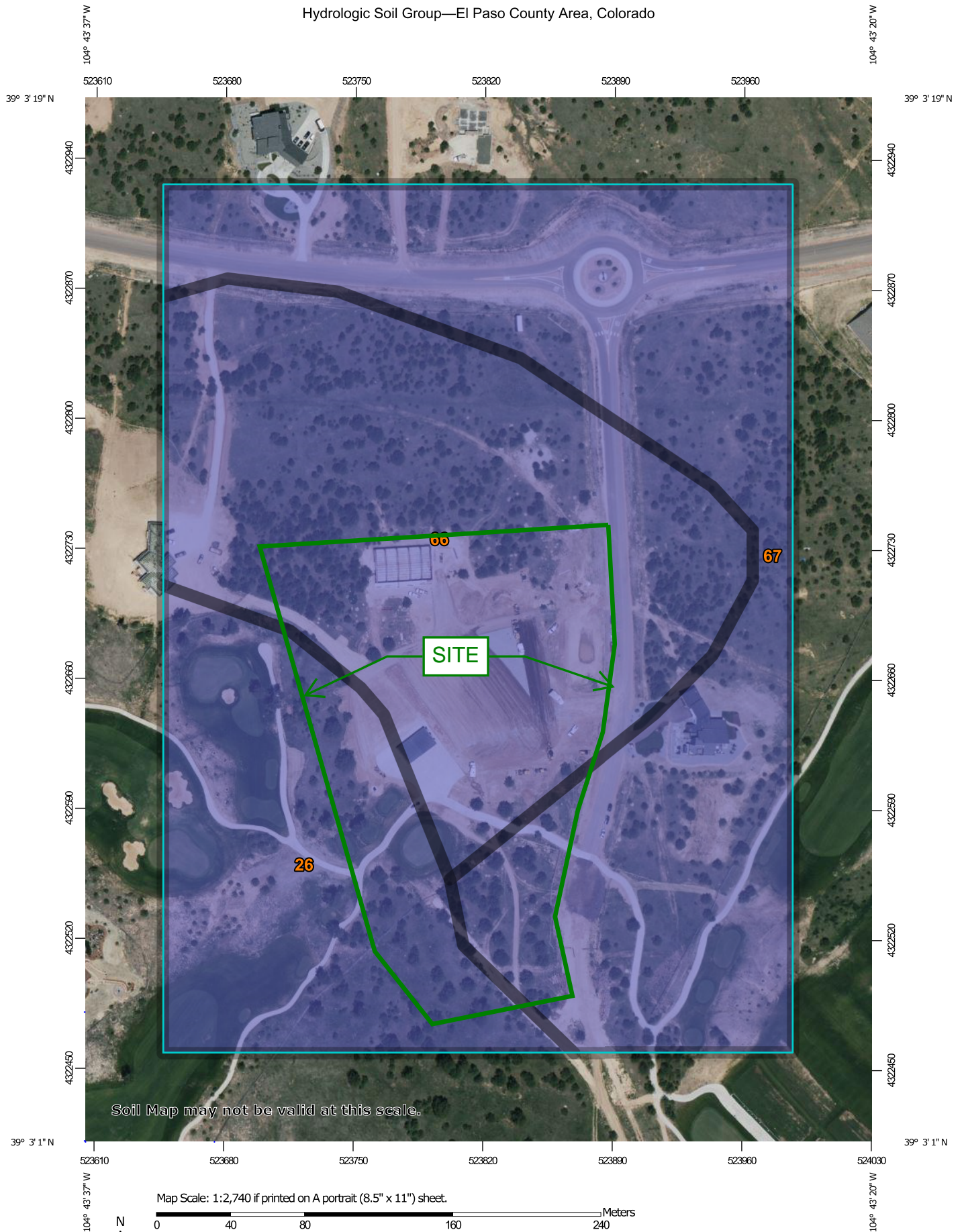
## FLYING HORSE NORTH FILING NO. 3

A PORTION OF SECTION 36, TOWNSHIP 11 SOUTH, RANGE 66 WEST OF THE SIXTH PRINCIPAL MERIDIAN,  
COUNTY OF EL PASO, STATE OF COLORADO

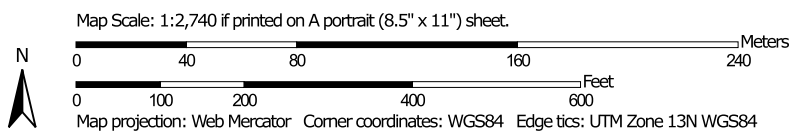


NOT TO SCALE

# Hydrologic Soil Group—El Paso County Area, Colorado



Soil Map may not be valid at this scale.



**Natural Resources  
Conservation Service**


Web Soil Survey  
National Cooperative Soil Survey

1/20/2025  
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.

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

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

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

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

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

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

Soil Survey Area: El Paso County Area, Colorado  
 Survey Area Data: Version 22, Sep 3, 2024

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

Date(s) aerial images were photographed: Jun 9, 2021—Jun 12, 2021

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
26	Elbeth sandy loam, 8 to 15 percent slopes	B	8.4	21.4%
66	Peyton sandy loam, 1 to 5 percent slopes	B	15.1	38.3%
67	Peyton sandy loam, 5 to 9 percent slopes	B	15.9	40.3%
<b>Totals for Area of Interest</b>			<b>39.4</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 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, NINGS12  
National Geodetic Survey  
SSMC-3, #9202  
1315 East-West Highway  
Silver Spring, MD 20910-3282

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

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

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

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

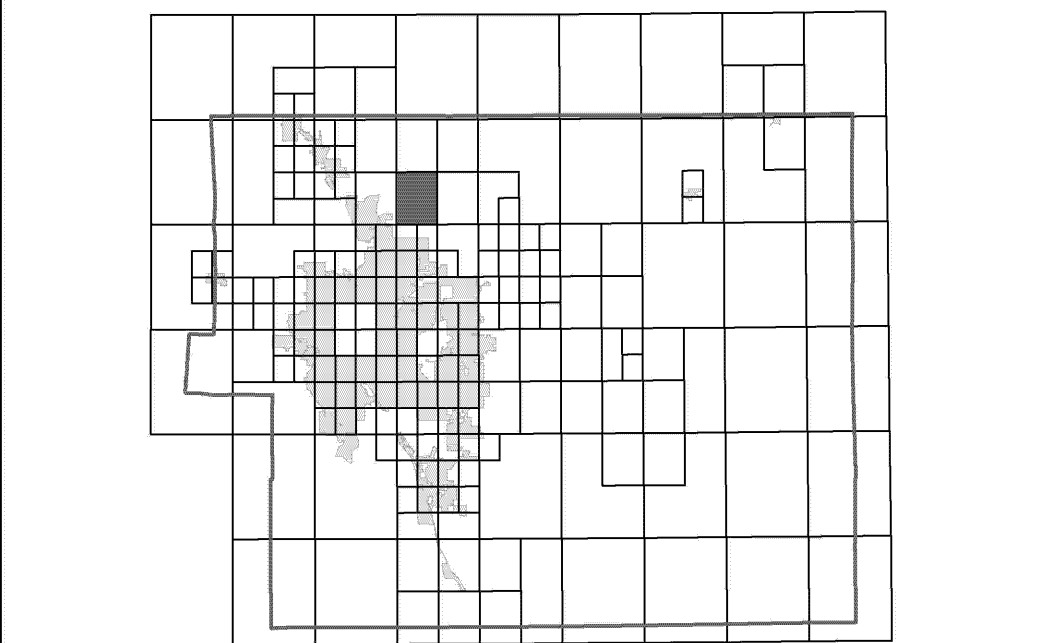
Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which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

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

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

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

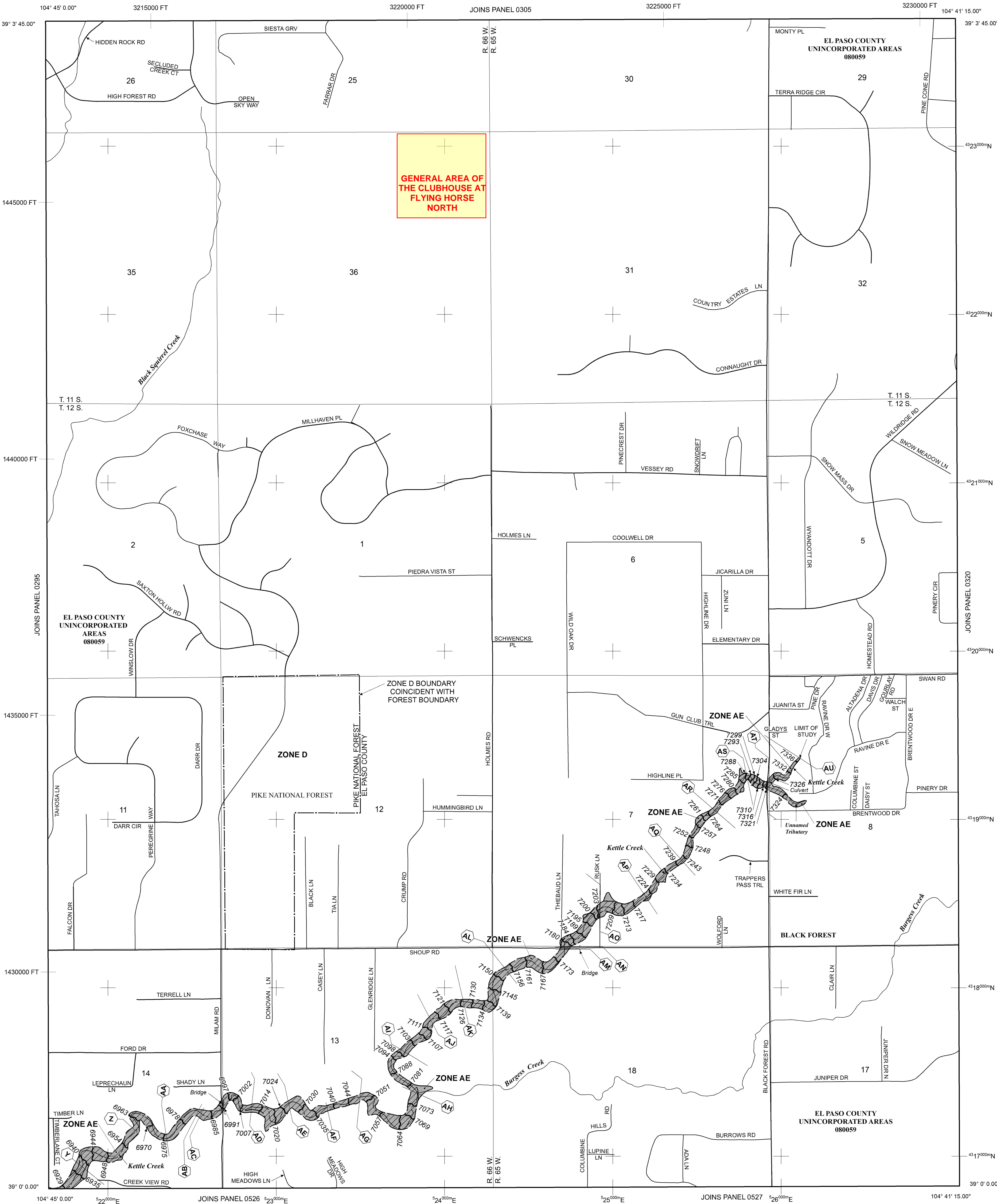
Panel Location Map



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



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



**LEGEND**

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

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

**ZONE A** No Base Flood Elevations determined.

**ZONE AE** Base Flood Elevations determined.

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

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

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

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

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

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

**FLOODWAY AREAS IN ZONE AE**

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

**OTHER FLOOD AREAS**

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

**OTHER AREAS**

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

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

**COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS**

**OTHERWISE PROTECTED AREAS (OPAs)**

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

**Legend:**

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

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

**Legend:**

- 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)
- River Mile

**MAP REPOSITORIES**

Refer to Map Repositories list on Map Index

**EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP**

**MARCH 17, 1997**

**EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL**

**DECEMBER 7, 2018** - to update corporate limits, to change Base Flood Elevations and Special Flood Hazard Areas, to update map format, to add roads and road names, and to incorporate previously issued Letters of Map Revision.

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

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

**MAP SCALE 1" = 1000'**

**500 0 1000 2000 FEET**

**300 0 300 600 METERS**

**NFIP**

**PANEL 0315G**

**FIRM**

**FLOOD INSURANCE RATE MAP**

**EL PASO COUNTY, COLORADO AND INCORPORATED AREAS**

**PANEL 315 OF 1300**

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

**CONTAINS:**

COMMUNITY	NUMBER	PANEL	SUFFIX
EL PASO COUNTY	080059	0315	G

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

**MAP NUMBER**

**08041C0315G**

**MAP REVISED**

**DECEMBER 7, 2018**

Federal Emergency Management Agency



# National Flood Hazard Layer FIRMMette



104°43'45"W 39°3'17"N



1:6,000

104°43'8"W 39°2'49"N

Basemap Imagery Source: USGS National Map 2023

## Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) Zone A, V, A99
		With BFE or Depth Zone AE, AO, AH, VE, AR
		Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
		Future Conditions 1% Annual Chance Flood Hazard Zone X
		Area with Reduced Flood Risk due to Levee. See Notes. Zone X
		Area with Flood Risk due to Levee Zone D
OTHER AREAS		NO SCREEN Area of Minimal Flood Hazard Zone X
		Effective LOMRs
GENERAL STRUCTURES		Area of Undetermined Flood Hazard Zone D
		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
OTHER FEATURES		20.2 Cross Sections with 1% Annual Chance Water Surface Elevation
		17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
		Coastal Transect
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary
		Coastal Transect Baseline
		Profile Baseline
		Hydrographic Feature
MAP PANELS		Digital Data Available
		No Digital Data Available
		Unmapped



The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards.

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 8/2/2023 at 11:04 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

## Appendix B: Hydrology Calculations



**The Clubhouse at Flying Horse North**  
**EXISTING CONDITIONS**  
**EL PASO COUNTY, COLORADO**


<b>Calc'd by:</b>	<b>CVW</b>
<b>Checked by:</b>	<b>RDL</b>
<b>Date:</b>	<b>4/7/2025</b>

**SUMMARY RUNOFF TABLE**

BASIN	AREA (ac)	% IMP.	C <sub>5</sub>	C <sub>100</sub>	Q <sub>5</sub> (cfs)	Q <sub>100</sub> (cfs)
CC-34	0.89	26.22	0.28	0.50	1.0	2.9
CC-34.1	15.09	5.82	0.12	0.38	6.7	36.1
CC-34.2	1.84	100.00	0.90	0.96	4.9	8.7
CC-34.3	1.01	40.81	0.40	0.59	1.6	3.9
CC-34.4	3.44	91.66	0.76	0.83	7.9	14.6
EX-1	2.69	28.20	0.28	0.50	2.7	8.0
OS-2	0.30	100.00	0.90	0.96	1.1	2.0
EX-2	4.72	40.23	0.40	0.59	8.0	19.8
OS-3	0.48	100.00	0.90	0.96	2.2	3.9
OS-4	0.48	100.00	0.90	0.96	2.2	3.9
EX-3	1.04	10.80	0.15	0.40	0.7	20.3
EX-4	1.33	2.00	0.08	0.35	0.5	21.3

**DESIGN POINT SUMMARY TABLE**

DESIGN POINT	CONTRIBUTING BASINS	ΣQ <sub>5</sub> (cfs)	ΣQ <sub>100</sub> (cfs)	Tributary Area (ac.)	Weighted % Impervious
1	EX-1 & CC-34.3	4.3	11.9	3.7	31.64%
1.1	CC-34, DP1, DP1.2	1.2	7.3	8.0	56.75%
1.2	CC-34.4	7.9	14.6	3.4	91.66%
1.3	CC-34.2, OS-2	6.0	10.8	2.1	100.00%
2	CC-34-34.4, EX-1, OS-2	25.9	76.2	25.3	29.99%
3	EX-2, OS-3	9.9	23.1	5.2	45.74%
4	OS-4	2.2	3.9	0.5	100.00%
5	EX-3	0.7	20.3	1.0	10.80%
6	EX-4	0.5	21.3	1.3	2.00%

	The Clubhouse at Flying Horse North														Calc'd by:			CVW				
	EXISTING CONDITIONS														Checked by:			RDL				
	EL PASO COUNTY, COLORADO														Date:		4/7/2025					
COMPOSITE 'C' FACTORS																						
BASIN	GOLF COURSE / UNDEVELOPED	ROADWAY	RESIDENTIAL (2.5AC LOT)	ROOFTOP	TOTAL	SOIL TYPE	GOLF COURSE /			ROADWAY			RESIDENTIAL (2.5AC LOT)			ROOFTOP			COMPOSITE IMPERVIOUSNESS & C			
	ACRES						%I	C <sub>5</sub>	C <sub>100</sub>	%I	C <sub>5</sub>	C <sub>100</sub>	%I	C <sub>5</sub> *	C <sub>100</sub> *	%I	C <sub>5</sub>	C <sub>100</sub>	%I	C <sub>5</sub>	C <sub>100</sub>	
CC-34	0.67	0.22	0.00	0.00	0.89	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	90	0.73	0.81	26.2	0.28	0.50	
CC-34.1	8.68	0.00	6.41	0.00	15.09	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	90	0.73	0.81	5.8	0.12	0.38	
CC-34.2	0.00	1.84	0.00	0.00	1.84	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	90	0.73	0.81	100.0	0.90	0.96	
CC-34.3	0.61	0.40	0.00	0.00	1.01	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	90	0.73	0.81	40.8	0.40	0.59	
CC-34.4	0.00	0.57	0.00	2.87	3.44	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	90	0.73	0.81	91.7	0.76	0.83	
EX-1	1.92	0.28	0.00	0.49	2.69	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	90	0.73	0.81	28.2	0.28	0.50	
OS-2	0.00	0.30	0.00	0.00	0.30	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	90	0.73	0.81	100.0	0.90	0.96	
EX-2	2.88	1.84	0.00	0.00	4.72	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	90	0.73	0.81	40.2	0.40	0.59	
OS-3	0.00	0.48	0.00	0.00	0.48	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	90	0.73	0.81	100.0	0.90	0.96	
OS-4	0.00	0.48	0.00	0.00	0.48	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	90	0.73	0.81	100.0	0.90	0.96	
EX-3	0.94	0.00	0.00	0.10	1.04	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	90	0.73	0.81	10.8	0.15	0.40	
EX-4	1.33	0.00	0.00	0.00	1.33	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	90	0.73	0.81	2.0	0.08	0.35	
TOTAL TO POND A	11.88	3.61	6.41	3.36	25.26														29.99%	0.31	0.52	
TOTAL OFFSITE	5.14	2.80	0.00	0.10	8.05														37.24%	0.37	0.57	
GRAND TOTAL	17.03	6.41	6.41	3.46	33.31														31.74%	0.32	0.53	



**The Clubhouse at Flying Horse North**  
**EXISTING CONDITIONS**  
**EL PASO COUNTY, COLORADO**

**Calc'd by:**

**CVW**

**Checked by:**

**RDL**

**Date:**

**4/7/2025**

**TIME OF CONCENTRATION**

BASIN DATA			OVERLAND TIME ( $T_t$ )			TRAVEL TIME ( $T_t$ )					TOTAL	$tc=(L/180)+10$	Design $tc$
DESIGNATION	$C_s$	AREA (ac)	LENGTH (ft)	SLOPE %	$t_t$ (min)	$C_v$	LENGTH (ft)	SLOPE %	V (ft/s)	$t_t$ (min)	$t_c$ (min)	$tc$ max	$tc$ design (min)
CC-34	0.28	0.89	100	2.0	11.9	10	300	1.00	1.0	5.0	16.9	12.2	12.2
CC-34.1	0.12	15.09	100	2.0	14.3	10	400	1.00	1.0	6.7	21.0	12.8	12.8
CC-34.2	0.90	1.84	16	2.0	1.2	10	2150	1.00	1.0	35.8	37.0	22.0	22.0
CC-34.3	0.40	1.01	16	2.0	4.0	10	480	1.00	1.0	8.0	12.0	12.8	12.0
CC-34.4	0.76	3.44	100	2.0	5.0	10	1839	1.00	1.0	30.7	35.6	20.8	20.8
EX-1	0.28	2.69	300	3.0	18.0	10	500	1.00	1.0	8.3	26.3	14.4	14.4
OS-2	0.90	0.30	16	2.0	1.2	10	500	1.00	1.0	8.3	9.5	12.9	9.5
EX-2	0.40	4.72	100	6.7	6.8	10	350	6.00	2.4	2.4	9.2	12.5	9.2
OS-3	0.90	0.48	91	2.0	2.8	20	638	3.80	3.9	2.7	5.5	14.1	5.5
OS-4	0.90	0.48	91	2.0	2.8	20	638	3.80	3.9	2.7	5.5	14.1	5.5
EX-3	0.15	1.04	34	5.0	6.0	7	74	22.00	3.3	0.4	6.3	10.6	6.3
EX-4	0.08	1.33	50	5.0	7.7	7	84	20.00	3.1	0.4	8.2	10.7	8.2



<div><div>1433</div><div>HRGreen</div></div>			The Clubhouse at Flying Horse North												Calc'd by:		CVW							
			EXISTING CONDITIONS												Checked by:		RDL							
			DESIGN STORM: 5-YEAR												Date:		4/7/2025							
			#REF!																					
			DIRECT RUNOFF					TOTAL RUNOFF				OVERLAND			PIPE				TRAVEL TIME		REMARKS			
STREET	DESIGN POINT	BASIN ID	AREA (ac)	C <sub>5</sub>	t <sub>c</sub> (min)	C <sub>5</sub> *A (ac)	/ (in./ hr.)	Q (cfs)	t <sub>c</sub> (min)	C <sub>5</sub> *A (ac)	/ (in./ hr.)	Q (cfs)	Q <sub>street</sub> (cfs)	C <sub>5</sub> *A (ac)	SLOPE %	Q <sub>PIPE</sub> (cfs)	C <sub>5</sub> *A (ac)	SLOPE %	PIPE SIZE (FT)	LENGTH (FT)	VEL. (FPS)	TRAVEL TIME (min)		
	1.1	CC-34	0.89	0.28	12.2	0.25	3.83	1.0		0.32		1.2					13.2	4.03	2.0	2.0	30	10.2	0.05	BS-34 & OVERFLOW FROM DP'S 1 & 1.2 CAPTURED AT 5' SUMP INLET
		CC-34.1	15.09	0.12	12.8	1.79	3.76	6.7																BASIN FLOW CAPTURED IN ROADSIDE DITCH, COLLECTED AT DP2 POND
	1.3	CC-34.2	1.84	0.90	22.0	1.66	2.94	4.9		1.93		6.0					19.2	5.96	5.5	3.0	95	22.1	0.07	BS-34.2 & OS-2 CAPTURED W/ 10' TYPE R SUMP INLET, PIPE FLOW FROM DP1.1 & DP1.3 CONVERGE
		CC-34.3	1.01	0.40	12.0	0.41	3.85	1.6																BS-34.3 TO FLOW DOWNSTREAM INTO ON-GRADE INLET AT DP1
	1.2	CC-34.4	3.44	0.76	20.8	2.61	3.03	7.9		2.61		7.9	0.2	0.07	1.0		7.7	2.54	1.1	2.0	185	7.6	0.41	BS-34.4 CAPTURED ON GRADE BY 15' CDOT TYPE R INLET
	2									7.74		25.9												FULL SPECTRUM DETENTION POND A TO BE DESIGNED AT DP2
		EX-1	2.69	0.28	14.4	0.76	3.58	2.7		0.76		2.7												OS-1 TO FLOW DOWNSTREAM INTO ON-GRADE INLET AT DP1
	1									1.17		4.3	0.0	0.00	4.0		4.3	1.17	2.0	1.5	305	8.4	0.60	BS-34.3 & OS-2 CAPTURED ON GRADE BY 15' CDOT TYPE R INLET
		OS-2	0.30	0.90	9.5	0.27	4.21	1.1																OS-2 FLOWS TO DP1.3
		EX-2	4.72	0.40	9.2	1.89	4.26	8.0	BASIN EX-2 TC USED															EX-2 IS CONVEYED INTO ROADSIDE DITCH ALONG ALLEN RANCH ROAD
	3	OS-3	0.48	0.90	5.5	0.43	5.02	2.2	9.2	2.32	4.26	9.9												BASINS EX-2 & OS-3 COMBINE IN A ROADSIDE DITCH ALONG ALLEN RANCH ROAD
	4	OS-4	0.48	0.90	5.5	0.43	5.02	2.2				2.2												SHEET FLOWS TO ROADSIDE DITCH ALONG ALLEN RANCH ROAD
	5	EX-3	1.04	0.15	6.3	0.15	4.81	0.7																PORTION OF ONSITE BASIN BS-21.3 THAT IS CONVEYED WEST VIA SHEET FLOW
	6	EX-4	1.33	0.08	8.2	0.11	4.43	0.5																PORTION OF ONSITE BASIN BS-20 THAT IS CONVEYED WEST VIA SHEET FLOW





The Clubhouse at Flying Horse North

EXISTING CONDITIONS

DESIGN STORM: 100-YEAR

Calc'd by:

CVW

Checked by:

RDL

Date:

4/7/2025

			DIRECT RUNOFF						TOTAL RUNOFF				OVERLAND			PIPE				TRAVEL TIME			REMARKS
STREET	DESIGN POINT	BASIN ID	AREA (ac)	C <sub>100</sub>	t <sub>c</sub> (min)	C <sub>100</sub> *A (ac)	I (in./ hr.)	Q (cfs)	t <sub>c</sub> (min)	C <sub>100</sub> *A (ac)	I (in./ hr.)	Q (cfs)	Q <sub>street</sub> (cfs)	C <sub>100</sub> *A (ac)	SLOPE %	Q <sub>PIPE</sub> (cfs)	C <sub>100</sub> *A (ac)	SLOPE %	PIPE SIZE (ft)	LENGTH (ft)	VEL. (ft/s)	TRAVEL TIME (min)	
	1.1	CC-34	0.89	0.50	12.2	0.45	6.43	2.9		1.26		7.3				29.4	5.25	2.0	2.0	30	10.2	0.05	BS-34 & OVERFLOW FROM DP'S 1 & 1.2 CAPTURED AT 5' SUMP INLET
		CC-34.1	15.09	0.38	12.8	5.71	6.31	36.1															BASIN FLOW CAPTURED IN ROADSIDE DITCH, COLLECTED AT DP2 POND
	1.3	CC-34.2	1.84	0.96	22.0	1.77	4.94	8.7		2.05		10.8				40.1	7.31	5.5	3.0	95	22.1	0.07	BS-34.2 & OS-2 CAPTURED W/ 10' TYPE R SUMP INLET, PIPE FLOW FROM DP1.1 & DP1.3 CONVERGE
		CC-34.3	1.01	0.59	12.0	0.60	6.46	3.9															BS-34.3 TO FLOW DOWNSTREAM INTO ON-GRADE INLET AT DP1
	1.2	CC-34.4	3.44	0.83	20.8	2.87	5.09	14.6		2.87		14.6	3.0	0.59	1.0	11.6	2.28	1.1	2.0	185	7.6	0.41	BS-34.4 CAPTURED ON GRADE BY 15' CDOT TYPE R INLET
	2									13.02		76.2											FULL SPECTRUM DETENTION POND A TO BE DESIGNED AT DP2
		EX-1	2.69	0.50	14.4	1.34	6.01	8.0		1.34		8.0											OS-1 TO FLOW DOWNSTREAM INTO ON-GRADE INLET AT DP1
	1									1.93		11.9	1.4	0.23	4.0	10.5	1.71	2.0	1.5	305	8.4	0.60	BS-34.3 & OS-2 CAPTURED ON GRADE BY 15' CDOT TYPE R INLET
		OS-2	0.30	0.96	9.5	0.29	7.06	2.0															OS-2 FLOWS TO DP1.3
		EX-2	4.72	0.59	9.2	2.78	7.15	19.8	BASIN EX-2 TC USED														EX-2 IS CONVEYED INTO ROADSIDE DITCH ALONG ALLEN RANCH ROAD
	3	OS-3	0.48	0.96	5.5	0.46	8.44	3.9	9.2	3.24	7.15	23.1											BASINS EX-2 & OS-3 COMBINE IN A ROADSIDE DITCH ALONG ALLEN RANCH ROAD
	4	OS-4	0.48	0.96	5.5	0.46	8.44	3.9				3.9											SHEET FLOWS TO ROADSIDE DITCH ALONG ALLEN RANCH ROAD

<div><div>HRGreen</div></div>			The Clubhouse at Flying Horse North													Calc'd by:		CVW								
			EXISTING CONDITIONS													Checked by:		RDL								
			DESIGN STORM: 100-YEAR													Date:		4/7/2025								
			DIRECT RUNOFF					TOTAL RUNOFF				OVERLAND			PIPE				TRAVEL TIME			REMARKS				
STREET	DESIGN PONT	BASIN ID	AREA (ac)	C <sub>100</sub>	f <sub>c</sub> (min)	C <sub>100</sub> *A (ac)	/ (in./ hr.)	Q (cfs)	f <sub>c</sub> (min)	C <sub>100</sub> *A (ac)	/ (in./ hr.)	Q (cfs)	Q <sub>street</sub> (cfs)	C <sub>100</sub> *A (ac)	SLOPE %	Q <sub>PIPE</sub> (cfs)	C <sub>100</sub> *A (ac)	SLOPE %	PIPE SIZE (ft)	LENGTH (ft)	VEL. (ft/s)	TRAVEL TIME (min)				
	5	EX-3	1.04	0.40	6.3	2.51	8.08	20.3															PORTION OF ONSITE BASIN BS-21.3 THAT IS CONVEYED WEST VIA SHEET FLOW			
	6	EX-4	1.33	0.35	8.2	2.86	7.44	21.3															PORTION OF ONSITE BASIN BS-20 THAT IS CONVEYED WEST VIA SHEET FLOW			



# The Clubhouse at Flying Horse North

## PROPOSED CONDITIONS

EL PASO COUNTY, COLORADO


Calc'd by:	CVW
Checked by:	RDL
Date:	4/7/2025

SUMMARY RUNOFF TABLE

BASIN	AREA (ac)	% IMP.	C <sub>s</sub>	C <sub>100</sub>	Q <sub>s</sub> (cfs)	Q <sub>100</sub> (cfs)
CC-34	0.89	26.22	0.28	0.50	1.0	2.9
CC-34.1	15.09	5.82	0.12	0.38	6.7	36.1
CC-34.2	1.84	100.00	0.90	0.96	4.9	8.7
CC-34.3	1.01	40.81	0.40	0.59	1.6	3.9
CC-34.4	3.44	91.66	0.76	0.83	7.9	14.6
PR-2	1.66	79.32	0.72	0.83	4.8	9.1
OS-2	0.34	100.00	0.90	0.96	1.3	2.3
PR-3	2.16	85.28	0.77	0.86	7.1	13.3
EX-3	0.73	2.00	0.08	0.35	0.3	18.7
EX-4	1.33	2.00	0.08	0.35	0.5	21.3
PR-1	0.27	90.00	0.73	0.81	1.0	1.9
OS-3	0.71	100.00	0.90	0.96	3.2	3.9
OS-4	0.48	100.00	0.90	0.96	2.2	3.9
PR-4	1.48	2.00	0.08	0.35	0.5	3.3
PR-5	1.95	2.00	0.19	0.43	1.4	5.4

DESIGN POINT SUMMARY TABLE

DESIGN POINT	CONTRIBUTING BASINS	ΣQ <sub>s</sub> (cfs)	ΣQ <sub>100</sub> (cfs)	Tributary Area (ac.)	Weighted % Impervious
1	PR-5 & CC-34.3	2.9	9.2	1.3	35.23%
1.1	CC-34, DP1, DP1.2	1.0	5.6	5.3	71.13%
1.2	CC-34.4	7.9	14.6	3.4	91.66%
1.3	CC-34.2, OS-2	6.2	11.0	2.2	100.00%
2	DP1.3, CC-34.1	30.7	79.1	28.7	35.95%
3	PR-3	7.1	13.3	2.2	85.28%
4	OS-3	3.2	5.8	0.7	100.00%
5	OS-4	2.2	3.9	0.5	100.00%
6	EX-3	0.3	18.7	0.7	2.00%
7	EX-4	0.5	21.3	1.3	2.00%
8	PR-4	0.5	3.3	1.5	2.00%
9	PR-1, PR-2	5.7	10.9	1.9	84.66%

	The Clubhouse at Flying Horse North																Calc'd by:		CVW			
	PROPOSED CONDITIONS																Checked by:		RDL			
	EL PASO COUNTY, COLORADO																Date:		4/7/2025			
COMPOSITE 'C' FACTORS																						
BASIN	GOLF COURSE / UNDEVELOPED	ROADWAY	RESIDENTIAL (2.5AC LOT)	ROOFTOP	TOTAL	SOIL TYPE	GOLF COURSE /			ROADWAY			RESIDENTIAL (2.5AC LOT)			ROOFTOP			COMPOSITE IMPERVIOUSNESS & C			
							%I	C <sub>5</sub>	C <sub>100</sub>	%I	C <sub>5</sub>	C <sub>100</sub>	%I	C <sub>5</sub> *	C <sub>100</sub> *	%I	C <sub>5</sub>	C <sub>100</sub>	%I	C <sub>5</sub>	C <sub>100</sub>	
CC-34	0.67	0.22	0.00	0.00	0.89	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	90	0.73	0.81	26.2	0.28	0.50	
CC-34.1	8.68	0.00	6.41	0.00	15.09	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	90	0.73	0.81	5.8	0.12	0.38	
CC-34.2	0.00	1.84	0.00	0.00	1.84	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	90	0.73	0.81	100.0	0.90	0.96	
CC-34.3	0.61	0.40	0.00	0.00	1.01	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	90	0.73	0.81	40.8	0.40	0.59	
CC-34.4	0.00	0.57	0.00	2.87	3.44	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	90	0.73	0.81	91.7	0.76	0.83	
PR-2	0.34	1.22	0.00	0.10	1.66	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	90	0.73	0.81	79.3	0.72	0.83	
OS-2	0.00	0.34	0.00	0.00	0.34	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	90	0.73	0.81	100.0	0.90	0.96	
EX-3	0.73	0.00	0.00	0.00	0.73	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	90	0.73	0.81	2.0	0.08	0.35	
EX-4	1.33	0.00	0.00	0.00	1.33	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	90	0.73	0.81	2.0	0.08	0.35	
PR-1	0.00	0.00	0.00	0.27	0.27	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	90	0.73	0.81	90.0	0.73	0.81	
PR-3	0.31	1.69	0.00	0.16	2.16	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	90	0.73	0.81	85.3	0.77	0.86	
OS-3	0.00	0.71	0.00	0.00	0.71	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	90	0.73	0.81	100.0	0.90	0.96	
OS-4	0.00	0.48	0.00	0.00	0.48	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	90	0.73	0.81	100.0	0.90	0.96	
PR-4	1.48	0.00	0.00	0.00	1.48	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	90	0.73	0.81	2.0	0.08	0.35	
PR-5	1.70	0.25	0.00	0.00	1.95	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	90	0.73	0.81	2.0	0.19	0.43	
TOTAL TO POND A	12.31	6.53	6.41	3.40	28.65														35.95%	0.29	0.46	
TOTAL OFFSITE	3.55	1.19	0.00	0.00	4.74														26.61%	0.03	0.15	
GRAND TOTAL	15.86	7.72	6.41	3.40	33.39														34.50%	0.35	0.55	



**The Clubhouse at Flying Horse North**  
**PROPOSED CONDITIONS**  
**EL PASO COUNTY, COLORADO**

**Calc'd by:**

**CVW**

**Checked by:**

**RDL**

**Date:**

**4/7/2025**

**TIME OF CONCENTRATION**

BASIN DATA			OVERLAND TIME ( $T_t$ )			TRAVEL TIME ( $T_t$ )					TOTAL	$tc=(L/180)+10$	Design $tc$
DESIGNATION	$C_s$	AREA (ac)	LENGTH (ft)	SLOPE %	$t_t$ (min)	$C_v$	LENGTH (ft)	SLOPE %	V (ft/s)	$t_t$ (min)	$t_c$ (min)	$tc$ max	$tc$ design (min)
CC-34	0.28	0.89	100	2.0	11.9	10	300	1.00	1.0	5.0	16.9	12.2	12.2
CC-34.1	0.12	15.09	100	2.0	14.3	10	400	1.00	1.0	6.7	21.0	12.8	12.8
CC-34.2	0.90	1.84	16	2.0	1.2	10	2150	1.00	1.0	35.8	37.0	22.0	22.0
CC-34.3	0.40	1.01	16	2.0	4.0	10	480	1.00	1.0	8.0	12.0	12.8	12.0
CC-34.4	0.76	3.44	100	2.0	5.0	10	1839	1.00	1.0	30.7	35.6	20.8	20.8
PR-2	0.72	1.66	100	1.0	6.9	20	500	1.00	2.0	4.2	11.1	13.3	11.1
OS-2	0.90	0.34	16	2.0	1.2	10	500	1.00	1.0	8.3	9.5	12.9	9.5
EX-3	0.08	0.73	34	5.0	6.4	7	74	22.00	3.3	0.4	6.8	10.6	6.8
EX-4	0.08	1.33	50	5.0	7.7	7	84	20.00	3.1	0.4	8.2	10.7	8.2
PR-1	0.73	0.27	25	1.0	3.4	20	75	1.00	2.0	0.6	5.0	10.6	5.0
PR-3	0.77	2.16	100	0.5	7.6	20	340	3.00	3.5	1.6	9.3	12.4	9.3
OS-3	0.90	0.71	91	2.0	2.8	20	638	3.80	3.9	2.7	5.5	14.1	5.5
OS-4	0.90	0.48	91	2.0	2.8	20	638	3.80	3.9	2.7	5.5	14.1	5.5
PR-4	0.08	1.48	100	2.0	14.8	7	310	0.50	0.5	10.4	25.3	12.3	12.3
PR-5	0.19	1.95	100	1.0	16.8	7	310	0.50	0.5	10.4	27.2	12.3	12.3

**The Clubhouse at Flying Horse North****PROPOSED CONDITIONS****DESIGN STORM: 5-YEAR****Calc'd by:****CVW****Checked by:****RDL****Date:****4/7/2025**

DESIGN POINT	BASIN ID	DIRECT RUNOFF						TOTAL RUNOFF				OVERLAND			PIPE				TRAVEL TIME			REMARKS	
		AREA (ac)	C <sub>s</sub>	t <sub>c</sub> (min)	C <sub>s</sub> *A (ac)	f (in./ hr.)	Q (cfs)	t <sub>c</sub> (min)	C <sub>s</sub> *A (ac)	f (in./ hr.)	Q (cfs)	Q <sub>street</sub> (cfs)	C <sub>s</sub> *A (ac)	SLOPE %	Q <sub>PIPE</sub> (cfs)	C <sub>s</sub> *A (ac)	SLOPE %	PIPE SIZE (FT)	LENGTH (FT)	VEL. (FPS)	TRAVEL TIME (min)		
1.1		BASIN CC-34.4 TC USED														BASIN CC-34.4 TC USED							(DIRECT FLOW ADDITION USED IN DOWNSTREAM PIPE)
	CC-34	0.89	0.28	12.2	0.25	3.83	1.0	20.8	0.32	3.03	1.0				1.0	0.32	Pipe-(39)						
															20.3	6.69	Total @ MH-3					BS-34 & OVERFLOW FROM DPs 1 & 1.2 CAPTURED AT EXISTING 5' SUMP INLET	
	CC-34.1	15.09	0.12	12.8	1.79	3.76	6.7															BASIN FLOW CAPTURED IN ROADSIDE DITCH, COLLECTED AT DP2 POND	
1.3	CC-34.2	1.84	0.90	22.0	1.66	2.94	4.9		1.96		6.2				BASIN CC-34.2 TC USED							(DIRECT FLOW ADDITION USED IN PIPE)	
															25.5	8.65					BS-34.2 & OS-2 CAPTURED W/ EX. 10' TYPE R SUMP INLET, PIPE FLOW FROM DP1.1 & DP1.3 CONVERGE		
	CC-34.3	1.01	0.40	12.0	0.41	3.85	1.6															BS-34.3 TO FLOW DOWNSTREAM INTO EXISTING ON-GRADE INLET AT DP1	
1.2	CC-34.4	3.44	0.76	20.8	2.61	3.03	7.9		2.61		7.9	0.2	0.07	1.0	DIRECT FLOW USED							BS-34.4 CAPTURED ON GRADE BY 15' CDOT TYPE R INLET	
								BASIN CC-34.2 TC USED							7.7	2.54	1.1	2.0	185	7.6	0.41	EXISTING FULL SPECTRUM DETENTION POND A AT DP2	
2								22.0	10.44	2.94	30.7												
	PR-5	1.95	0.19	12.3	0.36	3.82	1.4															PR-1 CONVEYED TO PR-2 VIA PROPOSED CLUBHOUSE ROOF DRAINS	
1	BASIN PR-5 USED											0.0	0.00	0.0	INCLUDES PIPE TRAVEL TIME							PR-5 & CC-34.3 CAPTURED ON GRADE BY EXISTING 15' CDOT TYPE R INLET	
															2.9	0.77	P10						
									12.3	0.77	3.82	2.9			14.6	3.83	Total @ MH-4					& COMBINES WITH CAPTURED FLOWS FROM DP9	
	OS-2	0.34	0.90	9.5	0.31	4.21	1.3															OS-2 FLOWS TO DP1.3	
	OS-3	0.71	0.90	5.5	0.64	5.02	3.2															OS-3 CONVEYED TO ROADSIDE DITCH VIA RIP RAP RUNDOWN	
3	PR-3	2.16	0.77	9.3	1.66	4.25	7.1								6.9	1.66			354	7.8	0.76	PR-3 CONVEYED TO PROPOSED 15' PRIVATE SUMP TYPE R INLET; PIPED TO DP9	
4	OS-3	0.71	0.90	5.5	0.64	5.02	3.2															CONVEYED TO EXISTING ALLEN RANCH ROAD ROADSIDE DITCH VIA RIP RAP RUNDOWN	
5	OS-4	0.48	0.90	5.5	0.43	5.02	2.2															CONVEYED TO EXISTING ALLEN RANCH ROAD ROADSIDE DITCH VIA RIP RAP RUNDOWN	
6	EX-3	0.73	0.08	6.8	0.06	4.72	0.3															PORTION OF ONSITE BASIN BS-21.3 THAT IS CONVEYED WEST VIA SHEET FLOW	
7	EX-4	1.33	0.08	8.2	0.11	4.43	0.5															PORTION OF ONSITE BASIN BS-20 THAT IS CONVEYED WEST VIA SHEET FLOW	
8	PR-4	1.48	0.08	12.3	0.12	3.82	0.5															BASIN PR-4 SHEET FLOWS OFFSITE TO THE NORTH; NO IMPERVIOUSNESS ADDED	
	PR-1	0.27	0.73	5.0	0.20	5.17	1.0															PR-1 CONVEYED TO PR-2 PARKING LOT VIA ROOF DRAINS	
	PR-2	1.66	0.72	11.1	1.20	3.97	4.8															PR-2 CONVEYED TO TYPE D SUMP INLET VIA RIP RAP RUNDOWN	
9	WEIGHTED TC USED														INCLUDES PIPE TRAVEL TIME							BASIN PR-1, PR-2, & DP3 FLOWS COMBINE AT PROPOSED TYPE D SUMP INLET	
								10.2	1.40	4.09	5.7				11.7	3.06			975	8.0	2.03	VIA PR. RIP RAP RUNDOWN & PR. 18" PRIVATE STORM SEWER	

**The Clubhouse at Flying Horse North****PROPOSED CONDITIONS****DESIGN STORM: 100-YEAR**

Calc'd by:

Checked by:

Date:

**CVW****RDL****4/7/2025**

DESIGN POINT	BASIN ID	DIRECT RUNOFF						TOTAL RUNOFF				OVERLAND			PIPE				TRAVEL TIME			REMARKS			
		AREA (ac)	C <sub>100</sub>	t <sub>c</sub> (min)	C <sub>100</sub> *A (ac)	I (in./hr.)	Q (cfs)	t <sub>c</sub> (min)	C <sub>100</sub> *A (ac)	I (in./hr.)	Q (cfs)	Q <sub>direct</sub> (cfs)	C <sub>100</sub> *A (ac)	SLOPE %	Q <sub>PIPE</sub> (cfs)	C <sub>100</sub> *A (ac)	SLOPE %	PIPE SIZE (ft)	LENGTH (ft)	VEL. (ft/s)	TRAVEL TIME (min)				
		BASIN CC-34.4 TC USED													BASIN CC-34.4 TC USED							(DIRECT FLOW ADDITION USED IN DOWNSTREAM PIPE)			
1.1	CC-34	0.89	0.50	12.2	0.45	6.43	2.9	20.8	1.10	5.09	5.6				5.6	1.10		Pipe-(39)				BS-34 & OVERFLOW FROM DP'S 1 & 1.2 CAPTURED AT EXISTING 5' SUMP INLET			
	CC-34.1	15.09	0.38	12.8	5.71	6.31	36.1								41.8	8.20		Total @ MH-3				BASIN FLOW CAPTURED IN ROADSIDE DITCH, COLLECTED AT DP2 POND			
1.3	CC-34.2	1.84	0.96	22.0	1.77	4.94	8.7		2.09		11.0				50.9	10.29						BS-34.2 & OS-2 CAPTURED W/ EX. 10' TYPE R SUMP INLET, PIPE FLOW FROM DP1.1 & DP1.3 CONVERGE			
	CC-34.3	1.01	0.59	12.0	0.60	6.46	3.9															BS-34.3 TO FLOW DOWNSTREAM INTO EXISTING ON-GRADE INLET AT DP1			
1.2	CC-34.4	3.44	0.83	20.8	2.87	5.09	14.6		2.87		14.6	3.0	0.59	1.0	DIRECT FLOW USED				11.6	2.28	1.1	2.0	BS-34.4 CAPTURED ON GRADE BY 15' CDOT TYPE R INLET		
2								BASIN CC-34.2 TC USED														EXISTING FULL SPECTRUM DETENTION POND A AT DP2			
	PR-5	1.95	0.43	12.3	0.84	6.42	5.4															PR-1 CONVEYED TO PR-2 VIA PROPOSED CLUBHOUSE ROOF DRAINS			
	BASIN PR-5 TC USED											0.4	0.06	4.0	INCLUDES PIPE TRAVEL TIME							PR-5 & CC-34.3 CAPTURED ON GRADE BY EXISTING 15' CDOT TYPE R INLET			
1								12.3	1.43	6.42	9.2				8.8	1.37		P10				& COMBINES WITH CAPTURED FLOWS FROM DP9			
															30.9	4.82		Total @ MH-4	17	7.8	0.04				
	OS-2	0.34	0.96	9.5	0.33	7.06	2.3															OS-2 FLOWS TO DP1.3			
	OS-3	0.48	0.96	5.5	0.46	8.44	3.9															OS-3 CONVEYED TO ROADSIDE DITCH VIA RIP RAP RUNDOWN			
3	PR-3	2.16	0.86	9.3	1.86	7.13	13.3								INCLUDES PIPE TRAVEL TIME				12.9	1.86		354	7.8	0.76	PR-3 CONVEYED TO PROPOSED 15' PRIVATE SUMP TYPE R INLET; PIPED TO DP9
4	OS-3	0.71	0.96	5.5	0.68	8.44	5.8															CONVEYED TO EXISTING ALLEN RANCH ROAD ROADSIDE DITCH VIA RIP RAP RUNDOWN			
5	OS-4	0.48	0.96	5.5	0.46	8.44	3.9															CONVEYED TO EXISTING ALLEN RANCH ROAD ROADSIDE DITCH VIA RIP RAP RUNDOWN			
6	EX-3	0.73	0.35	6.8	2.36	7.92	18.7															PORTION OF ONSITE BASIN BS-21.3 THAT IS CONVEYED WEST VIA SHEET FLOW			
7	EX-4	1.33	0.35	8.2	2.86	7.44	21.3															PORTION OF ONSITE BASIN BS-20 THAT IS CONVEYED WEST VIA SHEET FLOW			
8	PR-4	1.48	0.35	12.3	0.52	6.42	3.3															BASIN PR-4 SHEET FLOWS OFFSITE TO THE NORTH; NO IMPERVIOUSNESS ADDED			
	PR-1	0.27	0.81	5.0	0.22	8.68	1.9															PR-1 CONVEYED TO PR-2 PARKING LOT VIA ROOF DRAINS			
	PR-2	1.66	0.83	11.1	1.37	6.67	9.1															PR-2 CONVEYED TO TYPE D SUMP INLET VIA RIP RAP RUNDOWN			
9		WEIGHTED TC USED							10.3	1.59	6.87	10.9			INCLUDES PIPE TRAVEL TIME				22.1	3.45		975	8.0	2.03	BASIN PR-1, PR-2, & DP3 FLOWS COMBINE AT PROPOSED TYPE D SUMP INLET
																						VIA PR. RIP RAP RUNDOWN & PR. 18" PRIVATE STORM SEWER			



Water Quality Treatment Summary Table								
Area ID	Total Area (ac)	Total Proposed Disturbed Area (ac)	Area Trib to Pond A (ac)	Disturbed Area Treated via Runoff Reduction (ac)	Disturbed Area Excluded from WQ per ECM App I.7.1.C.1 (ac)	Disturbed Area Excluded from WQ per ECM App I.7.1.B.2.2 (ac)	Disturbed Area Excluded from WQ per ECM App I.7.1.B.7 (ac)	Notes
OS-3	0.71	0.71	0.00	0.00	0.13	0.49		
OS-4	0.48	0.48	0.00	0.00		0.48		
PR-4	1.48	0.35	0.00	0.00			0.18	
EX-3	0.73	0.40	0.00	0.00	0.02		0.21	
EAST OF ALLEN RANCH ROAD	0.32	0.32	0.00	0.00			0.32	Disturbed area east of allen ranch road (tie-in to existing)
NW OF ALLEN RANCH ROAD	0.16	0.16	0.00	0.00			0.16	North of Basin OS-3; disturbance limited to Sediment Control Log install
NE OF ALLEN RANCH ROAD	0.19	0.19	0.00	0.00			0.04	North of Basin OS-4; disturbance limited to Sediment Control Log and Vehicle Tracking
PR-2	1.66	1.66	1.66	0.00			0.06	
PR-3	2.16	2.16	2.16	0.00			0.22	
PR-1	0.27	0.27	0.27	0.00				
PR-5	1.95	0.39	1.95	0.00				
EX-4	1.33	0.00	0.00	0.00				
OS-2	0.34	0.34	0.34	0.00				
CC-34.3	1.01	0.20	1.01	0.00				
CC-34	0.89	0.09	0.89	0.00				
CC-34.1	15.09	1.30	15.09	0.00				
CC-34.2	1.84	0.34	1.84	0.00				
CC-34.4	3.44	0.00	3.44	0.00				
Total	34.05	9.37	28.65		0.15	0.98	1.19	

Min Required Area to Receive WQ (ac)	Total Proposed Disturbed Area	Total Proposed Treated Area (ac)	Total Proposed Disturbed Area Excluded from WQ (ac)	Net Treatment (ac)
7.05	9.37	28.65	2.32	21.60

## Appendix C: Hydraulic Calculations



# CLUBHOUSE AT FLYING HORSE NORTH

Calc'd by:

CVW

2403186

Checked by:

RDL

## Riprap Sizing Calculations

Date:

5/29/2025

### Riprap Sizing - PROPOSED ROADSIDE DITCH TRANSITION

Q (cfs)	L (ft)	q (cfs/ft)	S (ft/ft)	C <sub>f</sub>	n	D <sub>50</sub> min. (in)
5.80	4.00	1.45	0.04	2	0	2.81

Type VL Buried Soil Riprap (D<sub>50</sub> = 6") will be utilized for the transitions from urban road section to rural at the north end of Allen Ranch Road.

### Riprap Sizing - PROPOSED PARKING LOT RIP RAP RUNDOWN (DP9)

Q (cfs)	L (ft)	q (cfs/ft)	S (ft/ft)	C <sub>f</sub>	n	D <sub>50</sub> min. (in)
12.00	6.00	2.00	0.064	2	0	4.12

Type VL Buried Soil Riprap (D<sub>50</sub> = 6") will be utilized for the parking lot rundown to the sump inlet.

### Riprap Sizing - EXISTING POND A EMERGENCY SPILLWAY

Q (cfs)	L (ft)	q (cfs/ft)	S (ft/ft)	C <sub>f</sub>	n	D <sub>50</sub> min. (in)
55.50	48.00	1.16	0.25	2	0	5.45

Existing Type L Buried Soil Riprap (D<sub>50</sub> = 9") is adequate for the emergency spillway erosion protection.

$$D_{50} = 5.23 S^{0.43} (1.35 C_f q)^{0.56}$$

Equation 13-9

Where:

- D<sub>50</sub> = median rock size (in)
- S = longitudinal slope (ft/ft)
- C<sub>f</sub> = concentration factor (1.0 to 3.0)
- q = unit discharge (cfs/ft)

When:

η (porosity) = 0.0 (i.e., for buried soil riprap)

# Channel Report

Proposed Rundown Channel (DP 9)

<Name>

Trapezoidal

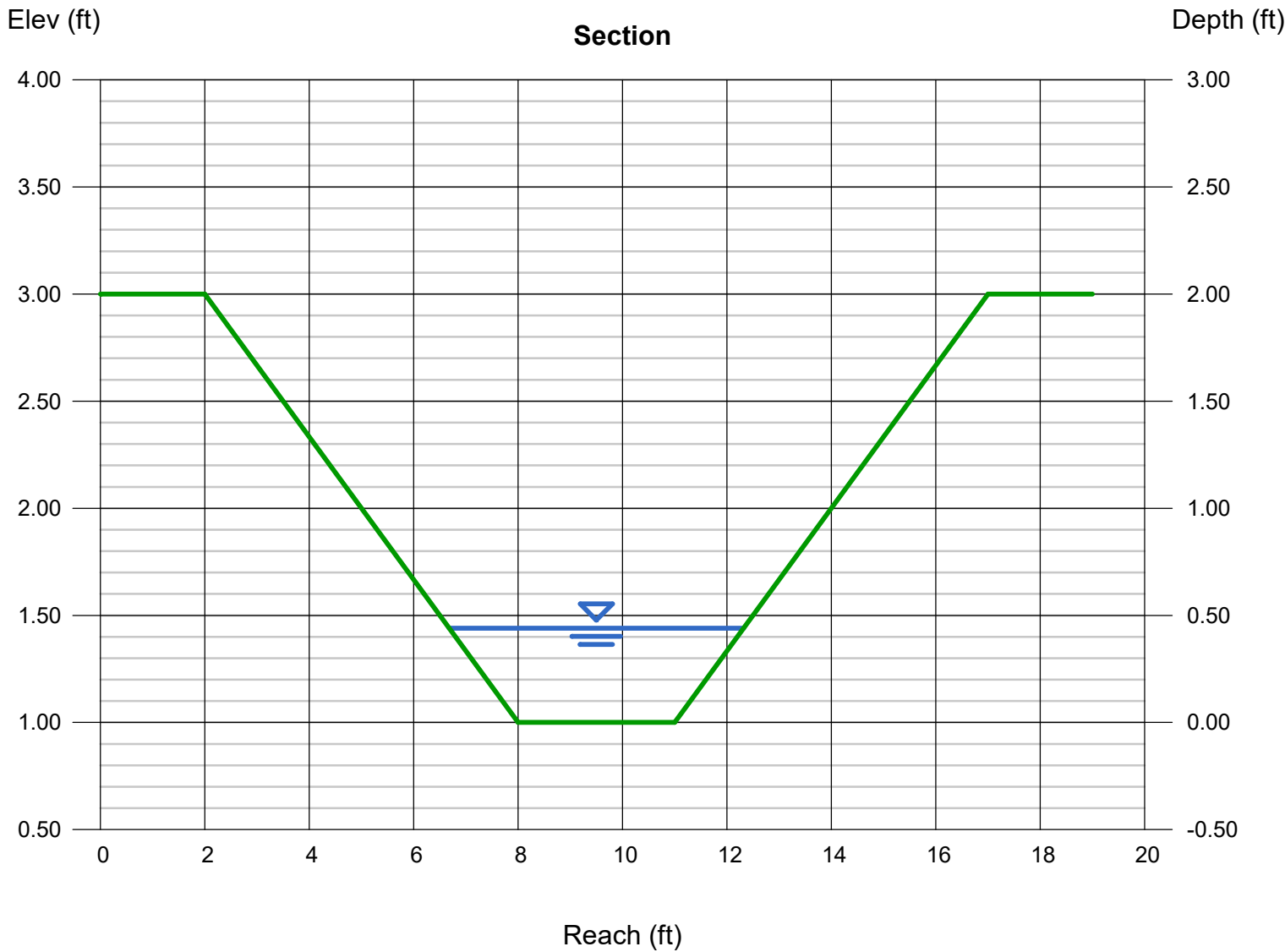
Bottom Width (ft) = 3.00  
Side Slopes (z:1) = 3.00, 3.00  
Total Depth (ft) = 2.00  
Invert Elev (ft) = 1.00  
Slope (%) = 6.40  
N-Value = 0.030

Highlighted

Depth (ft) = 0.44  
Q (cfs) = 10.90  
Area (sqft) = 1.90  
Velocity (ft/s) = 5.73  
Wetted Perim (ft) = 5.78  
Crit Depth, Yc (ft) = 0.61  
Top Width (ft) = 5.64  
EGL (ft) = 0.95

Calculations

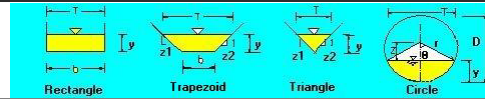
Compute by: Known Q  
Known Q (cfs) = 10.90



Existing Roadside Ditch  
w/ Proposed Flows (DP 4)

**WEST CHANNEL SECTION: 100 YR ANALYSIS**

Select Channel Type: Trapezoid ▼



Depth from Q ▼

Select unit system: Feet(ft) ▼

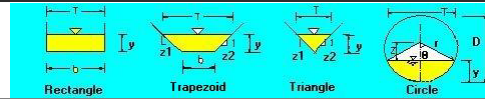
Channel slope: <input type="text" value="0.01"/> ft/ft	Water depth(y): <input type="text" value="0.17"/> ft	Bottom width(b): <input type="text" value="22"/> ft
Flow velocity: <input type="text" value="1.385978"/> ft/s	LeftSlope (Z1): <input type="text" value="1:8"/> to 1 (H:V)	RightSlope (Z2): <input type="text" value="1:10"/> to 1 (H:V)
Flow discharge: <input type="text" value="5.8"/> ft <sup>3</sup> /s	Input n value: <input type="text" value="0.03"/> or select n	
<input type="button" value="Calculate!"/>	Status: <span style="color: red;">Calculation finished</span>	<input type="button" value="Reset"/>
Wetted perimeter: <input type="text" value="26.82"/> ft	Flow area: <input type="text" value="4.18"/> ft <sup>2</sup>	Top width(T): <input type="text" value="26.8"/> ft
Specific energy: <input type="text" value="0.2"/> ft	Froude number: <input type="text" value="0.62"/>	Flow status: <input type="text" value="Subcritical flow"/>
Critical depth: <input type="text" value="0.13"/> ft	Critical slope: <input type="text" value="0.0257"/> ft/ft	Velocity head: <input type="text" value="0.03"/> ft

Copyright 2007 (updated) by Dr. Xing Fang (xing.fang@auburn.edu), Department of Civil and Environmental Engineering, Auburn University, Alabama, USA.

Existing Roadside Ditch  
w/ Proposed Flows (DP 5)

### EAST CHANNEL SECTION: 100 YR ANALYSIS

Select Channel Type: Trapezoid ▼



Depth from Q ▼

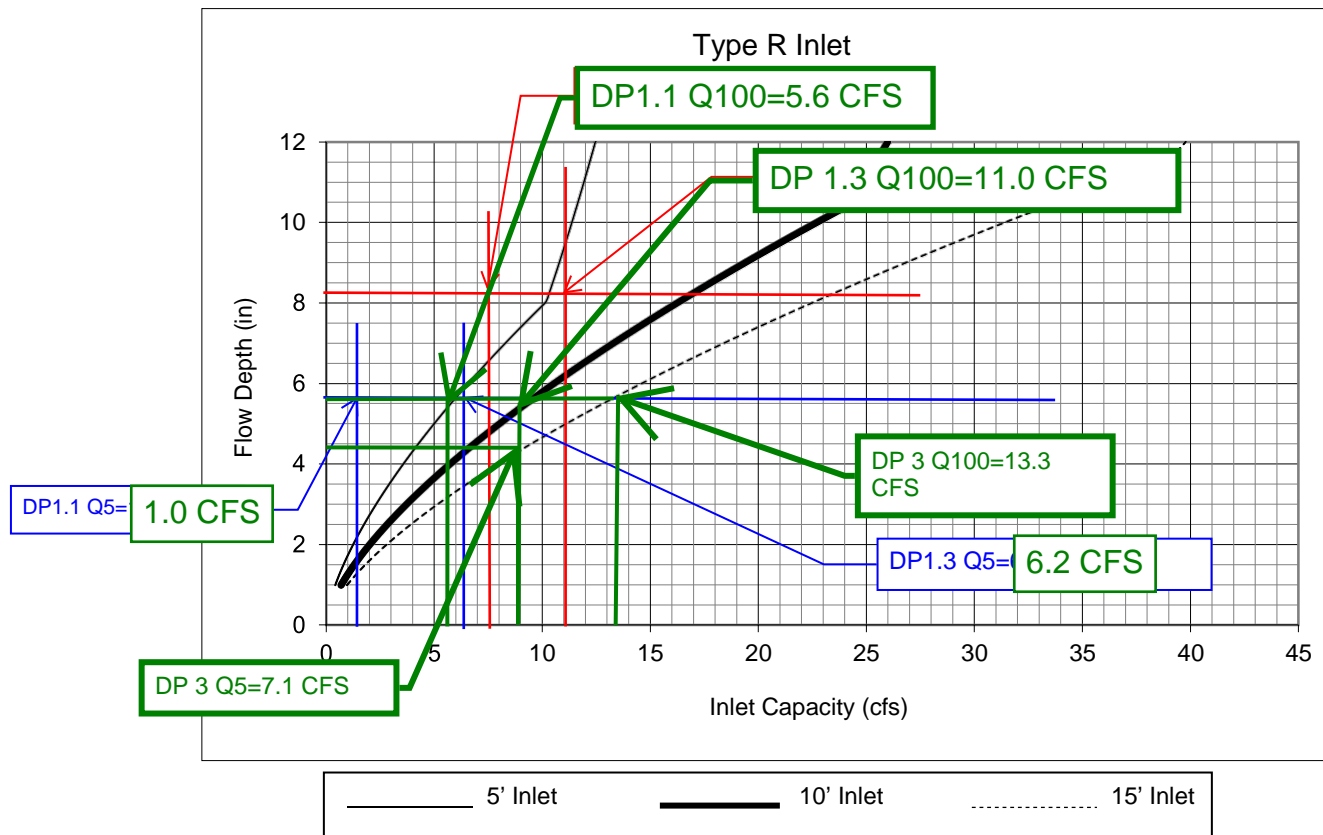
Select unit system: Feet(ft) ▼

Channel slope: 0.27 ft/ft	Water depth(y): 0.26 ft	Bottom width(b): 2.5 ft
Flow velocity: 2.427369 ft/s	LeftSlope (Z1): 4 to 1 (H:V)	RightSlope (Z2): 23 to 1 (H:V)
Flow discharge: 3.9 ft <sup>3</sup> /s	Input n value: 0.03 or select n	
Calculate!	Status: Calculation finished	Reset
Wetted perimeter: 9.68 ft	Flow area: 1.61 ft <sup>2</sup>	Top width(T): 9.64 ft
Specific energy: 0.36 ft	Froude number: 1.05	Flow status: Supercritical flow
Critical depth: 0.27 ft	Critical slope: 0.0225 ft/ft	Velocity head: 0.09 ft

Copyright 2007 (updated) by Dr. Xing Fang (xing.fang@auburn.edu), Department of Civil and Environmental Engineering, Auburn University, Alabama, USA.

## SUMP INLET CAPACITIES

**Figure 8-11. Inlet Capacity Chart Sump Conditions , Curb Opening (Type R) Inlet**



DP1.1: Q5 = 1.0 CFS Q100 = 5.6 CFS  
 INLET SIZE: 5' TYPE R SUMP INLET

DP1.3: Q5 = 6.2 CFS Q100 = 11.0 CFS  
 INLET SIZE: 10' TYPE R SUMP INLET

**NOTE: GREEN INDICATES UPDATES PER CLUBHOUSE AT FLYING HORSE NORTH FINAL DRAINAGE REPORT.**

DP3: Q5=7.1 CFS, Q100=13.3 CFS

**Notes:**

1. The standard inlet parameters must apply to use this chart.



**INLET MANAGEMENT**

Worksheet Protected

INLET NAME	DP1	DP1.1	DP1.2	DP1.3
Site Type (Urban or Rural)	URBAN	URBAN	URBAN	URBAN
Inlet Application (Street or Area)	STREET	STREET	STREET	STREET
Hydraulic Condition	On Grade	In Sump	On Grade	In Sump
Inlet Type	CDOT Type R Curb Opening		CDOT Type R Curb Opening	

**USER-DEFINED INPUT****User-Defined Design Flows**

Minor $Q_{Known}$ (cfs)	2.9	1.0	7.9	6.2
Major $Q_{Known}$ (cfs)	9.2	5.6	14.6	11.0

**Bypass (Carry-Over) Flow from Upstream** [Inlets must be organized from upstream \(left\) to downstream \(right\) in order for bypass flows to be linked.](#)

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

**Watershed Characteristics**

Subcatchment Area (acres)				
Percent Impervious				
NRCS Soil Type				

**Watershed Profile**

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

**Minor Storm Rainfall Input**

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

**Major Storm Rainfall Input**

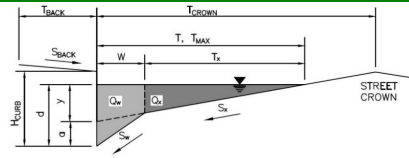
Design Storm Return Period, $T_r$ (years)				
One-Hour Precipitation, $P_1$ (inches)				

**CALCULATED OUTPUT**

Minor Total Design Peak Flow, $Q$ (cfs)	2.9	1.0	7.9	6.2
Major Total Design Peak Flow, $Q$ (cfs)	9.2	5.6	14.6	11.0
Minor Flow Bypassed Downstream, $Q_b$ (cfs)	0.0	N/A	0.2	N/A
Major Flow Bypassed Downstream, $Q_b$ (cfs)	0.4	N/A	3.0	N/A

**ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)****(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)**

Project:

Inlet ID: **DP1****Gutter Geometry:**

Maximum Allowable Width for Spread Behind Curb

Side Slope Behind Curb (leave blank for no conveyance credit behind curb)

Manning's Roughness Behind Curb (typically between 0.012 and 0.020)

Height of Curb at Gutter Flow Line

Distance from Curb Face to Street Crown

Gutter Width

Street Transverse Slope

Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)

Street Longitudinal Slope - Enter 0 for sump condition

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

$T_{BACK}$	=	9.0	ft
$S_{BACK}$	=	0.020	ft/ft
$n_{BACK}$	=	0.020	

$H_{CURB}$	=	6.00	inches
$T_{CROWN}$	=	17.0	ft
$W$	=	2.50	ft
$S_X$	=	0.020	ft/ft
$S_W$	=	0.083	ft/ft
$S_O$	=	0.010	ft/ft
$n_{STREET}$	=	0.016	

Max. Allowable Spread for Minor &amp; Major Storm

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

Allow Flow Depth at Street Crown (check box for yes, leave blank for no)

	Minor Storm	Major Storm	
$T_{MAX}$	17.0	17.0	ft
$d_{MAX}$	5.6	8.2	inches
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

MINOR STORM Allowable Capacity is based on Depth Criterion

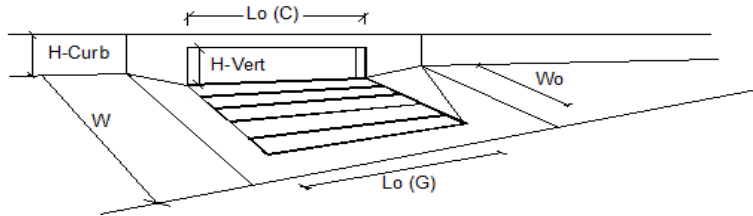
MAJOR STORM Allowable Capacity is based on Depth Criterion

	Minor Storm	Major Storm	
$Q_{allow}$	9.2	33.2	cfs

**Minor storm max. allowable capacity GOOD - greater than the design peak flow of 2.90 cfs on sheet 'Inlet Management'****Major storm max. allowable capacity GOOD - greater than the design peak flow of 9.20 cfs on sheet 'Inlet Management'**

# INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.02 (August 2022)

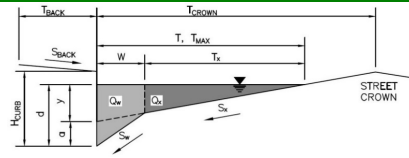


Design Information (Input)		MINOR		MAJOR	
Type of Inlet	CDOT Type R Curb Opening	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		$a_{LOCAL}$ =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		$N_o$ =	3	3	
Length of a Single Unit Inlet (Grate or Curb Opening)		$L_o$ =	5.00	5.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		$W_o$ =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		$C_f (G)$ =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)		$C_f (C)$ =	0.10	0.10	
Street Hydraulics: OK - $Q < \text{Allowable Street Capacity}$					
Total Inlet Interception Capacity		$Q$ =	2.9	8.8	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)		$Q_o$ =	0.0	0.4	cfs
Capture Percentage = $Q_i/Q_o$		$C\%$ =	100	95	%

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

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

Project:

Inlet ID: **DP1.1****Gutter Geometry:**

Maximum Allowable Width for Spread Behind Curb

Side Slope Behind Curb (leave blank for no conveyance credit behind curb)

Manning's Roughness Behind Curb (typically between 0.012 and 0.020)

Height of Curb at Gutter Flow Line

Distance from Curb Face to Street Crown

Gutter Width

Street Transverse Slope

Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)

Street Longitudinal Slope - Enter 0 for sump condition

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

$T_{BACK}$	=	9.0	ft
$S_{BACK}$	=	0.020	ft/ft
$n_{BACK}$	=	0.020	

$H_{CURB}$	=	6.00	inches
$T_{CROWN}$	=	17.0	ft
$W$	=	2.00	ft
$S_X$	=	0.020	ft/ft
$S_W$	=	0.083	ft/ft
$S_O$	=	0.000	ft/ft
$n_{STREET}$	=	0.016	

Max. Allowable Spread for Minor &amp; Major Storm

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

Check boxes are not applicable in SUMP conditions

	Minor Storm	Major Storm	
$T_{MAX}$	17.0	17.0	ft
$d_{MAX}$	5.6	8.2	inches

MINOR STORM Allowable Capacity is not applicable to Sump Condition

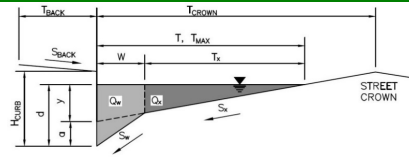
MAJOR STORM Allowable Capacity is not applicable to Sump Condition

	Minor Storm	Major Storm	
$Q_{allow}$	SUMP	SUMP	cfs

**NOTE: REFER TO SUMP INLET CAPACITIES CHART FOR CAPACITY AND DEPTH INFORMATION AT THIS INLET**

**ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)****(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)**

Project:

Inlet ID: **DP1.2****Gutter Geometry:**

Maximum Allowable Width for Spread Behind Curb

Side Slope Behind Curb (leave blank for no conveyance credit behind curb)

Manning's Roughness Behind Curb (typically between 0.012 and 0.020)

Height of Curb at Gutter Flow Line

Distance from Curb Face to Street Crown

Gutter Width

Street Transverse Slope

Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)

Street Longitudinal Slope - Enter 0 for sump condition

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

$T_{BACK}$	=	9.0	ft
$S_{BACK}$	=	0.020	ft/ft
$n_{BACK}$	=	0.020	

$H_{CURB}$	=	6.00	inches
$T_{CROWN}$	=	17.0	ft
$W$	=	2.00	ft
$S_X$	=	0.020	ft/ft
$S_W$	=	0.083	ft/ft
$S_O$	=	0.010	ft/ft
$n_{STREET}$	=	0.016	

Max. Allowable Spread for Minor &amp; Major Storm

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

Allow Flow Depth at Street Crown (check box for yes, leave blank for no)

	Minor Storm	Major Storm	
$T_{MAX}$	17.0	17.0	ft
$d_{MAX}$	5.6	8.2	inches
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

MINOR STORM Allowable Capacity is based on Spread Criterion

MAJOR STORM Allowable Capacity is based on Depth Criterion

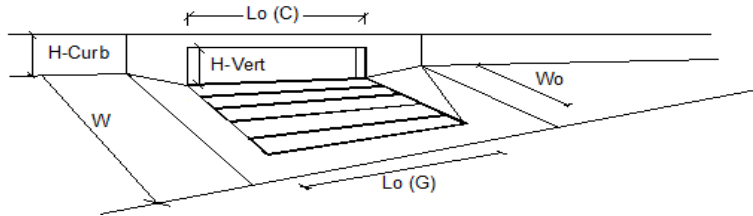
	Minor Storm	Major Storm	
$Q_{allow}$	10.9	36.7	cfs

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 7.90 cfs on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design peak flow of 14.60 cfs on sheet 'Inlet Management'

# INLET ON A CONTINUOUS GRADE

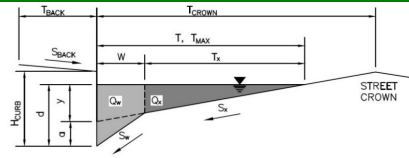
MHFD-Inlet, Version 5.02 (August 2022)



Design Information (Input)		MINOR		MAJOR	
Type of Inlet	CDOT Type R Curb Opening	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		$a_{LOCAL}$ =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		$N_o$ =	3	3	
Length of a Single Unit Inlet (Grate or Curb Opening)		$L_o$ =	5.00	5.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		$W_o$ =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		$C_f (G)$ =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)		$C_f (C)$ =	0.10	0.10	
Street Hydraulics: OK - $Q < \text{Allowable Street Capacity}$					
Total Inlet Interception Capacity		$Q$ =	7.7	11.6	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)		$Q_s$ =	0.2	3.0	cfs
Capture Percentage = $Q_o/Q_s$		$C\%$ =	97	79	%

**ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)****(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)**

Project:

Inlet ID: **DP1.3****Gutter Geometry:**

Maximum Allowable Width for Spread Behind Curb

Side Slope Behind Curb (leave blank for no conveyance credit behind curb)

Manning's Roughness Behind Curb (typically between 0.012 and 0.020)

Height of Curb at Gutter Flow Line

Distance from Curb Face to Street Crown

Gutter Width

Street Transverse Slope

Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)

Street Longitudinal Slope - Enter 0 for sump condition

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

$T_{BACK}$	=	9.0	ft
$S_{BACK}$	=	0.020	ft/ft
$n_{BACK}$	=	0.020	

$H_{CURB}$	=	6.00	inches
$T_{CROWN}$	=	17.0	ft
$W$	=	2.00	ft
$S_X$	=	0.020	ft/ft
$S_W$	=	0.083	ft/ft
$S_O$	=	0.000	ft/ft
$n_{STREET}$	=	0.016	

Max. Allowable Spread for Minor &amp; Major Storm

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

Check boxes are not applicable in SUMP conditions

	Minor Storm	Major Storm	
$T_{MAX}$	17.0	17.0	ft
$d_{MAX}$	5.6	8.2	inches

MINOR STORM Allowable Capacity is not applicable to Sump Condition

MAJOR STORM Allowable Capacity is not applicable to Sump Condition

	Minor Storm	Major Storm	
$Q_{allow}$	SUMP	SUMP	cfs

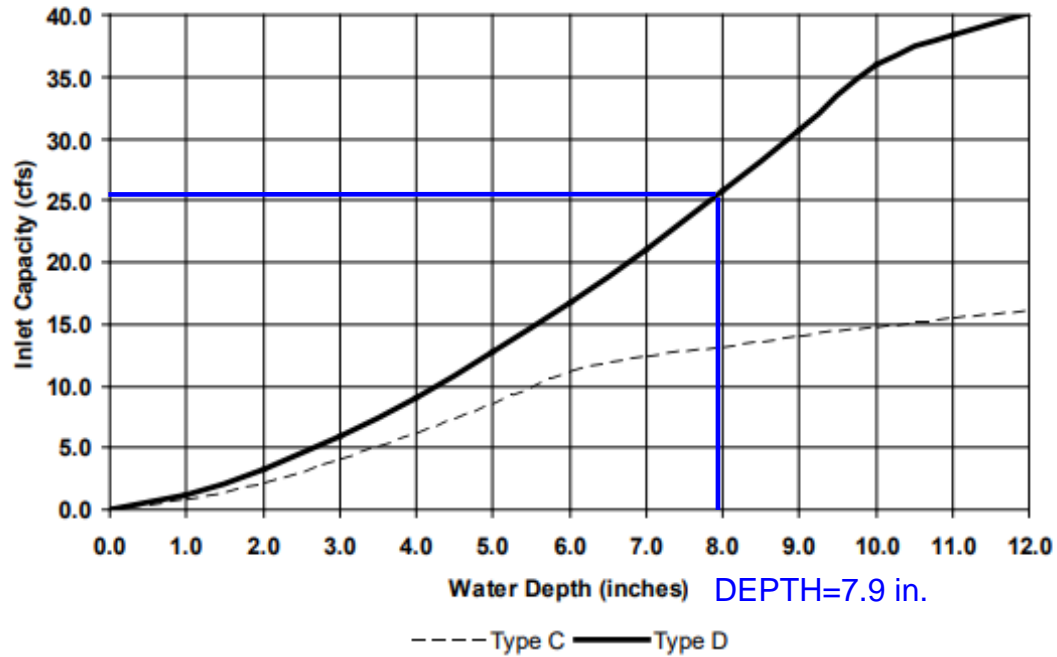
**NOTE: REFER TO SUMP INLET CAPACITIES CHART FOR CAPACITY AND DEPTH INFORMATION AT THIS INLET**



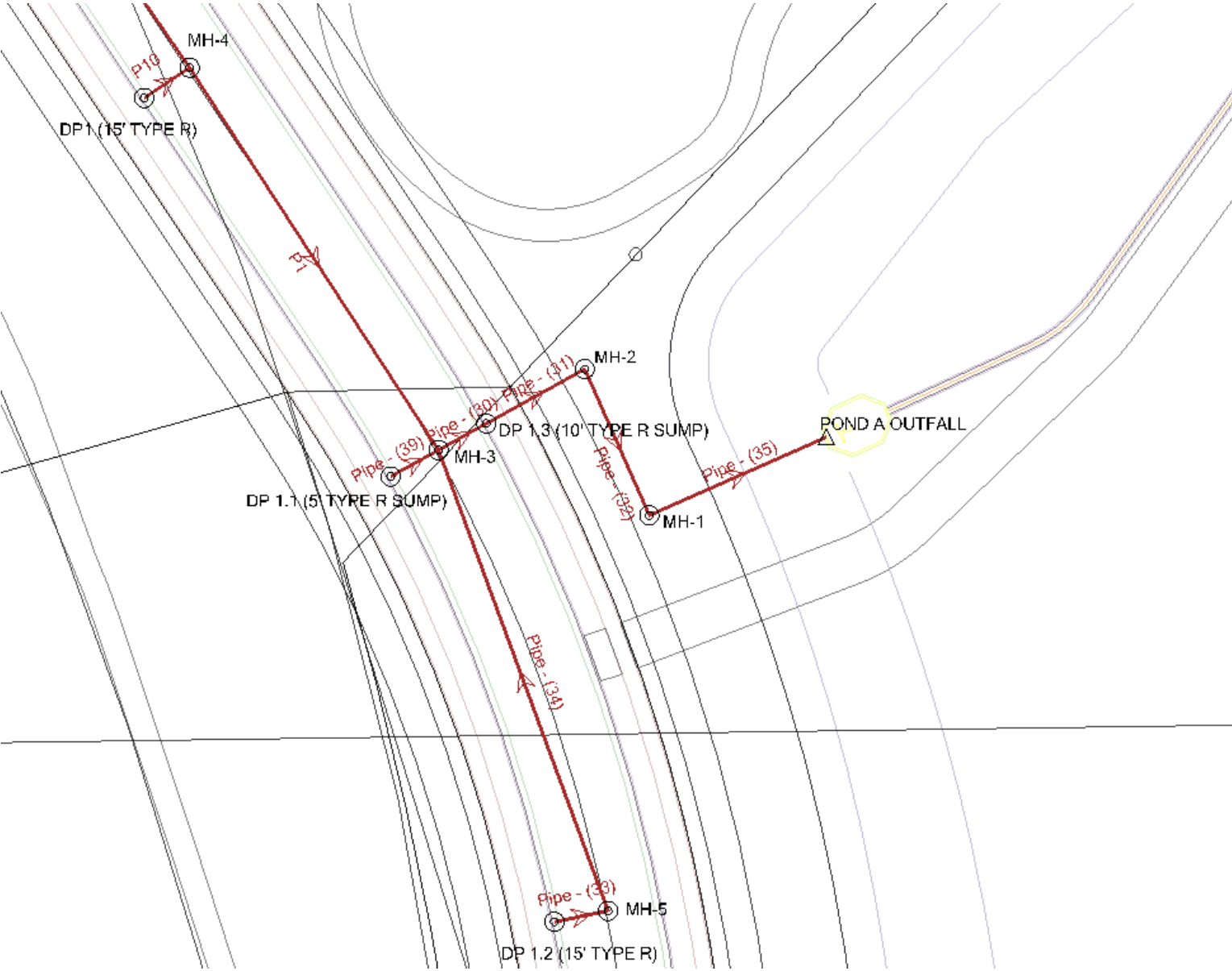
## DP9 INLET CAPACITY

Allowable Inlet Capacity for Type C and D Inlets for Sump Conditions

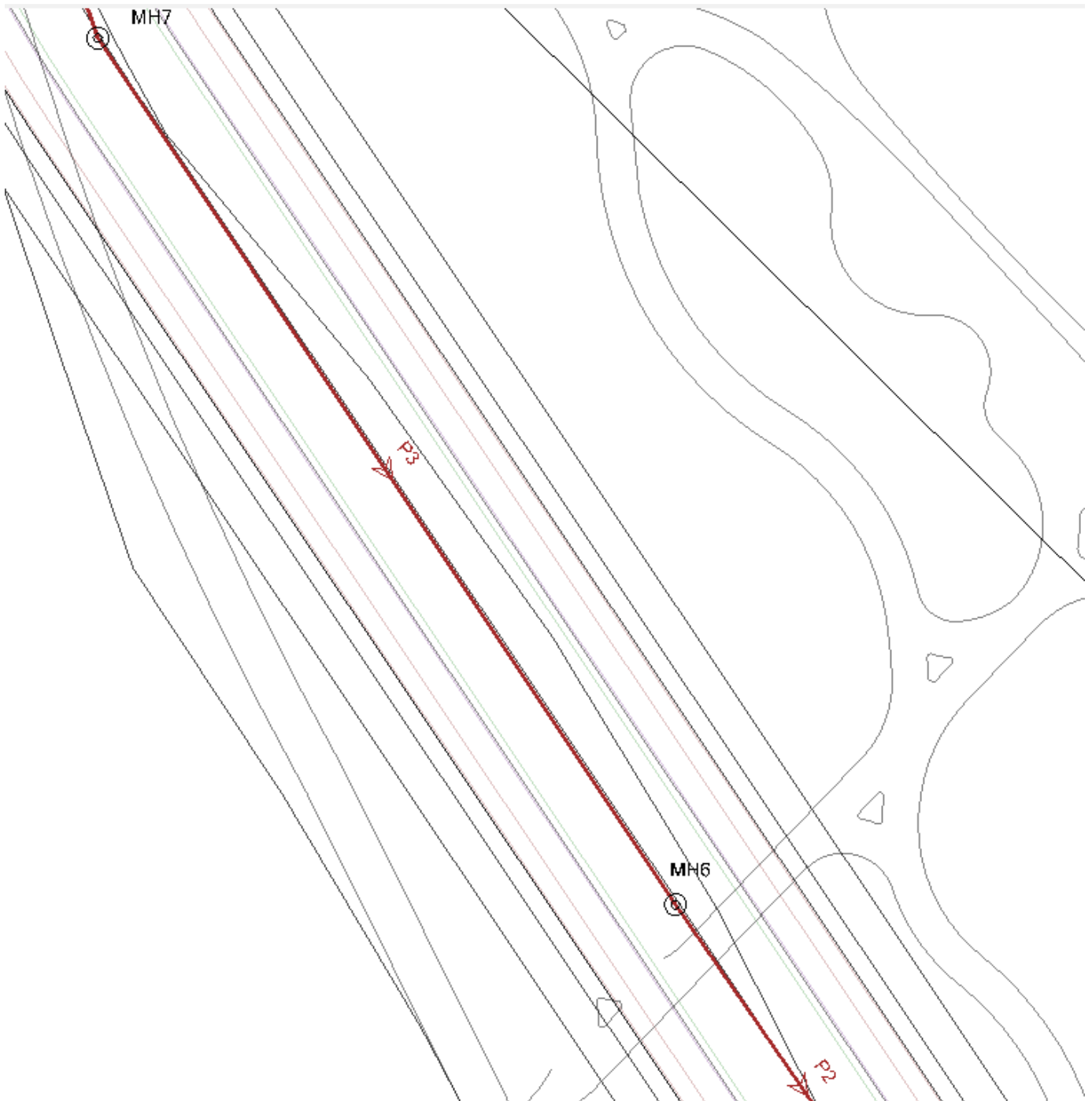
CAPACITY=  
25.2 CFS



STORMCAD NETWORK LAYOUT



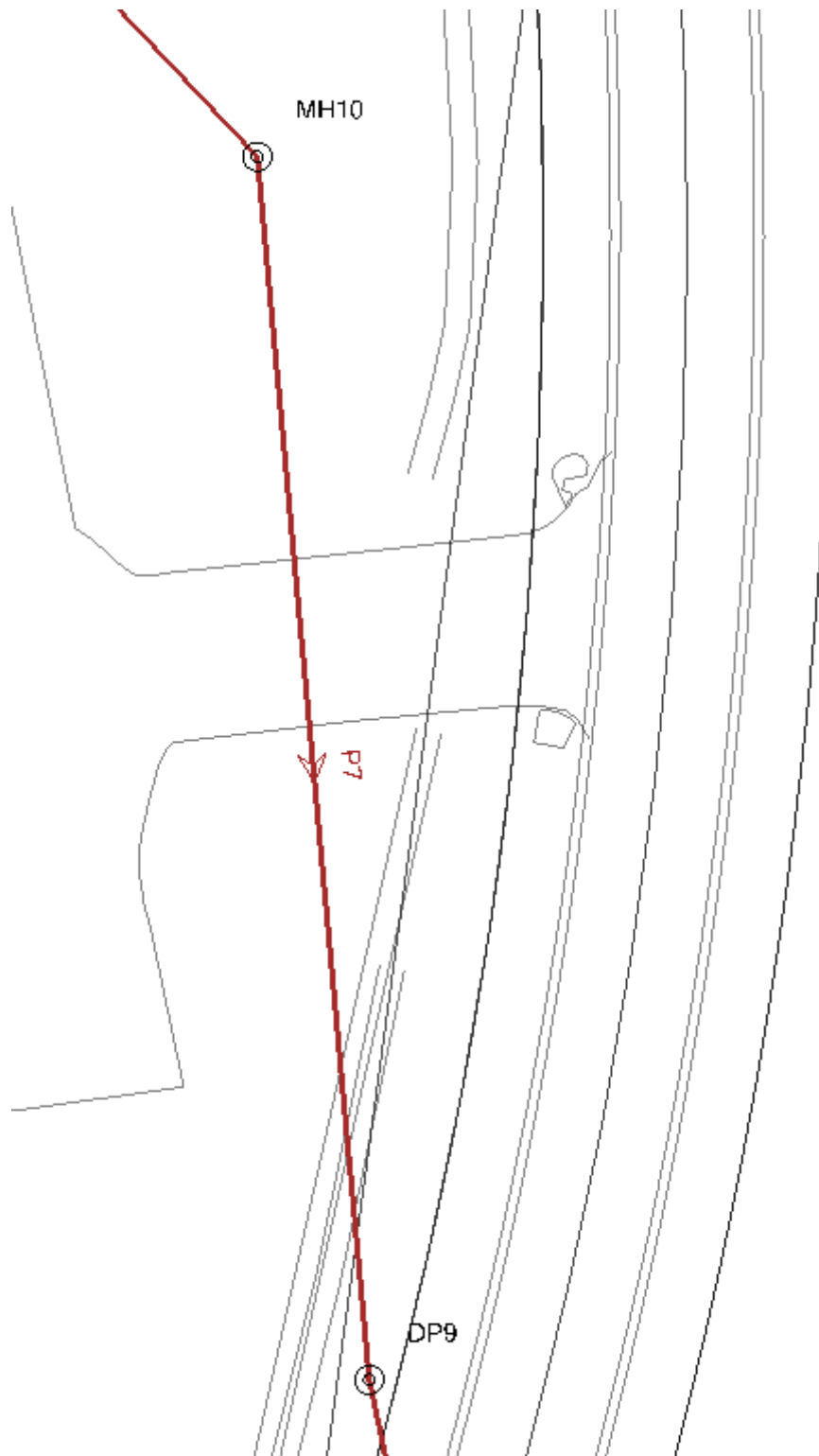
## STORMCAD NETWORK LAYOUT (UPSTREAM)



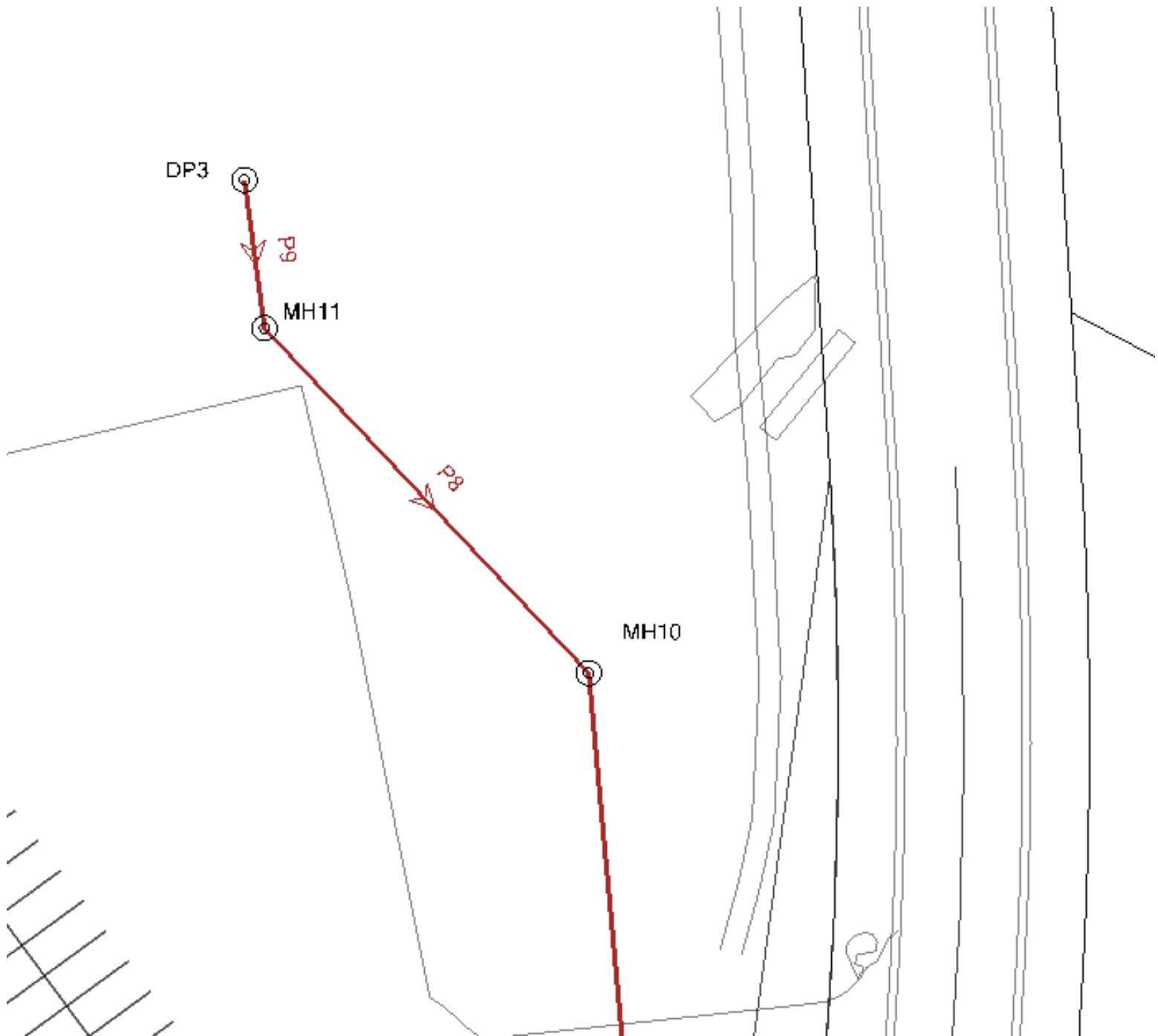
STORMCAD NETWORK LAYOUT (UPSTREAM)



## STORMCAD NETWORK LAYOUT (UPSTREAM)



## STORMCAD NETWORK LAYOUT (UPSTREAM)



## 5 YEAR CONDUIT TABLE

**FlexTable: Conduit Table**

Label	Start Node	Diameter (in)	Length (Unified) (ft)	Flow (cfs)	Velocity (ft/s)	Invert (Start) (ft)	Invert (Stop) (ft)	Slope (Calculated) (ft/ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
Pipe - (35)	MH-1	36.0	60.3	25.80	15.80	7,563.76	7,560.75	0.050	7,565.40	7,561.68
Pipe - (31)	DP 1.3 (10' TYPE R SUMP)	36.0	35.0	25.80	11.37	7,566.05	7,565.35	0.020	7,567.69	7,567.56
Pipe - (32)	MH-2	36.0	49.7	25.80	11.35	7,565.05	7,564.06	0.020	7,566.69	7,566.27
Pipe - (33)	DP 1.2 (15' TYPE R)	24.0	17.0	7.70	8.37	7,572.61	7,572.27	0.020	7,573.60	7,573.47
Pipe - (34)	MH-5	24.0	152.8	7.70	9.69	7,571.97	7,567.39	0.030	7,572.96	7,569.43
P10	DP1 (15' TYPE R)	30.0	17.0	2.90	8.79	7,571.37	7,568.89	0.146	7,571.93	7,571.03
P1	MH-4	30.0	142.0	2.90	6.23	7,568.59	7,567.19	0.010	7,570.69	7,569.43
Pipe - (30)	MH-3	30.0	17.0	20.70	10.83	7,566.89	7,566.55	0.020	7,568.44	7,568.37
Pipe - (39)	DP 1.1 (5' TYPE R SUMP)	24.0	17.0	1.00	4.61	7,567.73	7,567.39	0.020	7,569.43	7,569.43
P4	MH7	24.0	199.0	12.20	8.27	7,594.34	7,597.08	-0.014	7,598.34	7,595.29
P5	MH8	24.0	268.2	12.20	8.42	7,597.38	7,601.26	-0.014	7,602.52	7,598.32
P6	MH9	24.0	68.3	12.20	7.44	7,601.56	7,602.27	-0.010	7,603.53	7,602.60
P7	DP9	24.0	221.7	7.40	7.02	7,602.57	7,605.38	-0.013	7,606.35	7,604.33
P8	MH10	24.0	98.9	7.40	6.54	7,605.68	7,606.71	-0.010	7,607.68	7,606.46
P9	MH11	18.0	34.3	7.40	6.56	7,607.21	7,607.57	-0.010	7,608.62	7,608.13
P3	MH6	24.0	306.5	12.20	14.29	7,575.25	7,594.14	-0.062	7,595.40	7,575.88
P2	MH-4	24.0	133.0	12.20	7.44	7,569.39	7,570.45	-0.008	7,573.57	7,571.96

## 5 YEAR MH TABLE

**FlexTable: Manhole Table**

Label	Elevation (Ground) (ft)	Elevation (Rim) (ft)	Flow (Total Out) (cfs)	Depth (Out) (ft)	Hydraulic Grade Line (Out) (ft)	Hydraulic Grade Line (In) (ft)	Notes	Headloss (ft)
MH-2	7,574.70	7,574.70	25.80	1.64	7,566.69	7,567.56	SDMH	0.87
MH-5	7,579.46	7,579.46	7.70	0.99	7,572.96	7,573.47	SDMH	0.51
DP 1.2 (15' TYPE R)	7,578.99	7,578.99	7.70	0.99	7,573.60	7,574.18	15' TYPE-R INLET	0.58
MH-4	7,577.53	7,577.53	2.90	0.56	7,570.69	7,571.03	SDMH	0.35
MH-1	7,576.27	7,576.27	25.80	1.64	7,565.40	7,566.27	SDMH	0.87
DP1 (15' TYPE R)	7,577.06	7,577.06	2.90	0.56	7,571.93	7,572.22	15' TYPE-R INLET	0.29
MH-3	7,576.30	7,576.30	20.70	1.55	7,568.44	7,569.43	SDMH	1.00
DP 1.3 (10' TYPE R SUMP)	7,575.83	7,575.83	25.80	1.64	7,567.69	7,568.37	10' TYPE-R INLET	0.67
DP 1.1 (5' TYPE R SUMP)	7,575.83	7,575.83	1.00	1.70	7,569.43	7,569.44	5' TYPE-R INLET	0.00
DP3	7,612.09	7,612.09	7.40	1.05	7,608.62	7,609.35	15' TYPE R	0.73
MH7	7,599.42	7,599.42	12.20	1.26	7,595.40	7,595.45		0.05
MH8	7,602.65	7,602.65	12.20	1.26	7,598.34	7,598.39		0.05
MH9	7,606.49	7,606.49	12.20	1.26	7,602.52	7,602.57		0.05
DP9	7,608.37	7,608.37	12.20	1.26	7,603.53	7,604.33		0.80
MH10	7,614.32	7,614.32	7.40	0.97	7,606.35	7,606.50		0.15
MH11	7,613.04	7,613.04	7.40	0.97	7,607.68	7,607.71		0.04
MH6	7,581.25	7,581.25	12.20	1.26	7,573.57	7,573.59		0.03



## 5 YEAR OUTFALL TABLE

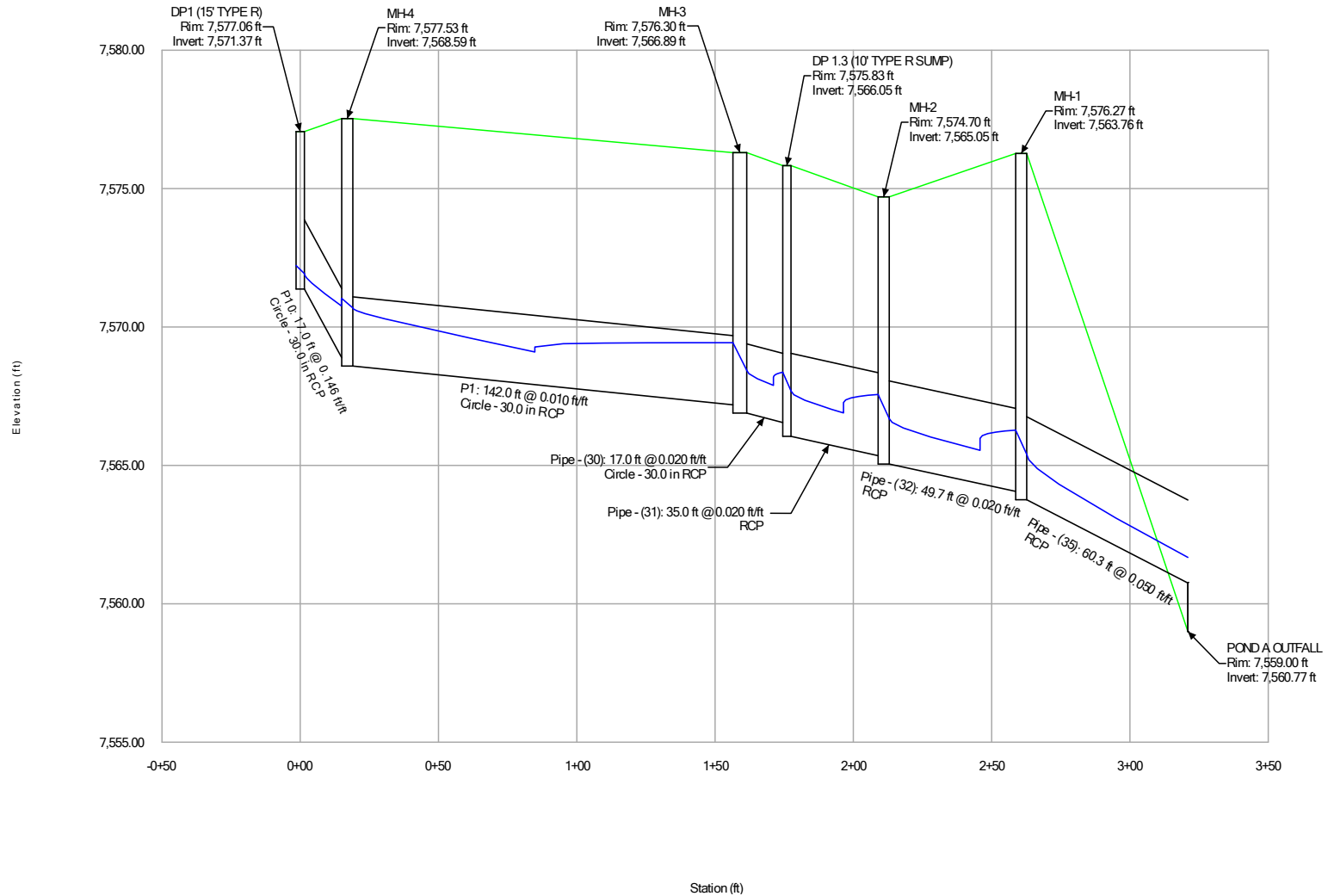
**FlexTable: Outfall Table**

Label	Elevation (Ground) (ft)	Elevation (Invert) (ft)	Elevation (User Defined Tailwater) (ft)	Hydraulic Grade (ft)	Flow (Total Out) (cfs)	Notes
POND A OUTFALL	7,559.00	7,560.77		7,561.68	25.80	CROWN TW

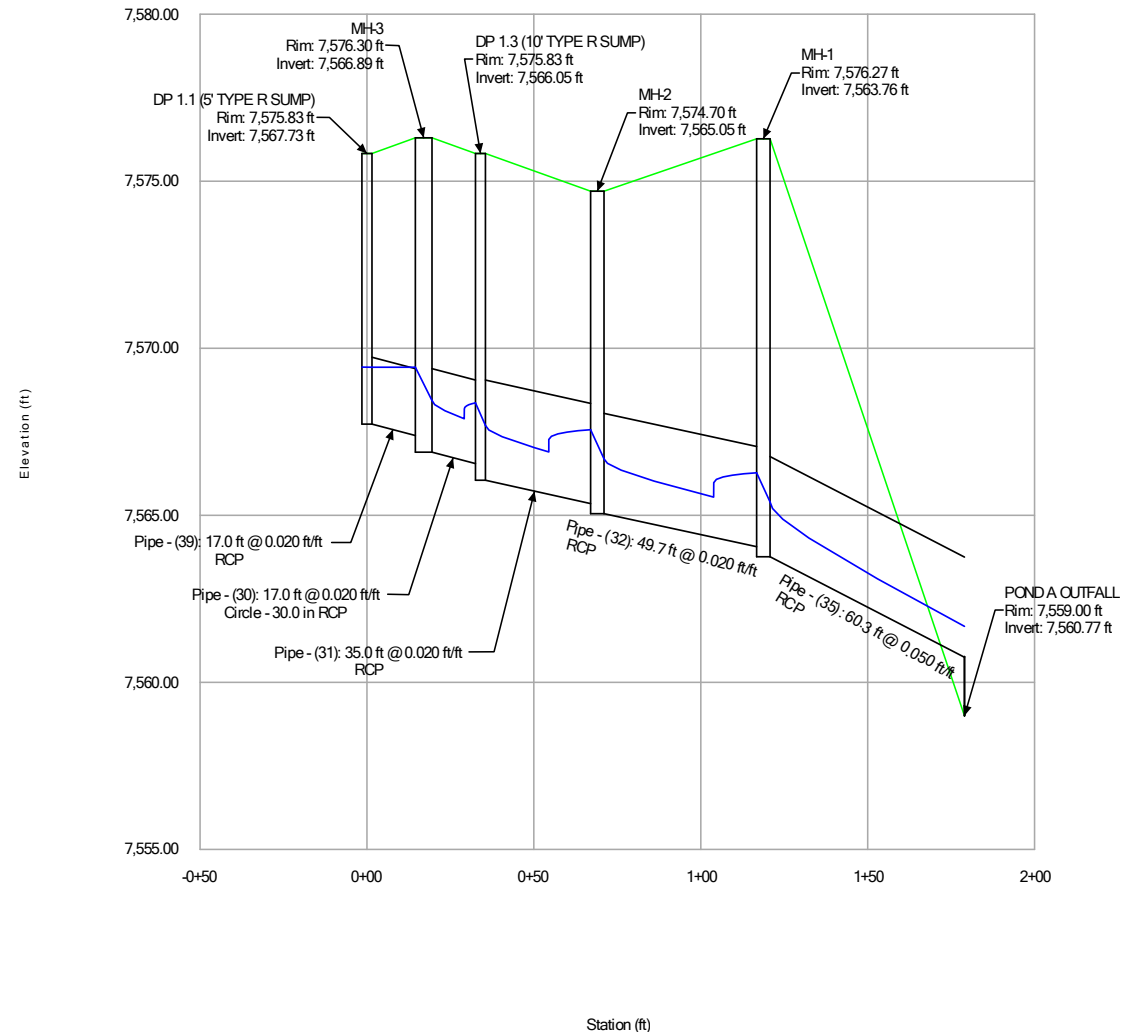
5 YEAR

## Profile Report

### Engineering Profile - DP1 - POND A (The Clubhouse at Flying Horse North.stsw)

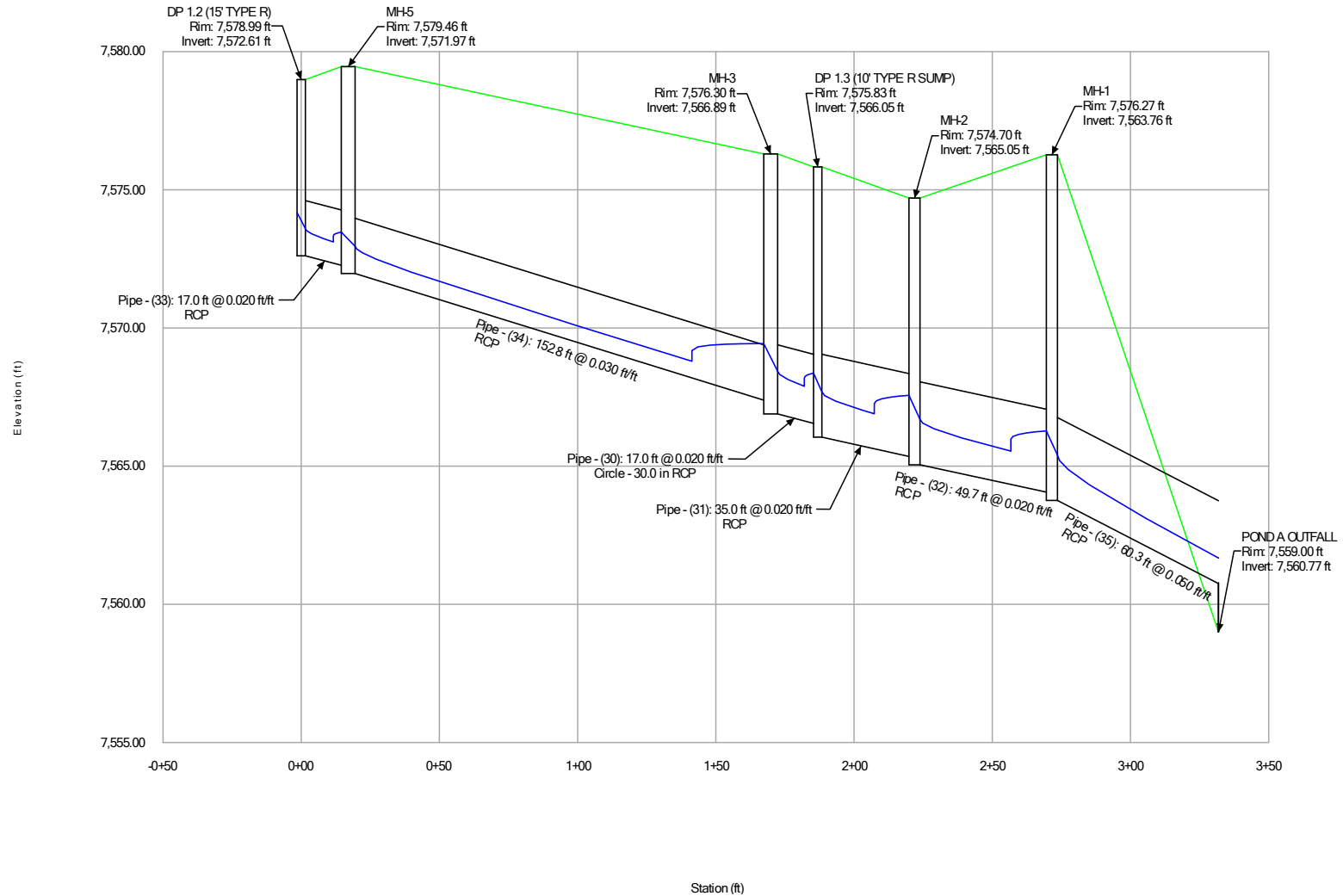


**5 YEAR**  
**Profile Report**  
**Engineering Profile - DP 1.1 - POND A (The Clubhouse at Flying Horse North.stsw)**



# 5 YEAR Profile Report

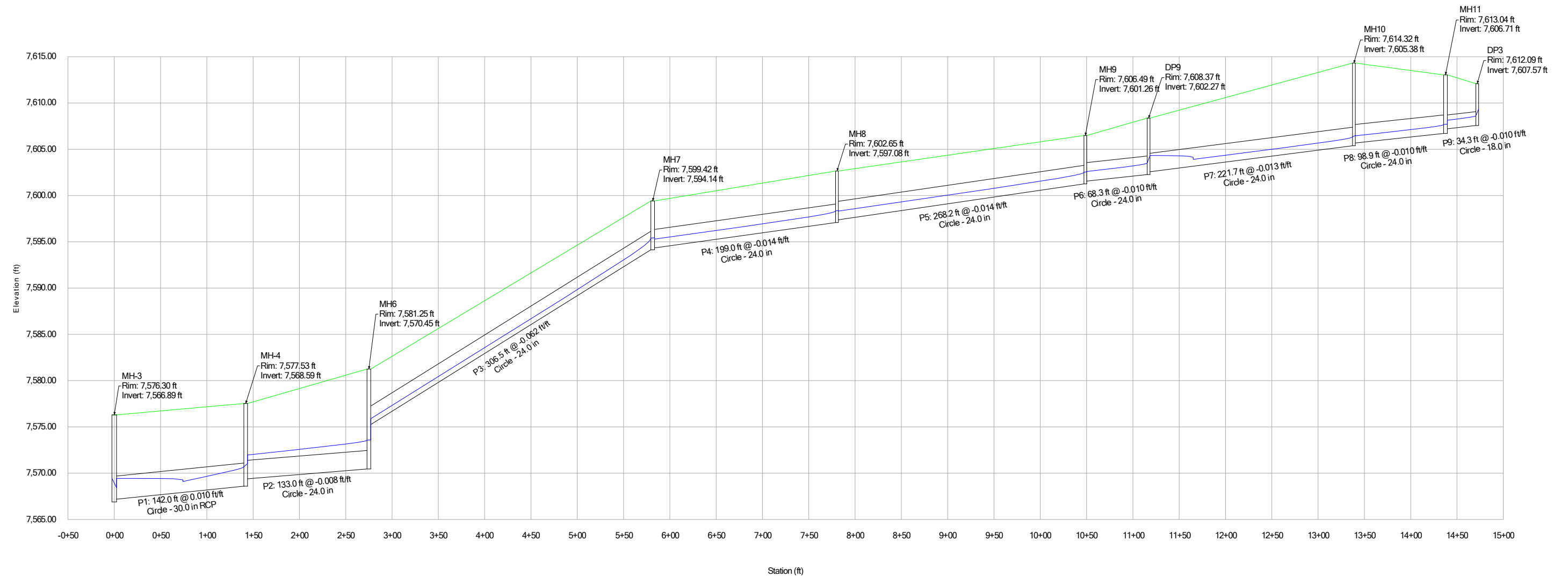
## Engineering Profile - DP 1.2 - POND A (The Clubhouse at Flying Horse North.stsw)



5 YEAR

Profile Report

Engineering Profile - EX-MH TO CLUBHOUSE (The Clubhouse at Flying Horse North.stsw)



# 100 YEAR CONDUIT TABLE

**FlexTable: Conduit Table**

Label	Start Node	Diameter (in)	Length (Unified) (ft)	Flow (cfs)	Velocity (ft/s)	Invert (Start) (ft)	Invert (Stop) (ft)	Slope (Calculated) (ft/ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
Pipe - (35)	MH-1	36.0	60.3	51.40	19.14	7,563.76	7,560.75	0.050	7,566.09	7,563.75
Pipe - (31)	DP 1.3 (10' TYPE R SUMP)	36.0	35.0	51.40	7.27	7,566.05	7,565.35	0.020	7,569.24	7,569.04
Pipe - (32)	MH-2	36.0	49.7	51.40	13.61	7,565.05	7,564.06	0.020	7,567.92	7,567.65
Pipe - (33)	DP 1.2 (15' TYPE R)	24.0	17.0	11.60	9.37	7,572.61	7,572.27	0.020	7,573.83	7,573.87
Pipe - (34)	MH-5	24.0	152.8	11.60	10.86	7,571.97	7,567.39	0.030	7,573.19	7,572.03
P10	DP1 (15' TYPE R)	30.0	17.0	8.80	1.79	7,571.37	7,568.89	0.146	7,574.04	7,574.03
P1	MH-4	30.0	142.0	31.80	6.48	7,568.59	7,567.19	0.010	7,572.88	7,572.03
Pipe - (30)	MH-3	30.0	17.0	42.40	8.64	7,566.89	7,566.55	0.020	7,570.26	7,570.08
Pipe - (39)	DP 1.1 (5' TYPE R SUMP)	24.0	17.0	5.60	1.78	7,567.73	7,567.39	0.020	7,572.04	7,572.03
P4	MH7	24.0	199.0	23.50	9.54	7,594.34	7,597.08	-0.014	7,598.80	7,595.80
P5	MH8	24.0	268.2	23.50	9.75	7,597.38	7,601.26	-0.014	7,602.98	7,598.81
P6	MH9	24.0	68.3	23.50	8.36	7,601.56	7,602.27	-0.010	7,603.99	7,603.24
P7	DP9	24.0	221.7	13.90	8.28	7,602.57	7,605.38	-0.013	7,606.72	7,605.55
P8	MH10	24.0	98.9	13.90	7.69	7,605.68	7,606.71	-0.010	7,608.05	7,606.80
P9	MH11	18.0	34.3	13.90	7.87	7,607.21	7,607.57	-0.010	7,609.25	7,608.59
P3	MH6	24.0	306.5	23.50	17.08	7,575.25	7,594.14	-0.062	7,595.86	7,576.15
P2	MH-4	24.0	133.0	23.50	7.48	7,569.39	7,570.45	-0.008	7,575.47	7,574.03

HRG Response:  
Revised.

NOTE: VARIANCE REQUEST IS BEING SUBMITTED FOR EXISTING PIPES 35 AND 39.

revise to deviation

# 100 YEAR MH TABLE

**FlexTable: Manhole Table**

Label	Elevation (Ground) (ft)	Elevation (Rim) (ft)	Flow (Total Out) (cfs)	Depth (Out) (ft)	Hydraulic Grade Line (Out) (ft)	Hydraulic Grade Line (In) (ft)	Notes	Headloss (ft)
MH-2	7,574.70	7,574.70	51.40	2.87	7,567.92	7,569.04	SDMH	1.12
MH-5	7,579.46	7,579.46	11.60	1.22	7,573.19	7,573.87	SDMH	0.68
DP 1.2 (15' TYPE R)	7,578.99	7,578.99	11.60	1.22	7,573.83	7,574.61	15' TYPE-R INLET	0.77
MH-4	7,577.53	7,577.53	31.80	4.29	7,572.88	7,574.03	SDMH	1.15
MH-1	7,576.27	7,576.27	51.40	2.33	7,566.09	7,567.65	SDMH	1.56
DP1 (15' TYPE R)	7,577.06	7,577.06	8.80	2.67	7,574.04	7,574.12	15' TYPE-R INLET	0.07
MH-3	7,576.30	7,576.30	42.40	3.37	7,570.26	7,572.03	SDMH	1.76
DP 1.3 (10' TYPE R SUMP)	7,575.83	7,575.83	51.40	3.19	7,569.24	7,570.08	10' TYPE-R INLET	0.84
DP 1.1 (5' TYPE R SUMP)	7,575.83	7,575.83	5.60	4.31	7,572.04	7,572.11	5' TYPE-R INLET	0.07
DP3	7,612.09	7,612.09	13.90	1.68	7,609.25	7,610.70	15' TYPE R	1.44
MH7	7,599.42	7,599.42	23.50	1.72	7,595.86	7,595.96		0.10
MH8	7,602.65	7,602.65	23.50	1.72	7,598.80	7,598.90		0.10
MH9	7,606.49	7,606.49	23.50	1.72	7,602.98	7,603.08		0.10
DP9	7,608.37	7,608.37	23.50	1.72	7,603.99	7,605.55		1.56
MH10	7,614.32	7,614.32	13.90	1.34	7,606.72	7,606.96		0.24
MH11	7,613.04	7,613.04	13.90	1.34	7,608.05	7,608.11		0.06
MH6	7,581.25	7,581.25	23.50	5.02	7,575.47	7,575.51		0.04

## 100 YEAR OUTFALL TABLE

**FlexTable: Outfall Table**

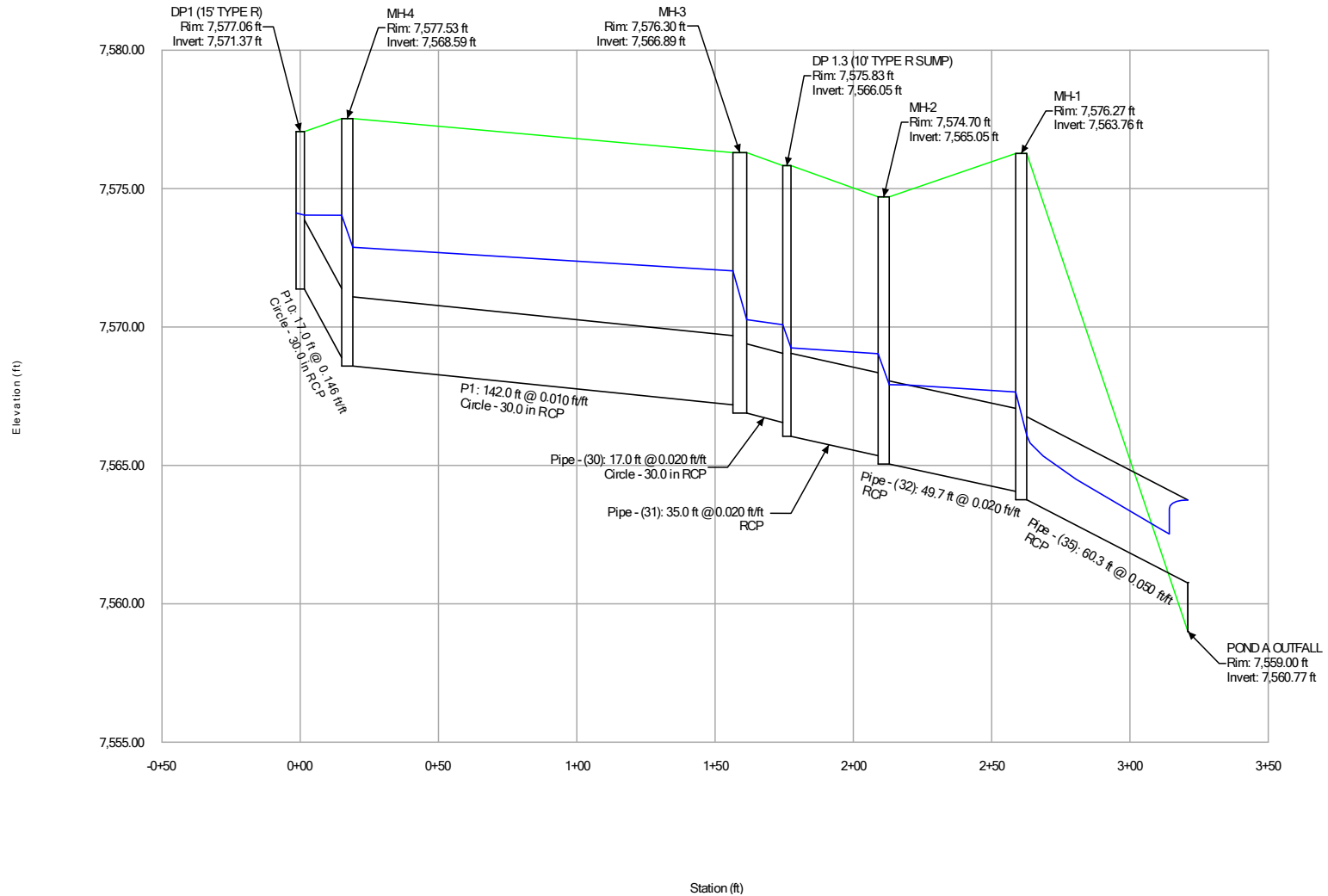
Label	Elevation (Ground) (ft)	Elevation (Invert) (ft)	Elevation (User Defined Tailwater) (ft)	Hydraulic Grade (ft)	Flow (Total Out) (cfs)	Notes
POND A OUTFALL	7,559.00	7,560.77	7,563.75	7,563.75	51.40	CROWN TW



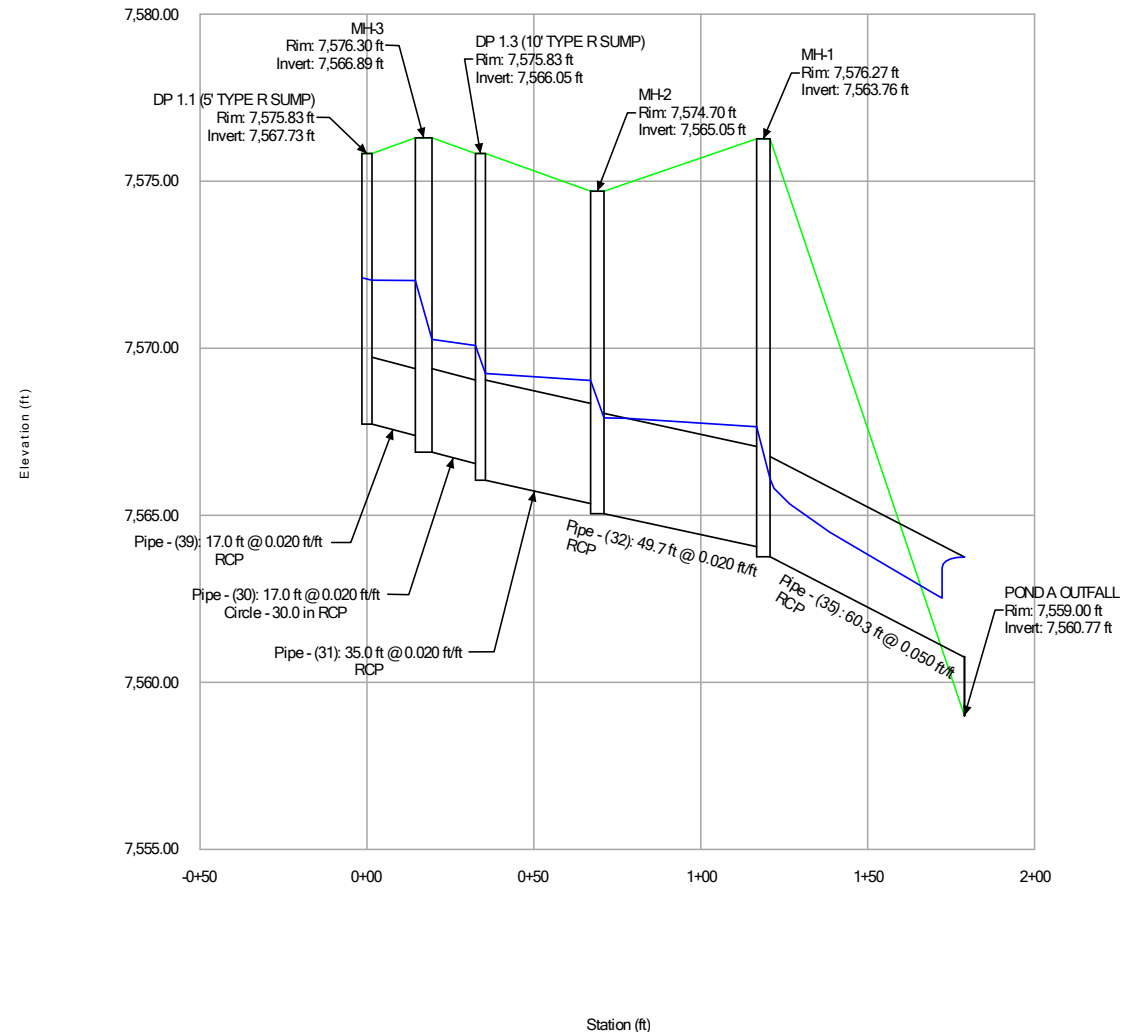
100 YEAR

## Profile Report

### Engineering Profile - DP1 - POND A (The Clubhouse at Flying Horse North.stsw)



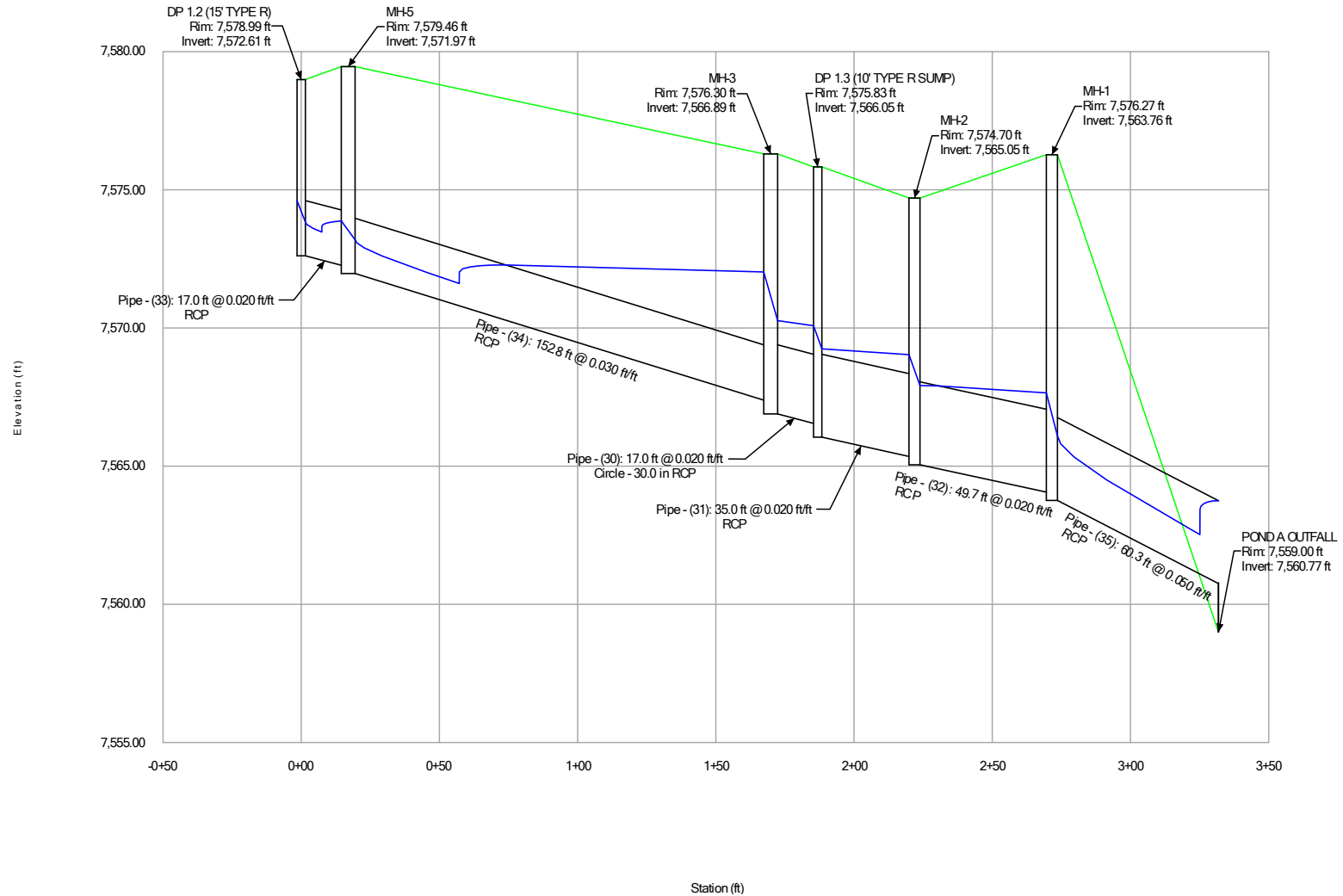
**100 YEAR**  
**Profile Report**  
**Engineering Profile - DP 1.1 - POND A (The Clubhouse at Flying Horse North.stsw)**



100 YEAR

## Profile Report

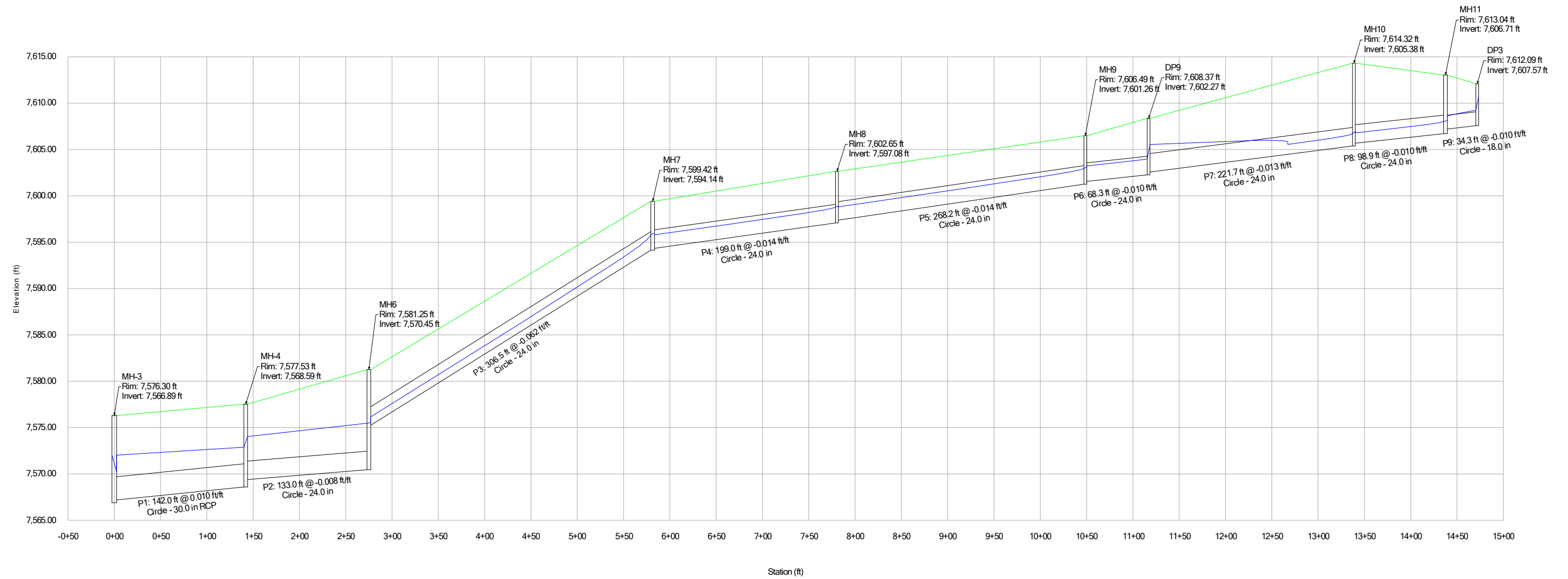
### Engineering Profile - DP 1.2 - POND A (The Clubhouse at Flying Horse North.stsw)



100 YEAR

Profile Report

Engineering Profile - EX-MH TO CLUBHOUSE (The Clubhouse at Flying Horse North.stsw)



## Appendix D: Pond Calculations

Note: The following are modifications to the existing  
Filing 3 Pond A Full Spectrum Detention Facility.

MHFD-Detention, Version 4.06 (July 2022)

**Basin ID: EXISTING POND A (PROPOSED CONDITIONS)**

**Example Zone Configuration (Retention Pond)**

The diagram illustrates a retention pond configuration with three distinct zones. Zone 1 is the deepest area, containing a permanent pool. Zone 2 is a shallower area above Zone 1. Zone 3 is the shallowest area at the top of the pond. The water level is indicated by a horizontal line labeled '100-YR VOLUME'. The elevation of the water level is marked as 'EURL'. The elevation of the bottom of the pond is marked as 'WOCV'. The 100-year orifice is located at the right end of the pond, labeled '100-YEAR ORIFICE'. The permanent pool is labeled 'PERMANENT POOL'.

### Example Zone Configuration (Retention Pond)

Selected BMP Type =	<b>EDB</b>	
Watershed Area =	<b>28.65</b>	acres
Watershed Length =	<b>3,155</b>	ft
Watershed Length to Centroid =	<b>500</b>	ft
Watershed Slope =	<b>0.020</b>	ft/ft
Watershed Imperviousness =	<b>35.95%</b>	percent
Percentage Hydrologic Soil Group A =	<b>0.0%</b>	percent
Percentage Hydrologic Soil Group B =	<b>100.0%</b>	percent
Percentage Hydrologic Soil Group C/D =	<b>0.0%</b>	percent
Target WQCV Drain Time =	<b>40.0</b>	hours
Location for 1-hr Rainfall Depths = Denver - Capitol Building		

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

Water Quality Capture Volume (WQCV) =	0.403	acre-feet
Excess Urban Runoff Volume (EURV) =	1.072	acre-feet
2-yr Runoff Volume ( $P_1 = 1.19$ ) =	1.063	acre-feet
5-yr Runoff Volume ( $P_1 = 1.5$ ) =	1.639	acre-feet
10-yr Runoff Volume ( $P_1 = 1.75$ ) =	2.162	acre-feet
25-yr Runoff Volume ( $P_1 = 2.2$ ) =	2.922	acre-feet
50-yr Runoff Volume ( $P_1 = 2.5$ ) =	3.515	acre-feet
100-yr Runoff Volume ( $P_1 = 2.52$ ) =	4.288	acre-feet
500-yr Runoff Volume ( $P_1 = 3.14$ ) =	5.809	acre-feet
Approximate 2-yr Detention Volume =	0.782	acre-feet
Approximate 5-yr Detention Volume =	1.102	acre-feet
Approximate 10-yr Detention Volume =	1.547	acre-feet
Approximate 25-yr Detention Volume =	1.752	acre-feet
Approximate 50-yr Detention Volume =	1.841	acre-feet
Approximate 100-yr Detention Volume =	2.135	acre-feet

Zone 1 Volume (WQCV) =	0.403	acre-feet
Zone 2 Volume (EURV - Zone 1) =	0.669	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	1.063	acre-feet
Total Detention Basin Volume =	2.135	acre-feet
Initial Surge Volume (ISV) =	user	ft <sup>3</sup>
Initial Surge 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 ( $R_{LW}$ ) =	user	

Initial Surcharge Area ( $A_{S1}$ )	=	user	ft <sup>2</sup>
Surcharge Volume Length ( $L_{S1}$ )	=	user	ft
Surcharge Volume Width ( $W_{S1}$ )	=	user	ft
Depth of Basin Floor ( $H_{FLOOR}$ )	=	user	ft
Length of Basin Floor ( $L_{FLOOR}$ )	=	user	ft
Width of Basin Floor ( $W_{FLOOR}$ )	=	user	ft
Area of Basin Floor ( $A_{FLOOR}$ )	=	user	ft <sup>2</sup>
Volume of Basin Floor ( $V_{FLOOR}$ )	=	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

	acre-feet
	acre-feet
1.19	inches
1.50	inches
1.75	inches
2.00	inches
2.25	inches
2.52	inches
	inches

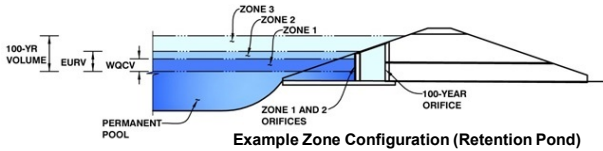
[illegible]

# DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)

Project: THE CLUBHOUSE AT FLYING HORSE NORTH

Basin ID: EXISTING POND A (PROPOSED CONDITIONS)



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	3.03	0.403	Orifice Plate
Zone 2 (EURV)	4.38	0.669	Orifice Plate
Zone 3 (100-year)	5.94	1.063	Weir&Pipe (Restrict)
Total (all zones)		2.135	

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)

Centroid 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

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	2.60						
Orifice Area (sq. inches)	2.00	4.50						

	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 with Flat or Sloped Grate and Outlet Pipe OR Rectangular/Trapezoidal Weir and No Outlet Pipe)

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 Type =   
Debris Clogging % =  %

Calculated Parameters for Overflow Weir  
Height of Grate Upper Edge, H<sub>u</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)

Depth to Invert of Outlet Pipe =  ft (distance below basin bottom at Stage = 0 ft)  
Outlet Pipe Diameter =  inches  
Restrictor Plate Height Above Pipe Invert =  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  
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	3.14
One-Hour Rainfall Depth (in)	N/A	N/A	1.063	1.639	2.162	2.922	3.515	4.288	5.809
CUHP Runoff Volume (acre-ft)	N/A	N/A	1.063	1.639	2.162	2.922	3.515	4.288	5.809
Inflow Hydrograph Volume (acre-ft)	N/A	N/A	2.8	7.8	11.9	21.4	26.8	34.2	47.8
CUHP Predevelopment Peak Q (cfs)	N/A	N/A							
OPTIONAL Override Predevelopment Peak Q (cfs)	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre)	N/A	N/A	0.10	0.27	0.41	0.75	0.94	1.19	1.67
Peak Inflow Q (cfs)	N/A	N/A	13.4	20.9	26.6	38.6	46.2	55.5	74.0
Peak Outflow Q (cfs)	0.2	0.3	0.3	4.7	9.8	19.7	22.9	24.6	42.4
Ratio Peak Outflow to Predevelopment Q	N/A	N/A	N/A	0.6	0.8	0.9	0.9	0.7	0.9
Structure Controlling Flow	Plate	Plate	Plate	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Outlet Plate 1	Spillway	Spillway
Max Velocity through Grate 1 (fps)	N/A	N/A	N/A	0.3	0.7	1.5	1.8	1.9	2.0
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)	41	67	67	71	69	66	64	61	55
Time to Drain 99% of Inflow Volume (hours)	43	70	71	76	75	74	73	72	70
Maximum Ponding Depth (ft)	3.03	4.38	4.25	4.78	4.97	5.26	5.50	6.08	6.68
Area at Maximum Ponding Depth (acres)	0.40	0.59	0.57	0.63	0.66	0.69	0.72	0.79	0.88
Maximum Volume Stored (acre-ft)	0.405	1.075	1.000	1.319	1.441	1.637	1.806	2.237	2.740

REVISED PER  
POND A DETAILS  
AMENDMENT  
(SEE APPENDIX D)

100 YR ACCESSES  
SPILLWAY

MHFD-Detention, Version 4.06 (July 2022)

**Basin ID: PROPOSED POND A MODIFICATIONS**

The diagram illustrates a retention pond configuration with three distinct zones. Zone 1 is the deepest area, containing a 'PERMANENT POOL' and a '100-YR ORIFICE'. Zone 2 is a shallower area above Zone 1, also containing a '100-YR ORIFICE'. Zone 3 is the shallowest area at the top of the pond. The water level is indicated by a dashed line labeled '100-YR VOLUME'. The ground surface is shown as a solid line, and the water surface is a dashed line. The pond is bounded by a 'EURV' (Extreme Upstream Right Bank) on the left and a 'WOCV' (Water of Concern Volume) on the right. The pond is labeled 'Example Zone Configuration (Retention Pond)'.

Selected BMP Type =	<b>EDB</b>	
Watershed Area =	28.65	acres
Watershed Length =	3,155	ft
Watershed Length to Centroid =	500	ft
Watershed Slope =	0.020	ft/ft
Watershed Imperviousness =	35.95%	percent
Percentage Hydrologic Soil Group A =	0.0%	percent
Percentage Hydrologic Soil Group B =	100.0%	percent
Percentage Hydrologic Soil Groups C/D =	0.0%	percent
Target WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths = Denver - Capitol Building		

### Optional User Overrides

	acre-feet
	acre-feet
1.19	inches
1.50	inches
1.75	inches
2.00	inches
2.25	inches
2.52	inches
	inches

Zone 1 Volume (WQCV) =	0.403	acre-feet
Zone 2 Volume (EURV - Zone 1) =	0.669	acre-feet
Zone 3 Volume (100-year - Zone 1 & 2) =	1.063	acre-feet
Total Detention Basin Volume =	2.135	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 ( $A_{SV}$ )	=	user	ft <sup>2</sup>
Surcharge Volume Length ( $L_{SV}$ )	=	user	ft
Surcharge Volume Width ( $W_{SV}$ )	=	user	ft
Depth of Basin Floor ( $H_{LFLOOR}$ )	=	user	ft
Length of Basin Floor ( $L_{LFLOOR}$ )	=	user	ft
Width of Basin Floor ( $W_{LFLOOR}$ )	=	user	ft
Area of Basin Floor ( $A_{LFLOOR}$ )	=	user	ft <sup>2</sup>
Volume of Basin Floor ( $V_{LFLOOR}$ )	=	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

## REGRADED SIDE SLOPES TO 3:1



✓ = calcs match details in plans

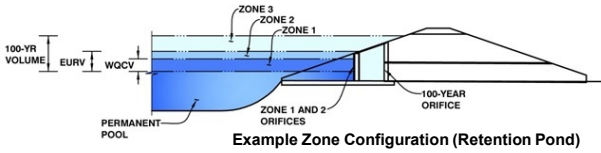
✗ = calcs do not match details in plans

## DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)

Project: THE CLUBHOUSE AT FLYING HORSE NORTH

Basin ID: PROPOSED POND A MODIFICATIONS



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	2.35	0.403	Orifice Plate
Zone 2 (EURV)	3.58	0.669	Orifice Plate
Zone 3 (100-year)	5.11	1.063	Weir&Pipe (Restrict)
Total (all zones)		2.135	

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)

Centroid of Lowest Orifice = 0.00 ft (relative to basin bottom at Stage = 0 ft)  
Depth at top of Zone using Orifice Plate = 3.58 ft (relative to basin bottom at Stage = 0 ft)  
Orifice Plate: Orifice Vertical Spacing = N/A inches  
Orifice Plate: Orifice Area per Row = N/A sq. inches

Calculated Parameters for Plate  
WQ Orifice Area per Row = N/A 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)	0.00	1.80	2.60					
Orifice Area (sq. inches)	2.30	4.70	2.30					

	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)								

SWAPPED ORIFICE PLATE

User Input: Vertical Orifice (Circular or Rectangular)

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

Calculated Parameters for Vertical Orifice  
Vertical Orifice Area = Not Selected Not Selected ft<sup>2</sup>  
Vertical Orifice Centroid = Not Selected Not Selected feet

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

Overflow Weir Front Edge Height, H<sub>o</sub> = Zone 3 Weir Not Selected ft (relative to basin bottom at Stage = 0 ft)  
Overflow Weir Front Edge Length = 6.00 Not Selected feet  
Overflow Weir Grate Slope = 0.00 Not Selected H:V  
Horiz. Length of Weir Sides = 3.00 Not Selected feet  
Overflow Grate Type = Type C Grate Not Selected  
Debris Clogging % = 50% Not Selected %

Calculated Parameters for Overflow Weir  
Height of Grate Upper Edge, H<sub>u</sub> = Zone 3 Weir Not Selected feet  
Overflow Weir Slope Length = 3.00 Not Selected feet  
Grate Open Area / 100-yr Orifice Area = 6.07 Not Selected  
Overflow Grate Open Area w/o Debris = 12.53 Not Selected ft<sup>2</sup>  
Overflow Grate Open Area w/ Debris = 6.26 Not Selected 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 = Zone 3 Restrictor Not Selected ft (distance below basin bottom)  
Outlet Pipe Diameter = 24.00 Not Selected inches  
Restrictor Plate Height Above Pipe Invert = 15.00 Not Selected inches

HRG Response:  
Pond details updated to match calculation (8ft spillway width).

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate  
Outlet Pipe Area = Zone 3 Restrictor Not Selected ft<sup>2</sup>  
Outlet Pipe Centroid = 0.71 Not Selected feet  
Outlet Pipe Slope = 1.82 Not Selected radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage = 6.00 ft (relative to basin bottom at Stage = 0 ft)  
Spillway Crest Length = 8.00 feet  
Spillway End Slopes = 4.00 H:V  
Freeboard above Max Water Surface = 1.00 feet

Calculated Parameters for Spillway  
Spillway Crest Length = 1.33 feet  
Spillway Crest Slope = 8.33 feet  
Basin Area at Top of Freeboard = 1.13 acres  
Basin Volume at Top of Freeboard = 5.13 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	3.14
One-Hour Rainfall Depth (in) =	N/A	N/A	1.063	1.639	2.162	2.922	3.515	4.288	5.809
CUHP Runoff Volume (acre-ft) =	0.403	1.072	1.063	1.639	2.162	2.922	3.515	4.288	5.809
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	1.063	1.639	2.162	2.922	3.515	4.288	5.809
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	2.8	7.8	11.9	21.4	26.8	34.2	47.8
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.10	0.27	0.41	0.75	0.94	1.19	1.67
Peak Inflow Q (cfs) =	N/A	N/A	13.4	20.9	26.6	38.6	46.2	55.5	74.0
Peak Outflow Q (cfs) =	0.2	0.4	0.4	0.5	4.3	12.6	19.2	23.2	33.7
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.1	0.4	0.6	0.7	0.7	0.7
Structure Controlling Flow =	Plate	Plate	Plate	Plate	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Outlet Plate 1	Spillway
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	N/A	0.3	1.0	1.5	1.8	1.9
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) =	39	59	60	72	74	71	69	66	60
Time to Drain 99% of Inflow Volume (hours) =	41	63	64	77	81	80	79	77	75
Maximum Ponding Depth (ft) =	2.35	3.58	3.44	4.30	4.75	5.06	5.24	5.64	6.46
Area at Maximum Ponding Depth (acres) =	0.44	0.62	0.61	0.69	0.74	0.77	0.78	0.82	0.89
Maximum Volume Stored (acre-ft) =	0.405	1.073	0.987	1.542	1.871	2.097	2.244	2.556	3.266

# Channel Report

Capacity of Existing Filing No. 3 Pond A  
Trickle Channel w/ Developed Flows

## TRICKLE CHANNEL CAPACITY

### Rectangular

Bottom Width (ft) = 2.00  
Total Depth (ft) = 0.50

Invert Elev (ft) = 1.00  
Slope (%) = 0.01  
N-Value = 0.013

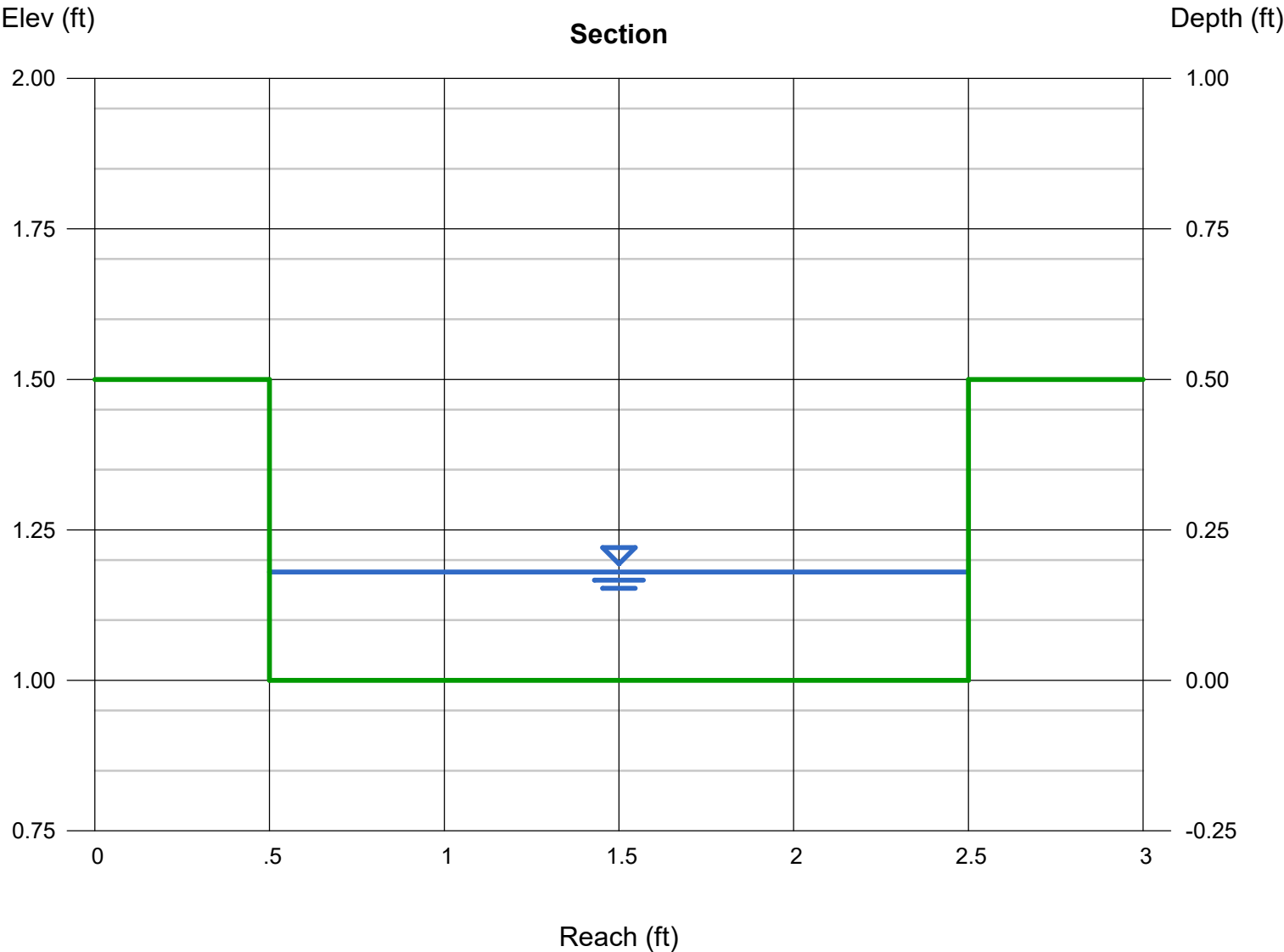
### Calculations

Compute by:  
Known Q (cfs) = 0.11

### Highlighted

Depth (ft) = 0.18  
Q (cfs) = 0.110  
Area (sqft) = 0.36  
Velocity (ft/s) = 0.31  
Wetted Perim (ft) = 2.36  
Crit Depth, Yc (ft) = 0.05  
Top Width (ft) = 2.00  
EGL (ft) = 0.18

1% OF 100 YR INFLOW  
(1% OF DP 1.3 100-YR FLOW)



# Existing Pond A Forebay w/ Proposed WQCV

## HR GREEN FOREBAY SIZING

PROJECT: CLUBHOUSE AT FLYING HORSE NORTH

DATE: 5/16/2025

DESIGNED BY: CMD

CHECKED BY: RDL

POND OR DP: F3 POND A

	INNER DIMENSIONS	OUTER DIMENSIONS
<b>LENGTH</b>		
L1	5 FT	5.83 FT
L2	20.000 FT	20.833 FT
L3	5 FT	5.83 FT
INNER L	30.000 FT	OUTER TOTAL L 31.666 FT
<b>WIDTH</b>		
W1	5 FT	5.83 FT
W2	15 FT (75% of L2)	15.83 FT
W3	5 FT	5.83 FT
INNER W	25.000 FT	OUTER TOTAL W 26.666 FT

**BAFFLE** (2.5'x0.83' + 2.5'x0.83')  
**AREA** 4.165 SF

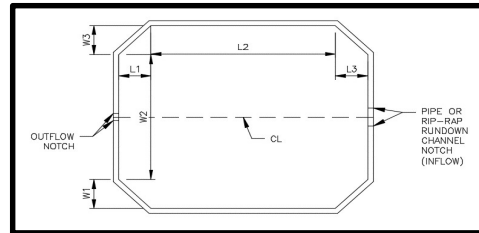
TRIANGLES 50  
RECTANGLE 300  
BAFFLE 4.165  
**TOTAL SURFACE AREA 345.835 SQ FT**

FOREBAY HT. **1.5 FT**

FOREBAY VOLUME **518.7525** CF  
**19.21305556** CY  
**0.011908919** AC-FT

REQ'D VOL (1% WQCV) 0.00403 AC-FT  
175.5468 CF  
Notch Width per USDCM **9.75** in  
Drain Time 4.5 min

SUFFICIENT  
VOLUME? **YES**



$$w = 9.23 (A_{FB} / t) (1 / \sqrt{h_{max}})$$

Equation 4-1

Where:

w = width of the rectangular vertical notch (inches)

$A_{FB}$  = surface area of the forebay (square feet)

t = emptying time of the brim-full forebay (seconds)

$h_{max}$  = maximum depth of the forebay (feet)

TABLE 4-12. FOREBAY SIZING CRITERIA

FOREBAY SIZING CRITERIA	WATERSHED IMPERVIOUS AREA (IA)				
	IA UP TO 2 ACRES	IA 2 UP TO 5 ACRES	IA 5 UP TO 10 ACRES	IA 10 UP TO 20 ACRES	IA GREATER THAN 20 ACRES
Forebay Release Rate and Configuration	Concrete sediment pad with dense grasses surrounding,	Size to drain in 4 to 5 minutes using Equation 4-1			
Minimum Forebay Volume <sup>1</sup>	concrete pad with slotted metal edge, or similar design	1% of WQCV			
Forebay Depth <sup>1</sup>		12 to 15 inches	15 to 18 inches	18 to 24 inches	24 to 30 inches

<sup>1</sup> Appropriate volume and depth should consider maintenance and access needs. The values provided are approximate and provide a starting point for design.

Revised to maintain  
drain time of 4-5 min.

show this in a detail in  
GEC Plans

**HRG Response:**  
Details of modifications to  
pond added to GEC.

# Weir Report

## Modified Emergency Overflow Weir - Existing Pond A

### Trapezoidal Weir

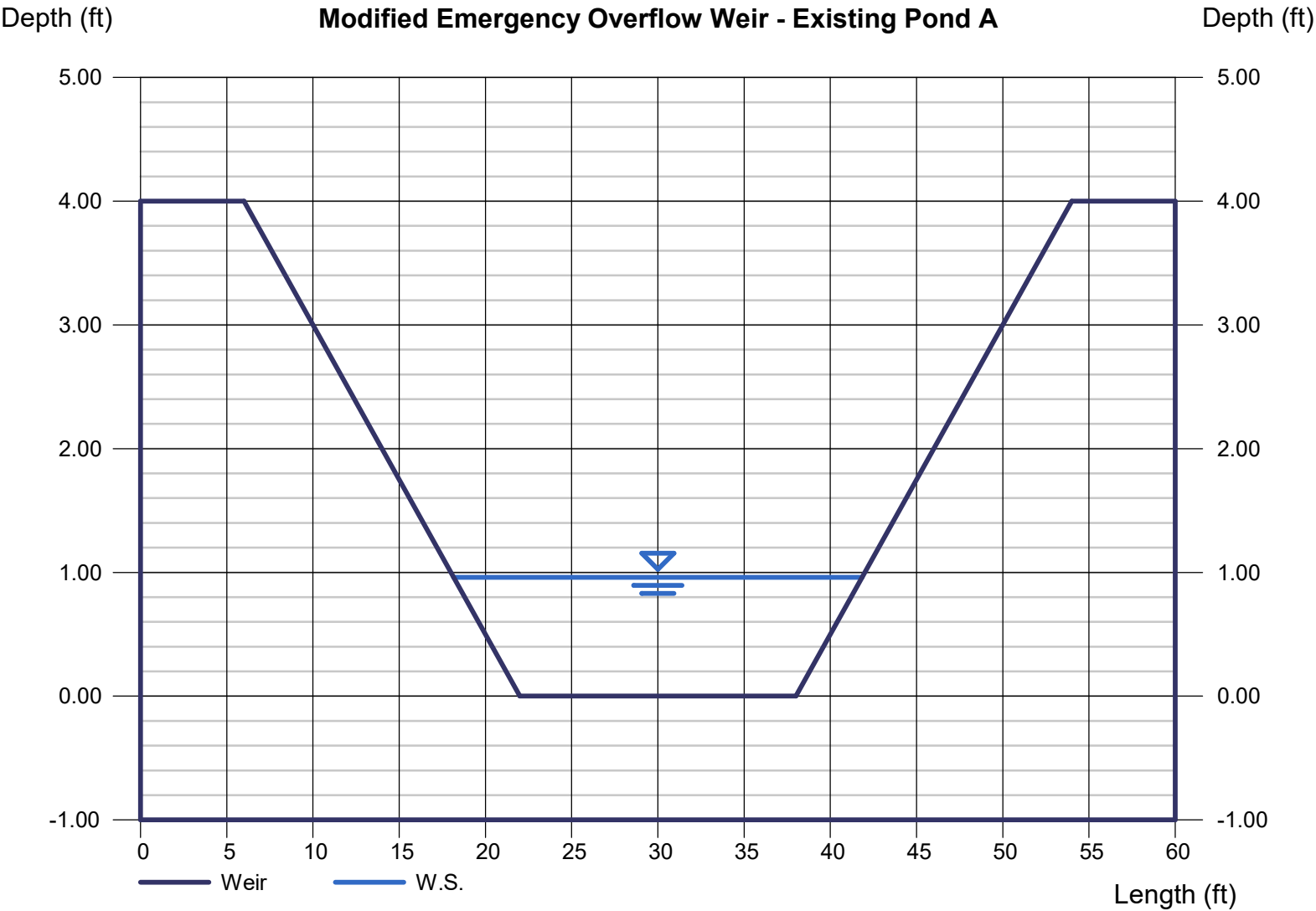
Crest = Sharp  
Bottom Length (ft) = 16.00  
Total Depth (ft) = 4.00  
Side Slope (z:1) = 4.00

### Highlighted

Depth (ft) = 0.96  
Q (cfs) = 55.50  
Area (sqft) = 19.05  
Velocity (ft/s) = 2.91  
Top Width (ft) = 23.68

### Calculations

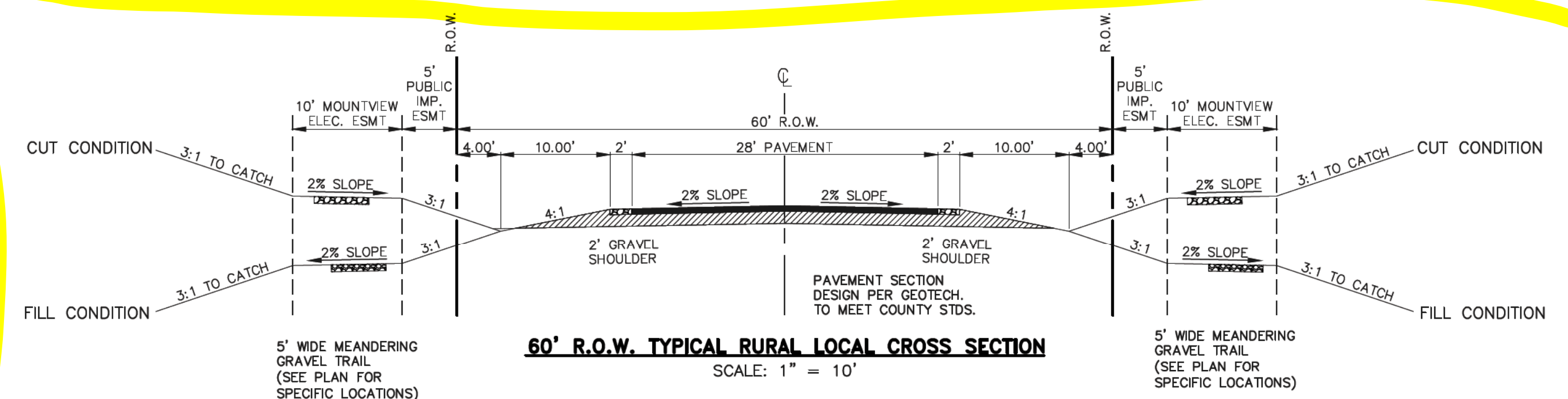
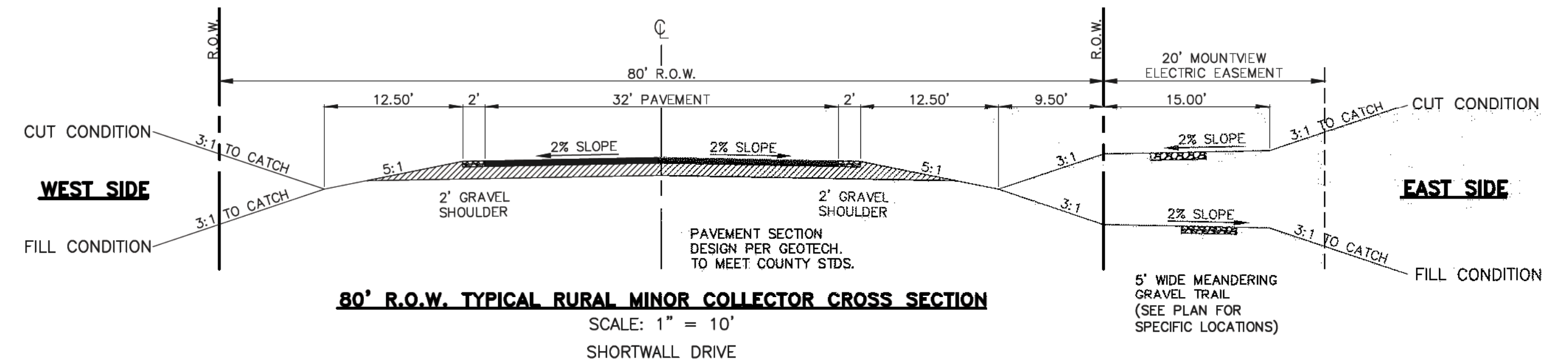
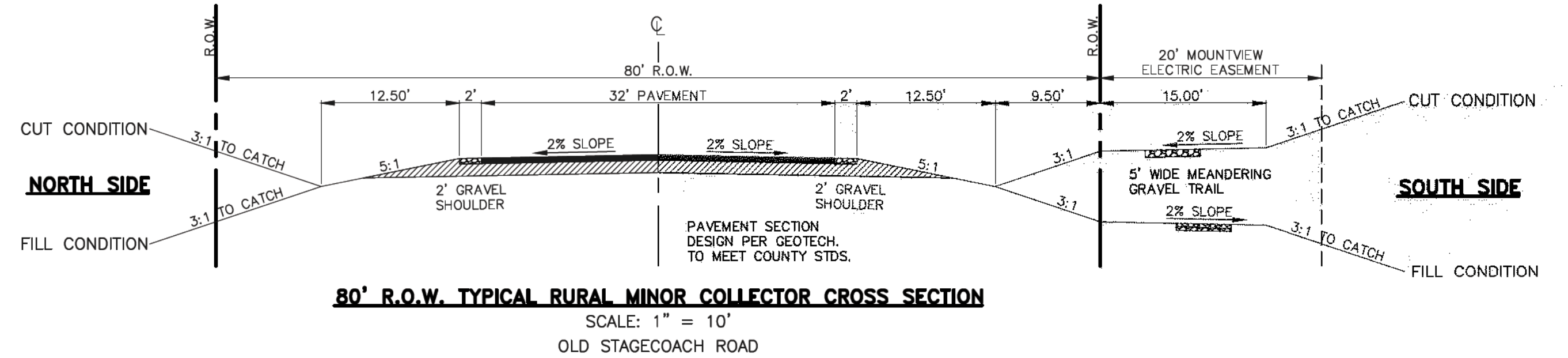
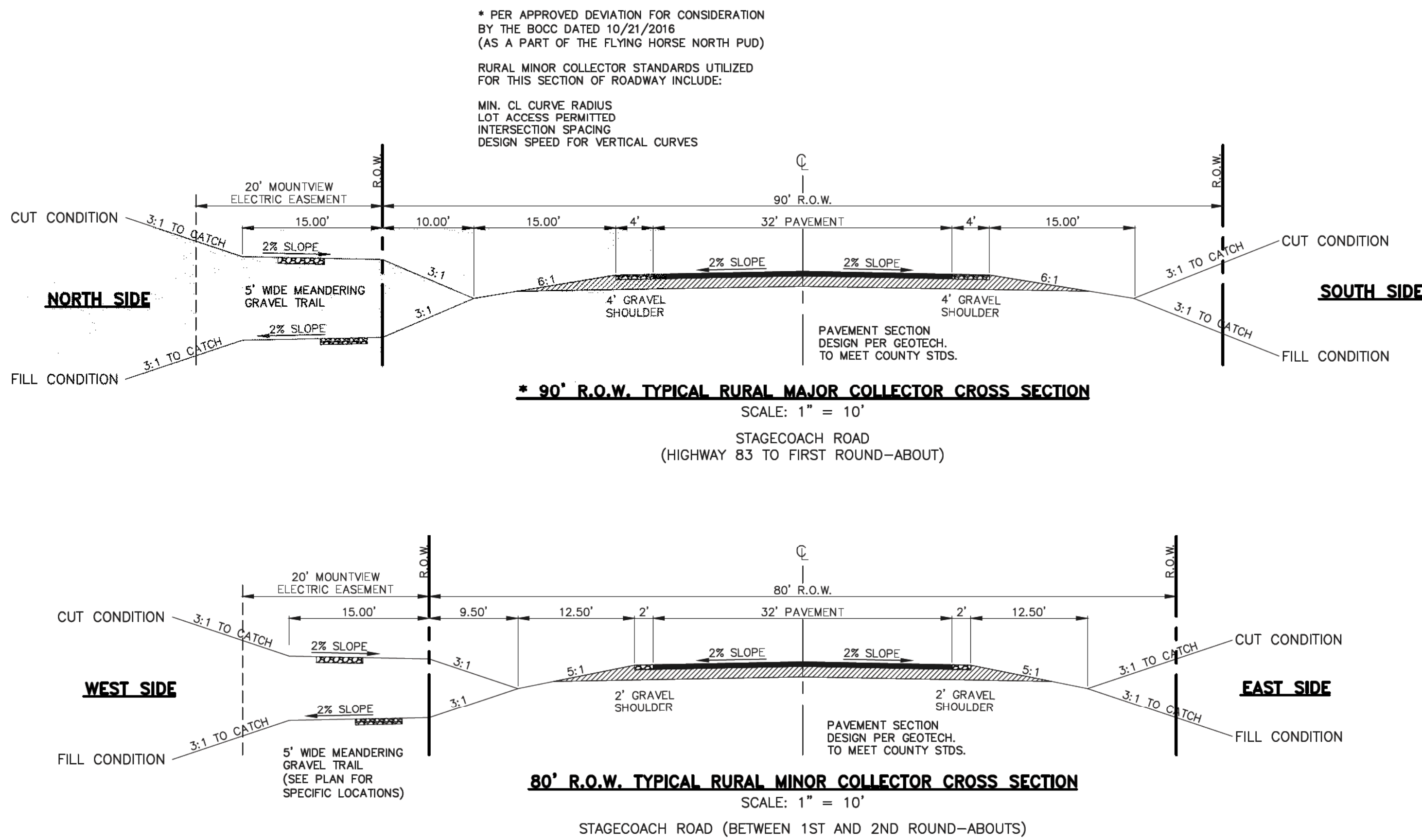
Weir Coeff. Cw = 3.10  
Compute by: Known Q  
Known Q (cfs) = 55.50



## Appendix E: Referenced Report Excerpts



N:\109611\DRAWINGS\CONSTRUCTION\109611-SI-02A.dwg, 9/13/2018 3:44:58 PM, 1:1



TYPICAL CROSS SECTION  
OF ALLEN RANCH ROAD  
NORTH OF CLUBHOUSE SITE

48 HOURS BEFORE YOU DIG,  
CALL UTILITY LOCATORS  
**811**

UTILITY NOTIFICATION CENTER OF COLORADO  
IT'S THE LAW

THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE  
SHOWN IN AN APPROXIMATE WAY ONLY. THE CONTRACTOR  
SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING  
UTILITIES BEFORE COMMENCING WORK. THE CONTRACTOR SHALL  
BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH  
MIGHT BE CAUSED BY HIS FAILURE TO EXACTLY LOCATE AND  
PRESERVE ANY AND ALL UNDERGROUND UTILITIES.

NO. REVISION

DATE

REVIEW:

PREPARED UNDER MY DIRECT SUPERVISION FOR AND ON BEHALF OF  
CLASSIC CONSULTING ENGINEERS AND SURVEYORS, LLC

MARC A. WHORTON, COLORADO P.E. #37155

9/17/18

DATE

**CLASSIC**  
CONSULTING  
ENGINEERS & SURVEYORS

619 N. Cascade Avenue, Suite 200  
Colorado Springs, Colorado 80903  
(719) 785-0790  
(719) 785-0799 (fax)

FLYING HORSE NORTH FILING NO. 1  
CONSTRUCTION DRAWINGS  
TYPICAL ROADWAY CROSS SECTION DETAILS

DESIGNED BY	MAW	SCALE	DATE	5/14/18
DRAWN BY	MAW	(H) 1" = 10'	SHEET 2A	OF 45
CHECKED BY		(V) 1" = N/A	JOB NO.	1096.11

CLASSIC  
ENGINEERS & SURVEYORS





maintenance facility is also planned as a part of Filing No. 1. Based on the current El Paso County ECM Section I.7.1.B. and given the size of the lots within this entire development area, stormwater quality is not required to be provided. However, detention/EURV will still be provided in specific locations on-site to limit the on-site development flow release to remain consistent with pre-development conditions within the major drainage corridors. These proposed facilities will aide in limiting any detrimental effects on downstream corridors. At specific areas where the Filing No. 1 development creates concentrated flows into future development areas, temporary sediment basins will be constructed to minimize sediment transfer downstream and off-site. The Filing No. 1 Final Drainage Report portion of this report will define the permanent facilities providing an Excess Urban Runoff Volume (EURV) in the lower portion of the facility storage volume with an outlet control device. Frequent and infrequent inflows are released at rates approximating undeveloped conditions. This concept provides some mitigation of increased runoff volume by releasing a portion of the increased runoff at a low rate over an extended period of time, up to 72 hours. This means that frequent storms, smaller than the 2 year event, will be reduced to very low flows near or below the sediment carrying threshold value for downstream drainage ways. Also, by incorporating an outlet structure that limits the 100-year runoff to the undeveloped condition rate, the discharge hydrograph for storms between the 2 year and the 100 year event will approximate the hydrograph for the undeveloped

## **EXISTING DITCH LINING ALONG ALLEN RANCH ROAD DESCRIPTION**

Given the rural nature of this development, roadside ditches are planned along all roadways. Concrete curb and gutter will only be used at the round-about locations and along the jurisdictional dam embankment as required by the State. The typical roadside ditch will be designed as a V-ditch with a depth of 24 inches.

The natural terrain within much of this development creates some steeper slopes on many of the roadways.

These slopes range from 1% to 10%. An analysis of the roadside ditches was performed in order to determine the necessary ditch lining required to maintain allowable velocity and shear stress.

The following three basic ditch improvements are recommended throughout the development:

(See Appendix for reference)

1. Revegetation with native seeding (Grass lined only)

Slope 2% or less and minimal flow





# DRAINAGE FEE EXCERPT

## FLOODPLAIN STATEMENT

A small portion of the Preliminary Plan (future lots not platted at this time) is located within a floodplain as determined by the Flood Insurance Rate Maps (F.I.R.M.) Map Number 08041C 0295F, 0841C 0315F, 04081C 0325F effective date, March 17, 1997 (See Appendix). However, no portion of property proposed to be platted with Filing No. 1 is within the floodplain.

## DRAINAGE AND BRIDGE FEES

### FLYING HORSE NORTH FILING NO. 1

The East Cherry Creek Basin does not currently have a Drainage Basin Fee. However, the following fees for the Filing No. 1 platted area within the Black Squirrel Creek Basin are due prior to platting:

The fees are calculated using the following impervious acreage method approved by El Paso County. The acreage for Flying Horse Filing No. 1 within the Black Squirrel Creek Basin is 342.7 acres. This total area is broken into two uses: 2.5 ac. lots (including roads and tracts) and golf course. The 2.5 ac. lot area equals 234.4 acres and the golf course area equals 108.3 acres. Thus, the percent imperviousness for this subdivision is calculated as follows (See Figure 1.1 for Basin Area Exhibit):

#### **2.5 ac. lots (incl. roads and tracts)**

(Per El Paso County Percent Impervious Chart: 11%)

$$234.4 \text{ Ac.} \times 11\% = \mathbf{25.78 \text{ Impervious Ac.}}$$

#### **Golf Course Development**

(Per El Paso County Percent Impervious Chart for greenbelts: 2%)

$$108.3 \text{ Ac.} \times 2\% = \mathbf{2.17 \text{ Impervious Ac.}}$$

**Total Impervious Acreage for Filing 1:     27.95 Imp. Ac.**

The following calculations are based on the 2018 drainage/bridge fees for the Black Squirrel Creek Drainage Basin:



# DRAINAGE FEE EXCERPT

## FILING 1 FEE TOTALS (prior to reduction):

### Bridge Fees

$$\text{\$ } 492.00 \times 27.95 \text{ Impervious Ac.} = \text{\$ } \underline{13,751.40}$$

### Drainage Fees

$$\text{\$ } 7,808.00 \times 27.95 \text{ Impervious Ac.} = \text{\$ } \underline{218,233.60}$$

Per the ECM 3.10.4a, this development requests a reduction of drainage fees based on the three on-site full spectrum detention/SWQ facilities proposed within the Black Squirrel Creek Drainage Basin to be constructed with Filing 1 rather than utilizing a reduction for low density lots. The following facilities within the Black Squirrel Creek basin meet the required six criteria as follows:

1. No downstream regional facility in place yet.
2. All three proposed facilities are less than 15 ac-ft. in volume
3. The proposed on-site facilities are not part of a regional plan.
4. The proposed outlets are designed to release to full-spectrum criteria.
5. Proposed facilities are per County criteria and will gain County approval.
6. All three proposed facilities will be private with ownership and maintenance by HOA.

Detention Pond 1	1.1 ac-ft. full spectrum	$\text{\$ } 24,448 \times 50\% =$	$\text{\$ } 12,224.00$
Detention Pond 4	4.5 ac-ft. full spectrum	$\text{\$ } 130,270 \times 50\% =$	$\text{\$ } 65,135.00$
Detention Pond 8	9.4 ac-ft. full spectrum	$\text{\$ } 111,320 \times 50\% =$	$\text{\$ } 55,660.00$
<b>Total Reduction</b>			<b><u><math>\text{\\$ } 133,019.00</math></u></b>



# DRAINAGE FEE EXCERPT

## FILING 1 FEE TOTALS:

### Bridge Fees

\$ 492.00 x 20.96 Impervious Ac. = \$ 13,751.40

### Drainage Fees

\$ 218,233.60 - 133,019.00 = \$ 85,214.60

## SUMMARY

This proposed development remains consistent with the previously approved Flying Horse North MDDP and Preliminary Drainage Report for Flying Horse North (Golf Course grading and private access roads). The proposed storm facilities have been sized to adequately handle the 100-yr. developed flows. All proposed detention facilities meet current criteria and provide full spectrum design. Upon future development outside of Filing No. 1, final drainage reports will be required finalizing final design of the proposed future drainage facilities. The proposed development will not adversely impact surrounding developments.

## PREPARED BY:

**Classic Consulting Engineers & Surveyors, LLC**



Marc A. Whorton, P.E.  
Project Manager

Maw/109611/reports/109611PDR.doc



# BASIN CC-4C (EXISTING SITE) HYDROLOGIC SUMMARY (CLASSIC'S)

ALL LAND ASSUMED 2 ACRE RESIDENTIAL LOTS, UNDEVELOPED WOODS OR  
GOOD CONDITION OPEN SPACE (LAWNS, PARKS GOLF COURSES, CEMETARIES ETC.)

## C<sub>N</sub> VALUES - DEVELOPED CONDITIONS

BASIN (label)	BASIN AREA (Ac)	GOLF COURSE / WOODS (B)		2 AC. RESIDENTIAL (B)		COMPOSITE C <sub>N</sub>
		CN	AREA (Ac.)	CN	AREA (Ac.)	
CC-1A	9.8	61	0.0	65	9.8	65.0
CC-1B	12.6	61	0.5	65	12.1	64.8
CC-2A	11.0	61	0.0	65	11.0	65.0
CC-2B	20.8	61	0.0	65	20.8	65.0
CC-2C	6.4	61	0.0	65	6.4	65.0
CC-3	52.5	61	25.0	65	27.5	63.1
CC-4A	108.7	61	65.0	65	43.7	62.6
CC-4B	8.1	85	4.5	65	3.6	76.1
CC-4C (Pre-Dev.)	7.4	61	7.4	65	0.0	61.0
CC-5	22.4	61	0.0	65	22.4	65.0
CC-6	27.8	61	0.0	65	27.8	65.0
CC-7	18.4	61	0.0	65	18.4	65.0
CC-8	7.7	61	0.0	65	7.7	65.0
CC-9	5.6	61	0.0	65	5.6	65.0
CC-10	85.6	61	51.0	65	34.6	62.6
CC-11	18.6	61	9.0	65	9.6	63.1
CC-12	12.2	61	0.0	65	12.2	65.0
CC-13A	19.3	61	0.0	65	19.3	65.0
CC-13B	25.5	61	0.0	65	25.5	65.0
CC-13C	9.9	61	0.0	65	9.9	65.0
CC-13D	18.8	61	0.0	65	18.8	65.0
CC-14	4.6	61	0.0	65	4.6	65.0
CC-15	12.8	61	0.0	65	12.8	65.0
CC-16	16.3	61	0.0	65	16.3	65.0
CC-17	25.0	61	0.0	65	25.0	65.0
CC-18	6.2	65	5.8	89	0.4	66.5
CC-19	3.7	61	0.0	65	3.7	65.0
CC-20	39.3	61	0.0	65	39.3	65.0
CC-21	6.2	61	6.2	65	0.0	61.0
CC-22	13.8	61	0.0	65	13.8	65.0
CC-23	5.7	61	0.4	65	5.3	64.7
CC-24	39.6	61	0.0	65	39.6	65.0
CC-25	3.5	61	0.0	65	3.5	65.0
CC-26	16.7	61	0.0	65	16.7	65.0
CC-27	18.9	61	3.0	65	15.9	64.4
CC-28	154.8	61	23.0	65	131.8	64.4

# BASIN CC-4C (EXISTING SITE) HYDROLOGIC SUMMARY (CLASSIC'S)

## TIME OF CONCENTRATION - DEVELOPED

BASIN	COMPOSITE Cn	C(5)	Length (ft)	OVERLAND Height (ft)	Tc (min)	STREET / CHANNEL FLOW (DCM Vol. 1 Fig. 6-25)				Tc TOTAL (min)	Tc LAG (0.6tc) (min)	Tc LAG (0.6tc) (hr)
						Length (ft)	Slope (%)	Velocity (fps)	Tc (min)			
CC-1A	65.0	0.08	300	16	18.4	500	5.0%	1.7	4.9	23.3	14.0	0.23
CC-1B	64.8	0.08	300	14	19.2	700	4.0%	2.0	5.8	25.0	15.0	0.25
CC-2A	65.0	0.08	300	14	19.2	250	3.0%	1.5	2.8	22.0	13.2	0.22
CC-2B	65.0	0.08	300	14	19.2	280	3.0%	1.5	3.1	22.3	13.4	0.22
CC-2C	65.0	0.08	300	18	17.7					17.7	10.6	0.18
CC-3	63.1	0.08	300	18	17.7	2300	3.0%	1.5	25.6	43.2	25.9	0.43
CC-4A	62.6	0.08	300	14	19.2	2700	2.0%	1.8	25.0	44.2	26.5	0.44
CC-4B	76.1	0.08	300	12	20.2	600	3.0%	1.6	6.3	26.4	15.9	0.26
CC-4C (Pre-Dev.)	61.0	0.08	40	0.8	9.3	350	3.0%	1.5	3.9	13.2	7.9	0.13
CC-5	65.0	0.08	300	18	17.7	1000	4.0%	2.0	8.3	26.0	15.6	0.26
CC-6	65.0	0.08	300	14	19.2	550	2.5%	1.6	5.7	24.9	14.9	0.25
CC-7	65.0	0.08	300	16	18.4	1000	3.0%	1.6	10.4	28.8	17.3	0.29
CC-8	65.0	0.08	300	10	21.4	250	2.0%	1.2	3.5	24.9	14.9	0.25
CC-9	65.0	0.08	300	18	17.7	100	2.0%	1.2	1.4	19.0	11.4	0.19
CC-10	62.6	0.08	300	22	16.5	2400	3.0%	1.8	22.2	38.7	23.2	0.39
CC-11	63.1	0.08	300	18	17.7	450	5.0%	2.1	3.6	21.2	12.7	0.21
CC-12	65.0	0.08	300	11	20.8	650	4.0%	2.0	5.4	26.2	15.7	0.26
CC-13A	65.0	0.08	300	14	19.2	1400	4.0%	2.0	11.7	30.9	18.5	0.31
CC-13B	65.0	0.08	300	18	17.7	1300	3.0%	1.6	13.5	31.2	18.7	0.31
CC-13C	65.0	0.08	300	14	19.2	350	4.0%	2.0	2.9	22.1	13.3	0.22
CC-13D	65.0	0.08	300	20	17.1	900	4.0%	2.0	7.5	24.6	14.7	0.25
CC-14	65.0	0.08	300	10	21.4					21.4	12.9	0.21
CC-15	65.0	0.08	300	14	19.2	550	3.0%	1.8	5.1	24.3	14.6	0.24
CC-16	65.0	0.08	300	10	21.4	650	2.5%	1.3	8.3	29.8	17.9	0.30
CC-17	65.0	0.08	300	9	22.2	950	2.0%	1.2	13.2	35.4	21.2	0.35
CC-18	66.5	0.08	300	7	24.1	400	2.0%	1.2	5.6	29.7	17.8	0.30
CC-19	65.0	0.08	300	8	23.1	100	2.0%	1.0	1.7	24.7	14.8	0.25
CC-20	65.0	0.08	300	9	22.2	350	6.0%	2.2	2.7	24.8	14.9	0.25
CC-21	61.0	0.08	300	18	17.7	200	3.0%	1.8	1.9	19.5	11.7	0.20
CC-22	65.0	0.08	300	14	19.2	700	4.0%	2.0	5.8	25.0	15.0	0.25
CC-23	64.7	0.08	300	10	21.4	850	2.0%	1.2	11.8	33.2	19.9	0.33
CC-24	65.0	0.08	300	20	17.1	900	4.0%	1.9	7.9	25.0	15.0	0.25
CC-25	65.0	0.08	300	16	18.4	500	3.0%	1.8	4.6	23.0	13.8	0.23
CC-26	65.0	0.08	300	14	19.2	900	5.0%	2.1	7.1	26.3	15.8	0.26
CC-27	64.4	0.08	300	14	19.2	1300	3.0%	1.8	12.0	31.2	18.7	0.31
CC-28	64.4	0.08	300	14	19.2	4700	3.0%	1.8	43.5	62.7	37.6	0.63

# BASIN CC-4C (EXISTING SITE) HYDROLOGIC SUMMARY (CLASSIC'S)

## BASIN SUMMARY - DEVELOPED CONDITIONS



BASIN (label)	AREA (acres)	COMPOSITE CN	TOTAL LAG TIME (hours)	Q 2 Yr. (cfs)	Q 5 Yr. (cfs)	Q 100 Yr. (cfs)
CC-1A	9.80	65.0	0.23	0.8	3.3	16.0
CC-1B	12.60	64.8	0.25	1.0	4.0	19.4
CC-2A	11.00	65.0	0.22	1.0	3.8	18.3
CC-2B	20.80	65.0	0.22	1.9	7.1	34.6
CC-2C	6.40	65.0	0.18	0.7	2.5	11.5
CC-3	52.50	63.1	0.43	1.8	8.8	54.5
CC-4A	108.70	62.6	0.44	15.4	39.0	156.0
CC-4B	8.10	76.1	0.26	4.0	7.3	20.6
CC-4C (Pre-Dev.)	7.40	61.0	0.13	0.2	1.8	11.2
CC-5	22.40	65.0	0.26	1.8	7.1	34.3
CC-6	27.80	65.0	0.25	2.3	9.1	43.2
CC-7	18.40	65.0	0.29	1.4	5.4	27.0
CC-8	7.70	65.0	0.25	0.6	2.5	12.0
CC-9	5.60	65.0	0.19	0.6	2.1	9.8
CC-10	85.60	62.6	0.39	2.6	14.1	91.9
CC-11	18.60	63.1	0.21	0.9	5.0	28.1
CC-12	12.20	65.0	0.26	1.0	3.9	18.7
CC-13A	19.30	65.0	0.31	1.4	5.4	27.3
CC-13B	25.50	65.0	0.31	1.8	7.2	36.1
CC-13C	9.90	65.0	0.22	0.9	3.4	16.5
CC-13D	18.80	65.0	0.25	1.5	6.2	29.2
CC-14	4.60	65.0	0.21	0.4	1.6	7.8
CC-15	12.80	65.0	0.24	1.1	4.3	20.4
CC-16	16.30	65.0	0.30	1.2	4.6	23.6
CC-17	25.00	65.0	0.35	1.7	6.5	32.8
CC-18	6.20	66.5	0.30	0.7	2.2	9.7
CC-19	3.70	65.0	0.25	0.3	1.2	5.8
CC-20	39.30	65.0	0.25	3.2	12.9	61.0
CC-21	6.20	61.0	0.20	0.1	1.2	8.5
CC-22	13.80	65.0	0.25	1.1	4.5	21.4
CC-23	5.70	64.7	0.33	0.4	1.5	7.7
CC-24	39.60	65.0	0.25	3.3	13.0	61.5
CC-25	3.50	65.0	0.23	0.3	1.2	5.7
CC-26	16.70	65.0	0.26	1.4	5.3	25.6
CC-27	18.90	64.4	0.31	1.2	4.9	25.8
CC-28	154.80	64.4	0.63	6.5	24.7	136.3

## EXISTING SC150 LINED ROADSIDE DITCH: PRODUCT SUMMARY

The complete line of RollMax™ products offers a variety of options for both short-term and permanent erosion control needs. Reference the RollMax Products Chart below to find the right solution for your next project.



### RollMax Product Selection Chart

TEMPORARY					
	Product Description	Longevity	Applications	Design Permissible Shear Stress lbs/ft <sup>2</sup> (Pa)	Design Permissible Velocity ft/s (m/s)
<b>ERONET</b>					
 DS75	1.5 lb., accelerated photodegradable, polypropylene top net, 100% straw fiber matrix	45 days	Low Flow Channels 4:1 - 3:1 Slopes	Unvegetated 1.55 (74)	Unvegetated 5.0 (1.52)
 DS150	1.5 lb., photodegradable, polypropylene top & bottom net, 100% straw fiber matrix	60 days	Moderate Flow Channels 3:1 - 2:1 Slopes	Unvegetated 1.75 (84)	Unvegetated 6.0 (1.83)
 S75	1.5 lb., photodegradable, polypropylene top net, 100% straw fiber matrix	12 months	Low Flow Channels 4:1 - 3:1 Slopes	Unvegetated 1.55 (74)	Unvegetated 5.0 (1.52)
 S150	1.5 lb., photodegradable, polypropylene top & bottom net, 100% straw fiber matrix	12 months	Moderate Flow Channels 3:1 - 2:1 Slopes	Unvegetated 1.75 (84)	Unvegetated 6.0 (1.83)
 SC150	2.9 lb., UV-stable polypropylene top net, 70% straw/30% coconut fiber matrix, 1.5 lb., photodegradable polypropylene bottom net	24 months	Medium Flow Channels 2:1 - 1:1 Slopes	Unvegetated 2.0 (96)	Unvegetated 8.0 (2.44)
 C125	2.9 lb., UV stable polypropylene top & bottom nets, 100% coconut fiber matrix	36 months	High Flow Channels 1:1 and Greater Slopes	Unvegetated 2.25 (108)	Unvegetated 10.0 (3.05)
<b>BIONET</b>					
 S75BN	9.3 lb., leno woven biodegradable jute top net, 100% straw fiber matrix	12 months	Low Flow Channels 4:1 - 3:1 Slopes	Unvegetated 1.60 (76)	Unvegetated 5.0 (1.52)
 S150BN	9.3 lb., leno woven biodegradable jute top net, 100% straw fiber matrix, 7.7 lb., woven biodegradable jute bottom net	12 months	Moderate Flow Channels 3:1 - 2:1 Slopes	Unvegetated 1.85 (88)	Unvegetated 6.0 (1.83)
 SC150BN	9.3 lb., leno woven biodegradable jute top net, 70% straw/30% coconut fiber matrix, 7.7 lb., woven biodegradable jute bottom net	18 months	Medium Flow Channels 2:1 - 1:1 Slopes	Unvegetated 2.10 (100)	Unvegetated 8.0 (2.44)

# EXISTING SC150 LINED ROADSIDE DITCH: MAX FLOW

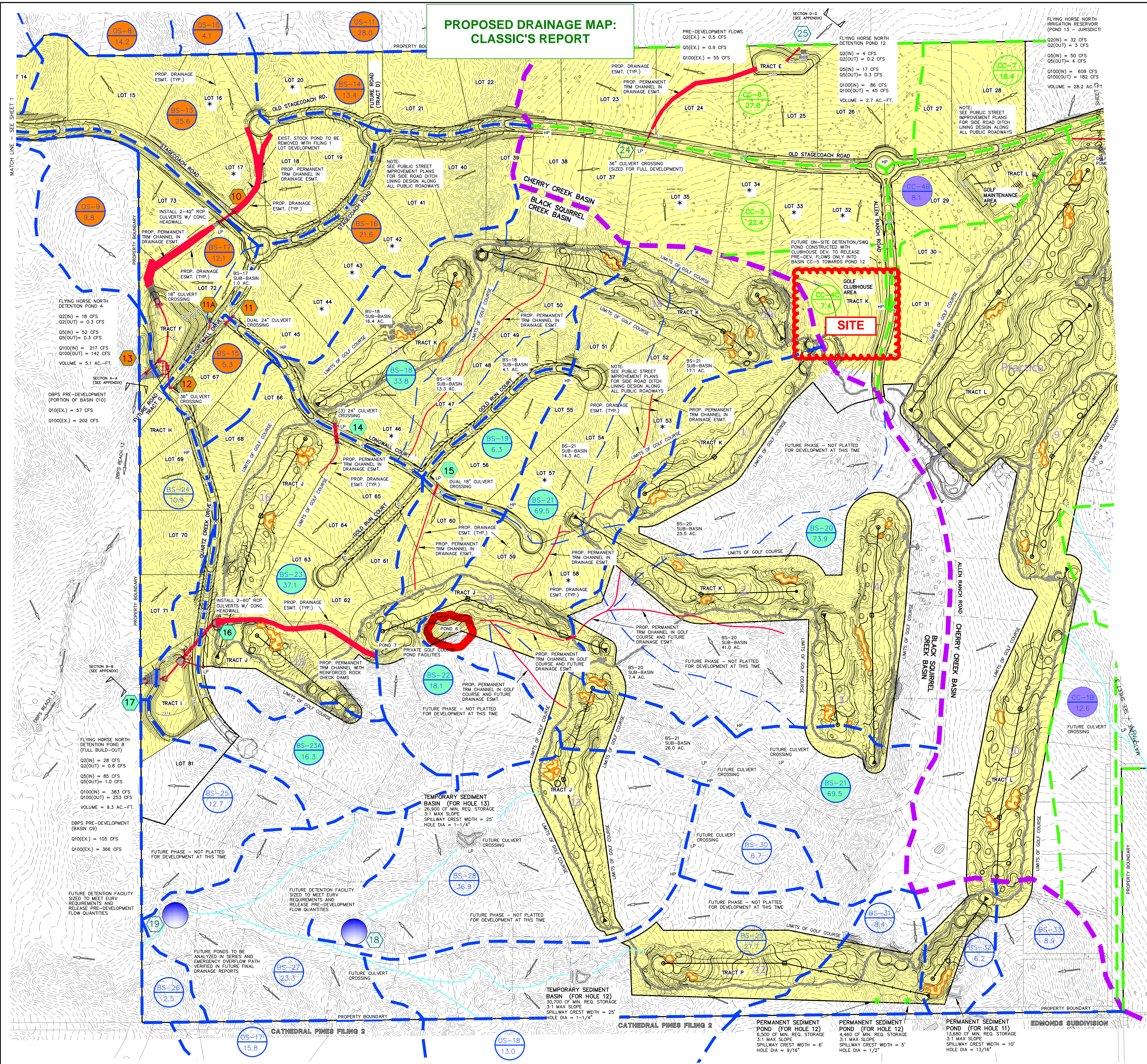
## ROADSIDE DITCH CALCUALTIONS

Limits of specific Ditch Lining relative to max. flow

		Erosion Control Blanket (ECB)		Turf Reinforcement Mat (TRM)	
		(North American Green - SC150)		(North American Green - P300)	
	Given:	(Temporary - 24 months)		(Permanent)	
	Max. Design Flow (cfs)	43.8		70.0	4.3
	Permissible Shear (lbs/ft. <sup>2</sup> )	2.0		8.0	2.0
	Permissible Velocity (ft./sec.)	8.0		16.0	3.0
	Safety Factor	1		1	1
	Max. Ditch Slope	2%		10%	2%
	Ditch Section (24 in. depth)	V-Ditch		V-Ditch	V-Ditch
	Flow Area (ft. <sup>2</sup> )	9.00		6.25	1.44
	Wetted Perimeter (ft.)	12.39		10.33	4.96
	Hydraulic Radius	0.73		0.61	0.29
	Mannings n	0.035		0.030	0.030
	Depth of Flow (max.)	1.50		1.25	0.60
	Calculations:				
	Shear Stress (lbs/ft. <sup>2</sup> )	1.9		7.8	0.7
	Velocity (ft./sec.)	4.9		11.2	3.0
	Allowed Flow (cfs)	43.8		70.2	4.4



PROPOSED DRAINAGE MAP:  
CLASSIC'S REPORT



BASIN SUMMARY - DEVELOPED CONDITIONS

BASIN (label)	AREA (acres)	COMPOSITE CN	TOTAL LAG TIME (hours)	Q 2 Yr. (cfs)	Q 5 Yr. (cfs)	Q 100 Yr. (cfs)
OS-8	14.20	65.0	0.27	2.1	6.2	24.7
OS-9	9.80	60.0	0.15	0.1	1.0	9.1
OS-10	4.10	65.0	0.17	0.7	2.1	8.2
OS-11	28.00	65.0	0.35	2.4	8.2	38.7
OS-12	68.10	62.7	0.37	2.2	11.9	75.8
OS-13	38.90	63.0	0.33	1.4	7.4	45.0
OS-14	28.40	62.0	0.31	0.7	4.6	31.0
OS-15	70.80	63.9	0.38	3.3	14.8	84.2
OS-16	4.50	65.0	0.24	0.4	1.5	7.2
OS-17	15.80	65.0	0.19	1.6	5.9	27.7
OS-18	13.00	65.0	0.20	1.3	4.7	22.6
BS-13	25.60	65.0	0.23	3.7	10.2	40.7
BS-14	13.40	65.0	0.23	2.6	6.8	26.5
BS-15	5.30	65.0	0.16	1.6	3.7	12.2
BS-16	21.50	65.0	0.34	4.6	11.8	44.1
BS-17	12.10	65.0	0.21	3.1	7.7	26.7
BS-18	33.80	63.6	0.41	3.5	12.4	56.0
BS-19	6.30	65.0	0.18	2.1	4.6	15.0
BS-20	73.90	63.4	0.37	7.4	24.6	112.4
BS-21	69.50	64.3	0.35	7.8	23.9	103.0
BS-22	18.10	64.4	0.22	3.7	9.6	36.5
BS-23	37.10	63.3	0.33	4.5	13.6	58.2
BS-24	16.30	64.4	0.29	5.5	12.0	36.3
BS-25	10.90	63.0	0.17	0.6	3.3	17.6
EX-24 (Pre-Dev)	13.20	60.0	0.17	0.2	2.2	17.8
BS-25	12.70	63.0	0.23	0.4	2.7	17.3
BS-26	2.90	60.0	0.18	0.0	0.4	3.4
BS-27	23.30	65.0	0.22	2.1	8.0	38.8
BS-28	36.90	64.4	0.32	2.2	9.3	49.4
BS-29	27.70	64.0	0.33	1.4	6.5	35.9
BS-30	6.70	65.0	0.20	0.7	2.4	11.7
BS-31	6.40	63.1	0.23	0.3	1.9	11.8
BS-32	6.20	62.6	0.20	0.3	1.6	9.4
BS-33	8.90	64.7	0.19	0.8	3.2	15.3
CC-1A	9.80	65.0	0.23	0.8	3.3	16.0
CC-1B	12.60	64.8	0.25	1.0	4.0	19.4
CC-2A	11.00	65.0	0.22	1.0	3.8	18.3
CC-2B	20.80	65.0	0.22	1.9	7.1	34.6
CC-2C	6.40	65.0	0.18	0.7	2.5	11.5
CC-3	52.50	63.1	0.43	1.8	8.8	54.5
CC-4A	108.70	62.6	0.44	15.4	39.0	156.0
CC-4B	8.10	76.1	0.26	4.0	7.3	20.6
CC-4C (Pre-Dev)	7.40	61.0	0.13	0.2	1.8	11.2
CC-5	22.40	65.0	0.26	1.8	7.1	34.3
CC-6	21.80	65.0	0.26	2.3	9.1	43.2
CC-7	18.40	65.0	0.29	1.4	5.4	27.0

DESIGN POINTS SURFACE ROUTING SUMMARY - DEVELOPED CONDITIONS

Design Point (label)	Contributing Basins	Q 2 Yr. (cfs)	Q 5 Yr. (cfs)	Q 100 Yr. (cfs)
DP-10 DEV	OS-8, OS-10, OS-11, BS-13, BS-14	10.7	32.0	143
DP-11 DEV	BS-16	4.6	11.8	36
DP-12 DEV	DP-11, 1.0 AC. Portion of BS-17 and BS-15	4.2	11.8	46
TOTAL INFLOW TO POND 4 (UD Detention hydrograph)	DP-10, DP-12, BS-17, OS-9	10	16	217
DP-13 DEV	Release from FHN Pond 4	0.3	0.3	142
DP-14 DEV	BS-18	3.5	12.4	56
DP-15 DEV	BS-19	2.1	4.6	15
DP-16 DEV	DP-14, DP-15, BS-20, BS-21, BS-22, BS-23	25.0	78.0	362
TOTAL INFLOW TO FHN POND 8 (Full Build-out) (UD Detention hydrograph)	DP-10, DP-12, BS-17, OS-9	24	37	390
DP-17 DEV (Full Build-out)	Release from FHN Pond 8	0.8	1.0	253
TOTAL INFLOW TO FHN POND 8 (Filing 1 Only) (UD Detention hydrograph)	DP-10, DP-12, BS-17, OS-9	9	14	301
DP-17 DEV (Filing 1 Only)	Release from FHN Pond 8	0.4	0.5	219
DP-18 DEV	BS-28, BS-29, BS-30, OS-18	5.0	21.6	115
DP-19 DEV	BS-27, OS-17, Release from DP-18	3.8	16.8	126
DP-20 DEV	CC-1A, OS-12	3.2	14.3	88
DP-21 DEV	CC-2A, OS-13	2.1	10.5	62
DP-22 DEV	CC-2B, Release from DP-21	3.7	16.6	92
DP-23 DEV	CC-3, OS-14	2.5	13.0	84
DP-24 DEV	CC-4C (Pre-Dev), CC-5	1.9	8.4	45
TOTAL INFLOW TO POND 12 (UD Detention hydrograph)	CC-4C, CC-5, CC-6	6	9	85
DP-25 DEV	Release from FHN Pond 12	0.2	0.3	45

DESCRIPTION	SYMBOL
EXISTING GROUND CONTOUR	6910
PROPOSED FINISHED CONTOUR	6910
BASIN BOUNDARY EAST CHERRY CREEK	---
MAJOR BASIN BOUNDARY	---
BASIN BOUNDARY BLACK SQUIRREL	---
DESIGN POINT	3
LOTS WITH NON-STANDARD CULVERT SIZE	*
BASIN IDENTIFIER	BB 10.0
EXISTING DIRECTION OF FLOW	→
PROPOSED DIRECTION OF FLOW	→
STORM SEWER	---
FILING NO. 1 PLAT AREA	---

CLASSIC CONSULTING ENGINEERS & SURVEYORS

FLYING HORSE NORTH  
PRELIMINARY/FINAL DRAINAGE REPORT  
FILING NO. 1 DRAINAGE MAP

DESIGNED BY: MAW  
DRAWN BY: MAW  
CHECKED BY: MAW

SCALE: (H) 1" = 200'  
(V) 1" = N/A

DATE: 10-25-17  
SHEET: 2 OF 4  
JOB NO.: 1096.11



# HYDROLOGIC COMPUTATIONS FOR BASINS TRIBUTARY TO POND A



**Flying Horse North Filing No. 3**  
**PROPOSED CONDITIONS**  
**EL PASO COUNTY, COLORADO**

<b>Calc'd by:</b>	<b>DLH</b>
<b>Checked by:</b>	<b>RDL</b>
<b>Date:</b>	<b>3/4/2024</b>

**SUMMARY RUNOFF TABLE**

BASIN	AREA (ac)	% IMP.	C <sub>s</sub>	C <sub>100</sub>	Q <sub>5</sub> (cfs)	Q <sub>100</sub> (cfs)
BS-18	33.90	7.77	0.14	0.39	12.6	60.1
BS-19	6.35	11.00	0.17	0.42	4.1	16.8
BS-20	23.79	6.83	0.13	0.39	9.6	48.5
BS-20.1	42.26	8.49	0.14	0.39	16.3	77.7
BS-20.2	4.32	11.00	0.17	0.42	2.5	10.1
BS-20.3	0.56	100.00	0.90	0.96	2.3	4.1
BS-21	0.77	100.00	0.90	0.96	3.0	5.4
BS-21.1	15.24	11.95	0.17	0.42	8.5	34.3
BS-21.2	0.18	100.00	0.90	0.96	0.8	1.5
BS-21.3	50.92	7.83	0.14	0.39	17.7	85.0
BS-22	0.24	100.00	0.90	0.96	1.1	2.0
BS-22.1	16.87	9.63	0.16	0.41	8.8	38.4
BS-23A	9.28	8.43	0.14	0.40	4.1	19.0
BS-23A.1	7.96	10.69	0.17	0.41	4.2	17.4
BS-23	37.06	7.26	0.13	0.39	15.6	76.7
BS-25	12.65	8.49	0.15	0.40	6.1	28.1
BS-26	4.90	3.74	0.10	0.36	1.7	10.6
BS-27	9.68	11.00	0.17	0.42	5.6	22.9
BS-28	24.03	11.00	0.17	0.42	12.3	50.6
BS-28.1	5.76	9.56	0.16	0.41	2.8	12.5
BS-28.2	19.47	8.75	0.15	0.40	9.0	41.0
BS-28.3	0.54	100.00	0.90	0.96	2.5	4.5
BS-29	22.93	7.78	0.14	0.39	8.3	39.7
BS-30	11.53	10.84	0.17	0.42	4.9	20.4
BS-31	8.40	4.57	0.11	0.37	3.2	18.6
BS-32	6.33	6.73	0.13	0.39	3.0	15.4
BS-33	8.91	10.39	0.16	0.41	5.2	21.9
CC-34	0.89	26.22	0.28	0.50	1.0	2.9
CC-34.1	15.09	5.82	0.12	0.38	6.7	36.1
CC-34.2	1.84	100.00	0.90	0.96	4.9	8.7
CC-34.3	1.01	40.81	0.40	0.59	1.6	3.9
CC-34.4	3.44	91.66	0.76	0.83	7.9	14.6
OS-1	2.70	29.55	0.29	0.51	2.8	8.2
OS-2	0.34	100.00	0.90	0.96	1.3	2.3
OS-17	15.80	11.00	0.17	0.42	9.9	40.6
OS-18	13.00	11.00	0.17	0.42	8.2	33.7


**DESIGN POINT SUMMARY TABLE**

DESIGN POINT	CONTRIBUTING BASINS	ΣQ <sub>5</sub> (cfs)	ΣQ <sub>100</sub> (cfs)	Tributary Area (ac.)	Weighted % Impervious
1	OS-1 & CC-34.3	4.4	12.1	3.7	32.62%
1.1	CC-34, DP1, DP1.2	1.2	7.5	8.0	57.17%
1.2	CC-34.4	7.9	14.6	3.4	91.66%
1.3	CC-34.2, OS-2	6.2	11.0	2.2	100.00%
2	CC-34-34.4, OS-1-2	26.2	76.6	25.3	30.25%
4	BS-21.1	8.5	34.3	15.2	11.95%
5	BS-20.2-20.3	4.7	14.2	4.9	21.21%
6	BS-20-20.3, 21.1-21.3	57.7	261.3	137.3	8.92%
7	BS-19, BS-22-22.1, DP6	71.7	318.4	160.7	9.21%
8	BS-18, 23, DP7	99.8	455.3	231.7	8.69%
9	BS-23A.1	4.2	17.4	8.0	7.96%
10	BS-23A, DP8, DP9	108.1	491.7	248.9	8.74%
11	BS-21	3.0	5.4	0.8	100.00%
12	BS-28.1, DP11	5.9	17.9	6.5	20.23%
13	BS-28.2	9.0	41.0	19.5	8.75%
14	BS-28, BS-28.3, DP12, DP13	29.7	114.0	50.6	12.28%
15	OS-18, BS-29-30	21.4	93.8	47.5	9.41%
16	OS-17, BS-27, DP15	36.9	157.3	72.9	9.96%
17	BS-26, DP14, DP16	68.2	281.8	128.4	10.04%
18	BS-31	3.2	18.6	8.4	4.57%
19	BS-32	3.0	15.4	6.3	6.73%
20	BS-33	5.2	21.9	8.9	10.39%
21	BS-25	6.1	28.1	12.7	8.49%


# HYDROLOGIC COMPUTATIONS FOR BASINS TRIBUTARY TO POND A

<div><div>1433</div><div>HRGreen</div></div>	Flying Horse North Filing No. 3						TRIBUTARY TO POND A												Calc'd by:			DLH		
	PROPOSED CONDITIONS												Checked by:			RDL								
	EL PASO COUNTY, COLORADO												Date:			3/4/2024								
	COMPOSITE 'C' FACTORS																							
BASIN	GOLF COURSE / UNDEVELOPED	ROADWAY	RESIDENTIAL (2.5AC LOT)	ROOFTOP	TOTAL	SOIL TYPE	GOLF COURSE /			ROADWAY			RESIDENTIAL (2.5AC LOT)			ROOFTOP			COMPOSITE IMPERVIOUSNESS & C					
							%I	C <sub>5</sub>	C <sub>100</sub>	%I	C <sub>5</sub>	C <sub>100</sub>	%I	C <sub>5</sub> *	C <sub>100</sub> *	%I	C <sub>5</sub>	C <sub>100</sub>	%I	C <sub>5</sub>	C <sub>100</sub>			
	ACRES																							
BS-18	12.15	0.00	21.75	0.00	33.90	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	90	0.73	0.81	7.8	0.14	0.39			
BS-19	0.00	0.00	6.35	0.00	6.35	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	90	0.73	0.81	11.0	0.17	0.42			
BS-20	11.02	0.00	12.77	0.00	23.79	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	90	0.73	0.81	6.8	0.13	0.39			
BS-20.1	23.35	0.20	17.62	1.09	42.26	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	90	0.73	0.81	8.5	0.14	0.39			
BS-20.2	0.00	0.00	4.32	0.00	4.32	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	90	0.73	0.81	11.0	0.17	0.42			
BS-20.3	0.00	0.56	0.00	0.00	0.56	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	90	0.73	0.81	100.0	0.90	0.96			
BS-21	0.00	0.77	0.00	0.00	0.77	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	90	0.73	0.81	100.0	0.90	0.96			
BS-21.1	1.56	0.05	13.33	0.30	15.24	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	90	0.73	0.81	11.9	0.17	0.42			
BS-21.2	0.00	0.18	0.00	0.00	0.18	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	90	0.73	0.81	100.0	0.90	0.96			
BS-21.3	21.87	0.40	28.65	0.00	50.92	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	90	0.73	0.81	7.8	0.14	0.39			
BS-22	0.00	0.24	0.00	0.00	0.24	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	90	0.73	0.81	100.0	0.90	0.96			
BS-22.1	2.56	0.00	14.31	0.00	16.87	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	90	0.73	0.81	9.6	0.16	0.41			
BS-23A	2.65	0.00	6.63	0.00	9.28	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	90	0.73	0.81	8.4	0.14	0.40			
BS-23A.1	0.27	0.00	7.69	0.00	7.96	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	90	0.73	0.81	10.7	0.17	0.41			
BS-23	15.38	0.00	21.68	0.00	37.06	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	90	0.73	0.81	7.3	0.13	0.39			
BS-25	3.53	0.00	9.12	0.00	12.65	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	90	0.73	0.81	8.5	0.15	0.40			
BS-26	3.95	0.00	0.95	0.00	4.90	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	90	0.73	0.81	3.7	0.10	0.36			
BS-27	0.00	0.00	9.68	0.00	9.68	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	90	0.73	0.81	11.0	0.17	0.42			
BS-28	0.00	0.00	24.03	0.00	24.03	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	90	0.73	0.81	11.0	0.17	0.42			
BS-28.1	0.92	0.00	4.84	0.00	5.76	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	90	0.73	0.81	9.6	0.16	0.41			
BS-28.2	4.87	0.00	14.60	0.00	19.47	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	90	0.73	0.81	8.7	0.15	0.40			
BS-28.3	0.00	0.54	0.00	0.00	0.54	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	90	0.73	0.81	100.0	0.90	0.96			
BS-29	8.20	0.00	14.73	0.00	22.93	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	90	0.73	0.81	7.8	0.14	0.39			
BS-30	0.20	0.00	11.33	0.00	11.53	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	90	0.73	0.81	10.8	0.17	0.42			
BS-31	6.00	0.00	2.40	0.00	8.40	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	90	0.73	0.81	4.6	0.11	0.37			
BS-32	3.00	0.00	3.33	0.00	6.33	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	90	0.73	0.81	6.7	0.13	0.39			
BS-33	0.60	0.00	8.31	0.00	8.91	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	90	0.73	0.81	10.4	0.16	0.41			
CC-34	0.67	0.22	0.00	0.00	0.89	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	90	0.73	0.81	26.2	0.28	0.50			
CC-34.1	8.68	0.00	6.41	0.00	15.09	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	90	0.73	0.81	5.8	0.12	0.38			
CC-34.2	0.00	1.84	0.00	0.00	1.84	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	90	0.73	0.81	100.0	0.90	0.96			
CC-34.3	0.61	0.40	0.00	0.00	1.01	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	90	0.73	0.81	40.8	0.40	0.59			
CC-34.4	0.00	0.57	0.00	2.87	3.44	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	90	0.73	0.81	91.7	0.76	0.83			
OS-1	1.89	0.32	0.00	0.49	2.70	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	90	0.73	0.81	29.6	0.29	0.51			
OS-2	0.00	0.34	0.00	0.00	0.34	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	90	0.73	0.81	100.0	0.90	0.96			
OS-17	0.00	0.00	15.80	0.00	15.80	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	90	0.73	0.81	11.0	0.17	0.42			
OS-18	0.00	0.00	13.00	0.00	13.00	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	90	0.73	0.81	11.0	0.17	0.42			
TOTAL ONSITE	132.04	5.97	264.82	4.26	407.10														10.21%	0.16	0.41			
TOTAL OFFSITE	1.89	0.66	28.80	0.49	31.84														13.52%	0.19	0.43			
GRAND TOTAL	133.93	6.63	293.62	4.75	438.94														10.45%	0.16	0.41			

# HYDROLOGIC COMPUTATIONS FOR BASINS TRIBUTARY TO POND A

	Flying Horse North Filing No. 3 <b>PROPOSED CONDITIONS</b> EL PASO COUNTY, COLORADO									Calc'd by:		DLH	
										Checked by:		RDL	
										Date:		3/4/2024	
TIME OF CONCENTRATION													
BASIN DATA			OVERLAND TIME (T <sub>f</sub> )			TRAVEL TIME (T <sub>t</sub> )					TOTAL	tc=(L/180)+10	Design tc
DESIGNATION	C <sub>s</sub>	AREA (ac)	LENGTH (ft)	SLOPE %	t <sub>f</sub> (min)	C <sub>v</sub>	LENGTH (ft)	SLOPE %	V (ft/s)	t <sub>t</sub> (min)	t <sub>c</sub> (min)	tc max	tc design (min)
BS-18	0.14	33.90	300	3.0	21.2	10	2600	3.00	1.7	25.0	46.2	26.1	26.1
BS-19	0.17	6.35	300	3.0	20.5	10	180	6.00	2.4	1.2	21.7	12.7	12.7
BS-20	0.13	23.79	260	7.0	15.0	10	1400	8.00	2.8	8.2	23.3	19.2	19.2
BS-20.1	0.14	42.26	300	7.0	16.0	10	2300	10.00	3.2	12.1	28.1	24.4	24.4
BS-20.2	0.17	4.32	300	5.4	16.8	10	950	5.00	2.2	7.1	23.9	16.9	16.9
BS-20.3	0.90	0.56	16	2.0	1.2	10	860	5.00	2.2	6.4	7.6	14.9	7.6
BS-21	0.90	0.77	16	2.0	1.2	10	1000	5.00	2.2	7.5	8.6	15.6	8.6
BS-21.1	0.17	15.24	300	7.0	15.4	10	1250	8.00	2.8	7.4	22.7	18.6	18.6
BS-21.2	0.90	0.18	16	2.0	1.2	10	260	5.00	2.2	1.9	5.0	11.5	5.0
BS-21.3	0.14	50.92	300	7.0	16.0	10	3110	7.00	2.6	19.6	35.6	28.9	28.9
BS-22	0.90	0.24	16	2.0	1.2	10	310	2.20	1.5	3.5	5.0	11.8	5.0
BS-22.1	0.16	16.87	300	4.5	18.1	10	970	6.00	2.4	6.6	24.7	17.1	17.1
BS-23A	0.14	9.28	250	10.0	12.9	10	1600	6.00	2.4	10.9	23.7	20.3	20.3
BS-23A.1	0.17	7.96	180	10.0	10.7	10	1483	6.00	2.4	10.1	20.7	19.2	19.2
BS-23	0.13	37.06	300	7.0	16.1	10	1320	6.00	2.4	9.0	25.0	19.0	19.0
BS-25	0.15	12.65	280	11.0	13.2	10	1000	10.00	3.2	5.3	18.4	17.1	17.1
BS-26	0.10	4.90	150	20.0	8.3	10	700	2.00	1.4	8.2	16.5	14.7	14.7
BS-27	0.17	9.68	170	10.0	10.3	10	1000	5.00	2.2	7.5	17.8	16.5	16.5
BS-28	0.17	24.03	200	8.0	12.1	10	1800	6.00	2.4	12.2	24.3	21.1	21.1
BS-28.1	0.16	5.76	200	7.0	12.8	10	1400	6.00	2.4	9.5	22.3	18.9	18.9
BS-28.2	0.15	19.47	300	6.0	16.6	10	1400	6.00	2.4	9.5	26.2	19.4	19.4
BS-28.3	0.90	0.54	16	2.0	1.2	10	370	4.00	2.0	3.1	5.0	12.1	5.0
BS-29	0.14	22.93	300	10.0	14.2	10	2800	5.00	2.2	20.9	35.1	27.2	27.2
BS-30	0.17	11.53	300	8.0	14.8	10	3100	5.00	2.2	23.1	37.9	28.9	28.9
BS-31	0.11	8.40	180	10.0	11.4	10	640	8.00	2.8	3.8	15.1	14.6	14.6
BS-32	0.13	6.33	180	11.0	10.8	10	320	6.00	2.4	2.2	12.9	12.8	12.8
BS-33	0.16	8.91	300	10.0	13.8	10	550	6.00	2.4	3.7	17.5	14.7	14.7
CC-34	0.28	0.89	100	2.0	11.9	10	300	1.00	1.0	5.0	16.9	12.2	12.2
CC-34.1	0.12	15.09	100	2.0	14.3	10	400	1.00	1.0	6.7	21.0	12.8	12.8
CC-34.2	0.90	1.84	16	2.0	1.2	10	2150	1.00	1.0	35.8	37.0	22.0	22.0
CC-34.3	0.40	1.01	16	2.0	4.0	10	480	1.00	1.0	8.0	12.0	12.8	12.0
CC-34.4	0.76	3.44	100	2.0	5.0	10	1839	1.00	1.0	30.7	35.6	20.8	20.8
OS-1	0.29	2.70	300	3.0	17.7	10	500	1.00	1.0	8.3	26.1	14.4	14.4
OS-2	0.90	0.34	16	2.0	1.2	10	500	1.00	1.0	8.3	9.5	12.9	9.5
OS-17	0.17	15.80	300	6.7	15.7	10	350	6.00	2.4	2.4	18.0	13.6	13.6
OS-18	0.17	13.00	300	6.0	16.2	10	300	6.00	2.4	2.0	18.3	13.3	13.3

# HYDROLOGIC COMPUTATIONS FOR BASINS TRIBUTARY TO POND A

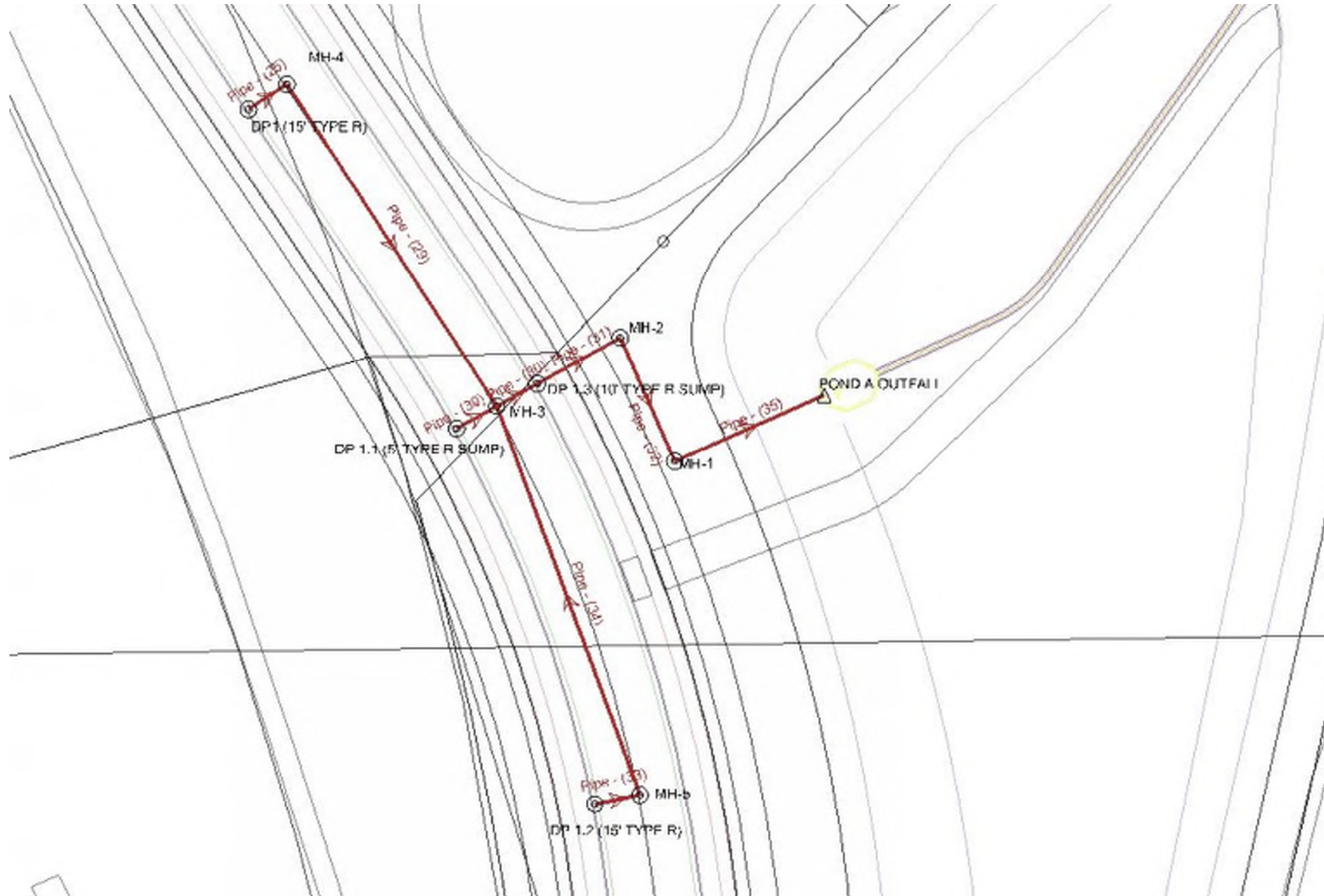
			Flying Horse North Filing No. 3										Calc'd by:		DLH										
			PROPOSED CONDITIONS										Checked by:		RDL										
			DESIGN STORM: 5-YEAR										Date:		3/4/2024										
			2.689458595																						
			DIRECT RUNOFF					TOTAL RUNOFF			OVERLAND			PIPE				TRAVEL TIME			REMARKS				
STREET	DESIGN POINT	BASIN ID	AREA (ac)	C <sub>s</sub>	f <sub>c</sub> (min)	C <sub>s</sub> *A (ac)	I (in./ hr.)	Q (cfs)	f <sub>c</sub> (min)	C <sub>s</sub> *A (ac)	I (in./ hr.)	Q (cfs)	Q <sub>street</sub> (cfs)	C <sub>s</sub> *A (ac)	SLOPE %	Q <sub>PIPE</sub> (cfs)	C <sub>s</sub> *A (ac)	SLOPE %	PIPE SIZE (FT)	LENGTH (FT)	VEL. (FPS)	TRAVEL TIME (min)			
	13	BS-28.2	19.47	0.15	19.4	2.87	3.13	9.0		2.87		9.0	9.0	2.87	4.5					1700	4.2	6.68		BS-28.2 FLOWS TO CULVERT AT DP13	
		BS-28.3	0.54	0.90	5.0	0.49	5.17	2.5					2.5	0.49	4.5					1620	4.2	6.36		BS-28.3 W/ DP13 AT NATURAL DRAINAGE WAY TO DP14	
		BS-29	22.93	0.14	27.2	3.16	2.63	8.3		5.38		16.5	16.5	5.38	4.0					900	4.0	3.75		BS-29 INCLUDE OS-18 AND COLLECTS AT DP15	
		BS-30	11.53	0.17	28.9	1.94	2.54	4.9					4.9	1.94	6.4					150	5.1	0.49		BS-30 COLLECTS IN ROADSIDE DITCH, FLOWS TO DP15	
	15												21.4	7.32	4.0					900	4.0	3.75		DP15 COLLECTS BS-29, BS-30, OS-18	
	16									11.66		36.9	36.9	11.66	30.0					100	11.0	0.15		DP16 COLLECTS BS-27, OS-17, DP15	
	14									9.04		29.7	29.7	9.04	30.0					150	11.0	0.23		DP14 COLLECTS BS-28, 28.1, 28.2, 28.3, BS-21	
	17									21.18		68.2												DP17 CONTAINS BS-21, 28, 28.1, 28.2, 28.3, 30, 29, 27 & OS-17-18 IN DET. POND	
	18	BS-31	8.40	0.11	14.6	0.89	3.57	3.2		0.89		3.2												BS-31 TO FLOW OFFSITE SOUTH	
	19	BS-32	6.33	0.13	12.8	0.81	3.76	3.0		0.81		3.0												BS-32 TO FLOW OFFSITE SOUT	
	20	BS-33	8.91	0.16	14.7	1.46	3.55	5.2		1.46		5.2												BS-33 TO FLOW OFFSITE SOUTH	
	1.1	CC-34	0.89	0.28	12.2	0.25	3.83	1.0		0.32		1.2				13.3	4.06	2.0	2.0	30	10.2	0.05		BS-34 & OVERFLOW FROM DP'S 1 & 1.2 CAPTURED AT 5' SUMP INLET	
		CC-34.1	15.09	0.12	12.8	1.79	3.76	6.7																BASIN FLOW CAPTURED IN ROADSIDE DITCH, COLLECTED AT DP2 POND	
	1.3	CC-34.2	1.84	0.90	22.0	1.66	2.94	4.9		1.96		6.2				19.5	6.03	5.5	3.0	95	22.1	0.07		BS-34.2 & OS-2 CAPTURED W/ 10' TYPE R SUMP INLET, PIPE FLOW FROM DP1.1 & DP1.3 CONVERGE	
		CC-34.3	1.01	0.40	12.0	0.41	3.85	1.6					0.2	0.07	1.0									BS-34.3 TO FLOW DOWNSTREAM INTO ON-GRADE INLET AT DP1	
	1.2	CC-34.4	3.44	0.76	20.8	2.61	3.03	7.9		2.61		7.9				7.7	2.54	1.1	2.0	185	7.6	0.41		BS-34.4 CAPTURED ON GRADE BY 15' CDOT TYPE R INLET	
	2									7.81		26.2													FULL SPECTRUM DETENTION POND A TO BE DESIGNED AT DP2
		OS-1	2.70	0.29	14.4	0.80	3.58	2.8		0.80		2.8	0.0	0.00	4.0									OS-1 TO FLOW DOWNSTREAM INTO ON-GRADE INLET AT DP1	
	1									1.21		4.4				4.4	1.21	2.0	1.5	305	8.4	0.60		BS-34.3 & OS-2 CAPTURED ON GRADE BY 15' CDOT TYPE R INLET	
		OS-2	0.34	0.90	9.5	0.31	4.21	1.3																OS-2 FLOWS TO DP1.3	
		OS-17	15.80	0.17	13.6	2.69	3.67	9.9		2.69		9.9												OS-17 FLOWS INTO BS-27	
		OS-18	13.00	0.17	13.3	2.21	3.70	8.2		2.21		8.2												OS-18 FLOWS INTO BS-29	

# HYDROLOGIC COMPUTATIONS FOR BASINS TRIBUTARY TO POND A

<div><div>1433</div><div>HRGreen</div></div>			Flying Horse North Filing No. 3												Calc'd by:		DLH								
			PROPOSED CONDITIONS												Checked by:		RDL								
			DESIGN STORM: 100-YEAR												Date:		3/4/2024								
			DIRECT RUNOFF						TOTAL RUNOFF				OVERLAND			PIPE				TRAVEL TIME			REMARKS		
STREET	DESIGN PONT	BASIN ID	AREA (ac)	C <sub>100</sub>	t <sub>c</sub> (min)	C <sub>100</sub> *A (ac)	I (in./ hr.)	Q (cfs)	t <sub>c</sub> (min)	C <sub>100</sub> *A (ac)	I (in./ hr.)	Q (cfs)	Q <sub>street</sub> (cfs)	C <sub>100</sub> *A (ac)	SLOPE %	Q <sub>PIPE</sub> (cfs)	C <sub>100</sub> *A (ac)	SLOPE %	PIPE SIZE (ft)	LENGTH (ft)	VEL. (ft/s)	TRAVEL TIME (min)			
		BS-28.3	0.54	0.96	5.0	0.52	8.68	4.5					4.5	0.52	4.5					1620	4.2	6.36			
																							BS-28.3 W/ DP13 AT NATURAL DRAINAGE WAY TO DP14		
		BS-29	22.93	0.39	27.2	9.01	4.41	39.7		14.44		73.4	73.4	14.44	4.0					900	4.0	3.75			
																							BS-29 INCLUDE OS-18 AND COLLECTS AT DP15		
		BS-30	11.53	0.42	28.9	4.80	4.26	20.4					20.4	4.80	6.4					150	5.1	0.49			
																							BS-30 COLLECTS IN ROADSIDE DITCH, FLOWS TO DP15		
	15									19.23		93.8	93.8	19.23	4.0					900	4.0	3.75			
																							DP15 COLLECTS BS-29, BS-30, OS-18		
	16									29.86		157.3	157.3	29.86	30.0					100	11.0	0.15			
																							DP16 COLLECTS BS-27, OS-17, DP15		
	14									21.42		114.0	114.0	21.42	30.0					150	11.0	0.23			
																							DP14 COLLECTS BS-28, 28.1, 28.2, 28.3, BS-21		
	17									53.05		281.8											DP17 CONTAINS BS-21, 28, 28.1, 28.2, 28.3, 30, 29, 27 & OS-17-18 IN DET. POND		
	18	BS-31	8.40	0.37	14.6	3.10	5.99	18.6		3.10		18.6											BS-31 TO FLOW OFFSITE SOUTH		
	19	BS-32	6.33	0.39	12.8	2.44	6.31	15.4		2.44		15.4											BS-32 TO FLOW OFFSITE SOUT		
	20	BS-33	8.91	0.41	14.7	3.68	5.96	21.9		3.68		21.9											BS-33 TO FLOW OFFSITE SOUTH		
	1.1	CC-34	0.89	0.50	12.2	0.45	6.43	2.9		1.30		7.5				29.5	5.28	2.0	2.0	30	10.2	0.05	BS-34 & OVERFLOW FROM DP'S 1 & 1.2 CAPTURED AT 5' SUMP INLET		
		CC-34.1	15.09	0.38	12.8	5.71	6.31	36.1															BASIN FLOW CAPTURED IN ROADSIDE DITCH, COLLECTED AT DP2 POND		
	1.3	CC-34.2	1.84	0.96	22.0	1.77	4.94	8.7		2.09		11.0				40.6	7.37	5.5	3.0	95	22.1	0.07	BS-34.2 & OS-2 CAPTURED W/ 10' TYPE R SUMP INLET, PIPE FLOW FROM DP1.1 & DP1.3 CONVERGE		
		CC-34.3	1.01	0.59	12.0	0.60	6.46	3.9															BS-34.3 TO FLOW DOWNSTREAM INTO ON-GRADE INLET AT DP1		
													3.0	0.59	1.0										
	1.2	CC-34.4	3.44	0.83	20.8	2.87	5.09	14.6		2.87		14.6				11.6	2.28	1.1	2.0	185	7.6	0.41	BS-34.4 CAPTURED ON GRADE BY 15' CDOT TYPE R INLET		
	2									13.08		76.6											FULL SPECTRUM DETENTION POND A TO BE DESIGNED AT DP2		
		OS-1	2.70	0.51	14.4	1.37	6.01	8.2		1.37		8.2											OS-1 TO FLOW DOWNSTREAM INTO ON-GRADE INLET AT DP1		
													1.6	0.26	4.0										
	1									1.96		12.1				10.5	1.70	2.0	1.5	305	8.4	0.60	BS-34.3 & OS-2 CAPTURED ON GRADE BY 15' CDOT TYPE R INLET		
		OS-2	0.34	0.96	9.5	0.33	7.06	2.3															OS-2 FLOWS TO DP1.3		
		OS-17	15.80	0.42	13.6	6.59	6.16	40.6		6.59		40.6											OS-17 FLOWS INTO BS-27		
		OS-18	13.00	0.42	13.3	5.42	6.21	33.7		5.42		33.7											OS-18 FLOWS INTO BS-29		

# STORMCAD LAYOUT

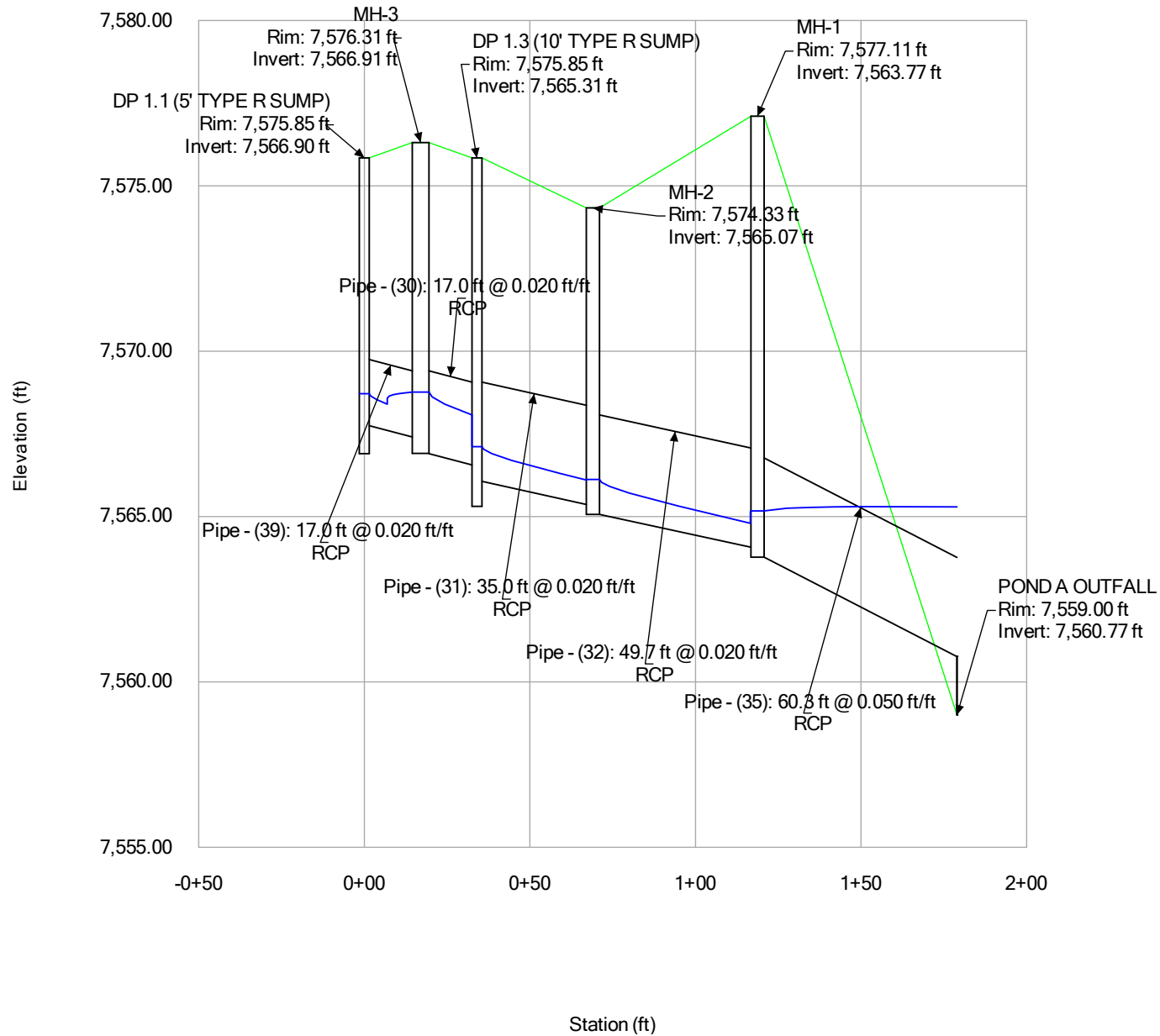
SCALE: N/A



# EXISTING STORM SYSTEM HYDRAULIC PERFORMANCE

## Profile Report

### Engineering Profile - DP 1.1 - POND (100YR-Estates-2-26-24.stsw)

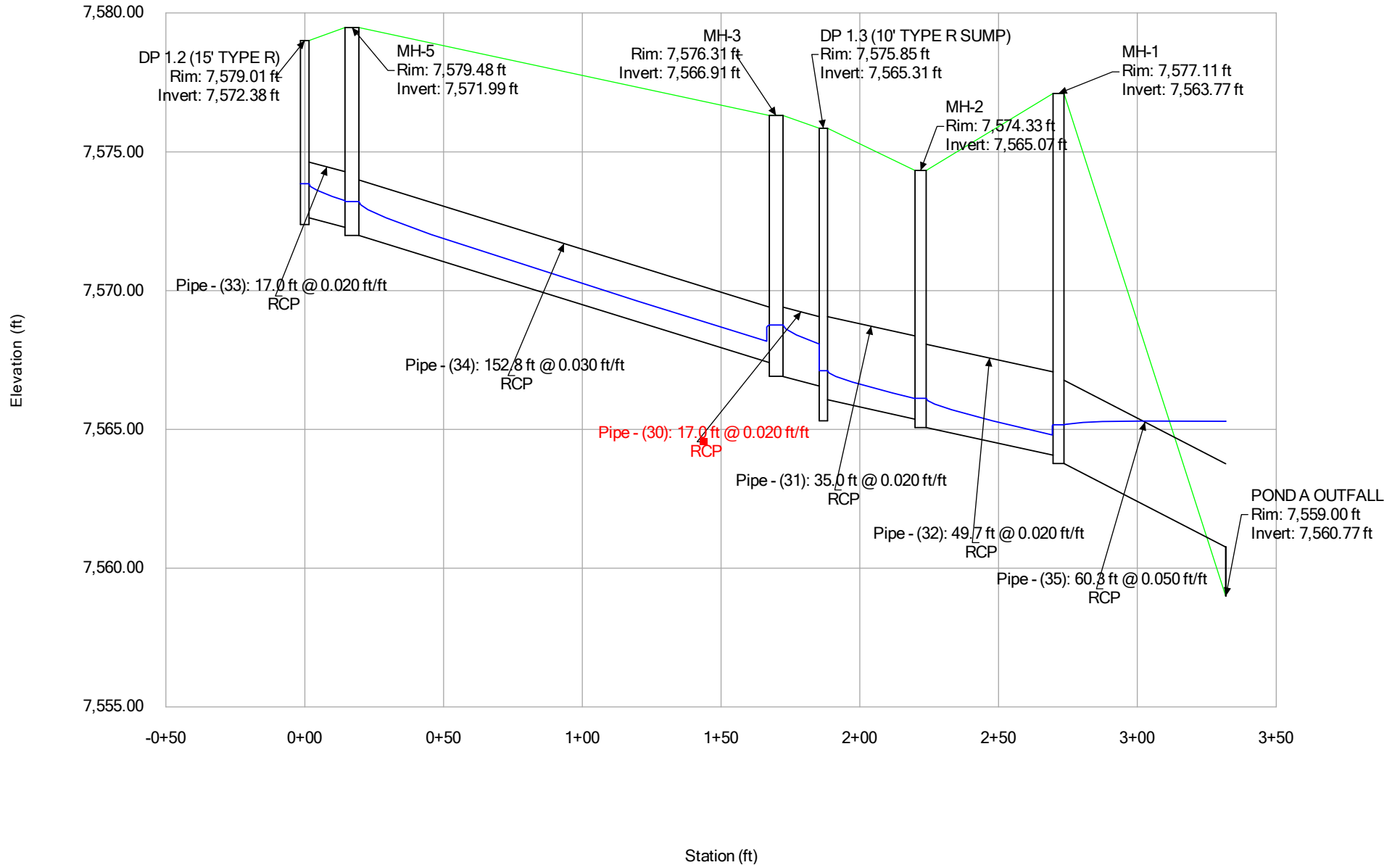




# EXISTING STORM SYSTEM HYDRAULIC PERFORMANCE

## Profile Report

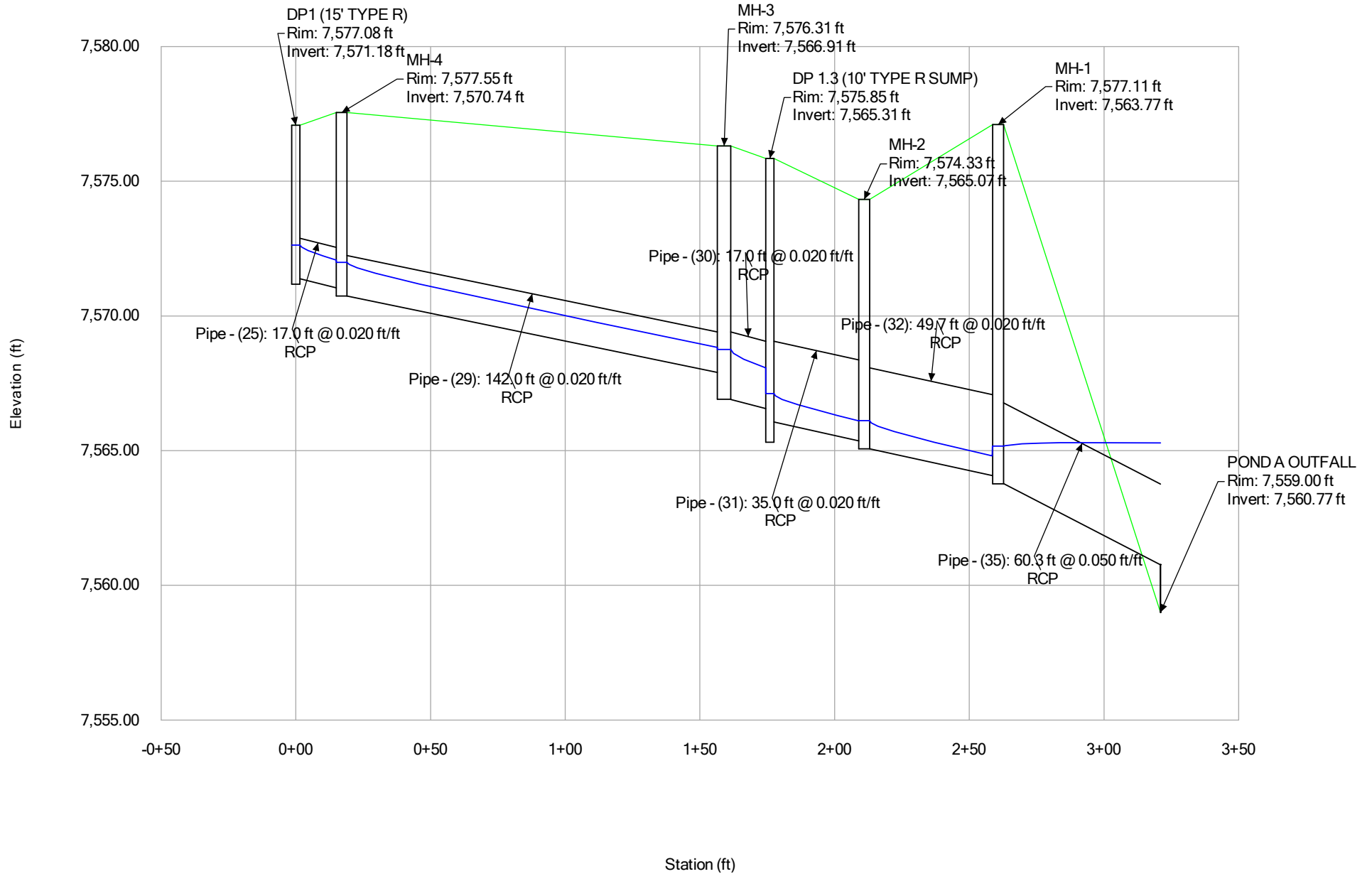
### Engineering Profile - DP 1.2 - POND (100YR-Estates-2-26-24.stsw)



# EXISTING STORM SYSTEM HYDRAULIC PERFORMANCE

## Profile Report

### Engineering Profile - DP1 - POND (100YR-Estates-2-26-24.stsw)



FLYING HORSE NORTH FILING NO. 3

100 YEAR STORM SCENARIO

FlexTable: Conduit Table

Label	Invert (Start) (ft)	Invert (Stop) (ft)	Length (Unified) (ft)	Slope (Calculated) (ft/ft)	Diameter (in)	Flow (cfs)	Velocity (ft/s)	Manning's n	Froude Number (Normal)	Capacity (Full Flow) (cfs)	Headloss (ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Energy Grade Line (In) (ft)	Energy Grade Line (Out) (ft)	Depth (Out) (ft)	Flow / Capacity (Design) (%)
Pipe - (35)	7,563.77	7,560.77	60.3	0.050	36.0	11.00	12.33	0.013	3.510	149.04	-0.12	7,565.17	7,565.29	7,565.35	7,565.33	4.52	7.4
Pipe - (31)	7,566.07	7,565.37	35.0	0.020	36.0	11.00	8.92	0.013	2.252	94.31	1.01	7,567.12	7,566.11	7,567.50	7,567.12	0.74	11.7
Pipe - (32)	7,565.07	7,564.08	49.7	0.020	36.0	11.00	8.92	0.013	2.252	94.31	0.95	7,566.12	7,565.17	7,566.51	7,565.52	1.09	11.7
Pipe - (33)	7,572.63	7,572.29	17.0	0.020	24.0	11.60	9.37	0.013	2.083	31.99	0.61	7,573.85	7,573.24	7,574.36	7,574.20	0.95	36.3
Pipe - (34)	7,571.99	7,567.41	152.8	0.030	24.0	11.60	10.86	0.013	2.578	39.17	4.45	7,573.21	7,568.76	7,573.73	7,569.17	1.36	29.6
Pipe - (25)	7,571.39	7,571.05	17.0	0.020	18.0	10.50	9.11	0.013	1.805	14.85	0.56	7,572.63	7,572.07	7,573.33	7,573.10	1.03	70.7
Pipe - (29)	7,570.74	7,567.91	142.0	0.020	18.0	10.50	9.11	0.013	1.805	14.85	3.15	7,571.99	7,568.84	7,572.69	7,570.13	0.93	70.7
Pipe - (30)	7,566.91	7,566.57	17.0	0.020	30.0	29.60	11.87	0.013	2.096	58.00	0.69	7,568.76	7,568.08	7,569.65	7,569.49	1.51	51.0
Pipe - (39)	7,567.75	7,567.41	17.0	0.020	24.0	7.50	8.32	0.013	2.117	31.99	-0.04	7,568.72	7,568.76	7,569.10	7,568.93	1.36	23.4

EXISTING STORM SYSTEM HYDRAULIC PERFORMACE

FLYING HORSE NORTH FILING NO. 3  
100 YEAR STORM SCENARIO

FlexTable: Manhole Table

ID	Label	Notes	Elevation (Ground) (ft)	Set Rim to Ground Elevation?	Elevation (Rim) (ft)	Elevation (Invert in 1) (ft)	Flow (Total Out) (cfs)	Depth (Out) (ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Headloss Method
34	MH-2	SDMH	7,574.33	True	7,574.33	7,565.37	11.00	1.05	7,566.12	7,566.12	Standard
35	MH-5	SDMH	7,579.48	True	7,579.48	7,572.29	11.60	1.22	7,573.21	7,573.21	Standard
36	DP 1.2 (15' TYPE R)	15' TYPE-R INLET	7,579.01	True	7,579.01	(N/A)	11.60	1.47	7,573.85	7,573.85	Standard
37	MH-4	SDMH	7,577.55	True	7,577.55	7,571.05	10.50	1.25	7,571.99	7,571.99	Standard
38	MH-1	SDMH	7,577.11	True	7,577.11	7,564.08	11.00	1.39	7,565.17	7,565.17	Standard
39	DP1 (15' TYPE R)	15' TYPE-R INLET	7,577.08	True	7,577.08	(N/A)	10.50	1.45	7,572.63	7,572.63	Standard
40	MH-3	SDMH	7,576.31	True	7,576.31	7,567.41	29.60	1.86	7,568.76	7,568.76	Standard
41	DP 1.3 (10' TYPE R SUMP)	10' TYPE-R INLET	7,575.85	True	7,575.85	7,566.57	11.00	1.80	7,567.12	7,567.12	Standard
42	DP 1.1 (5' TYPE R SUMP)	5' TYPE-R INLET	7,575.85	True	7,575.85	(N/A)	7.50	1.82	7,568.72	7,568.72	Standard

EXISTING STORM SYSTEM HYDRAULIC PERFORMANCE

FLYING HORSE NORTH FILING NO. 3  
100 YEAR STORM SCENARIO

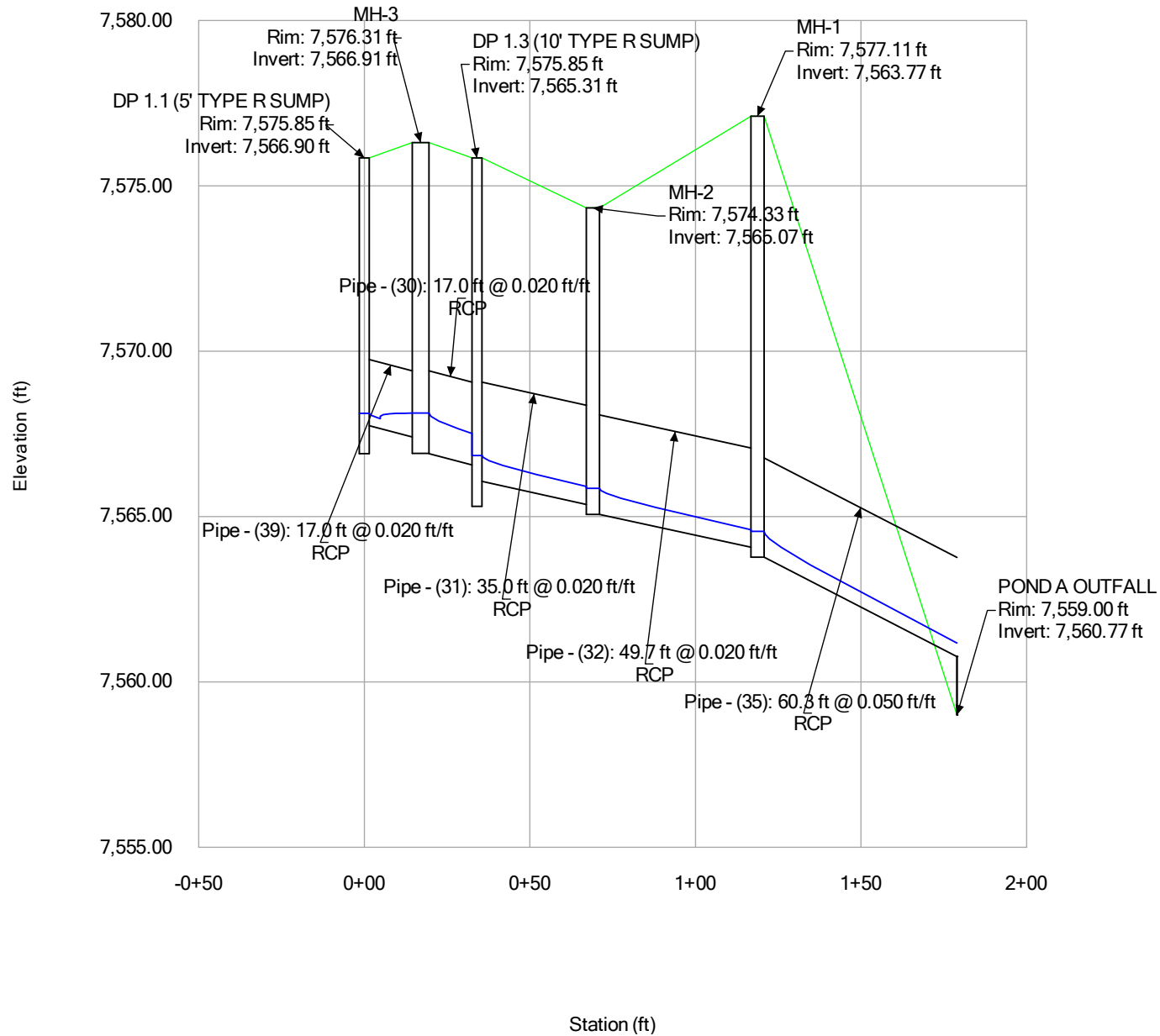
FlexTable: Outfall Table

ID	Label	Elevation (Ground) (ft)	Set Rim to Ground Elevation?	Elevation (Invert) (ft)	Boundary Condition Type	Boundary Element	Elevation (User Defined Tailwater) (ft)	Hydraulic Grade (ft)	Flow (Total Out) (cfs)	Notes
83	POND A OUTFALL	7,559.00	True	7,560.77	User Defined Tailwater	<None>	7,565.29	7,565.29	11.00	Dummy Null Structure for LandXML purposes

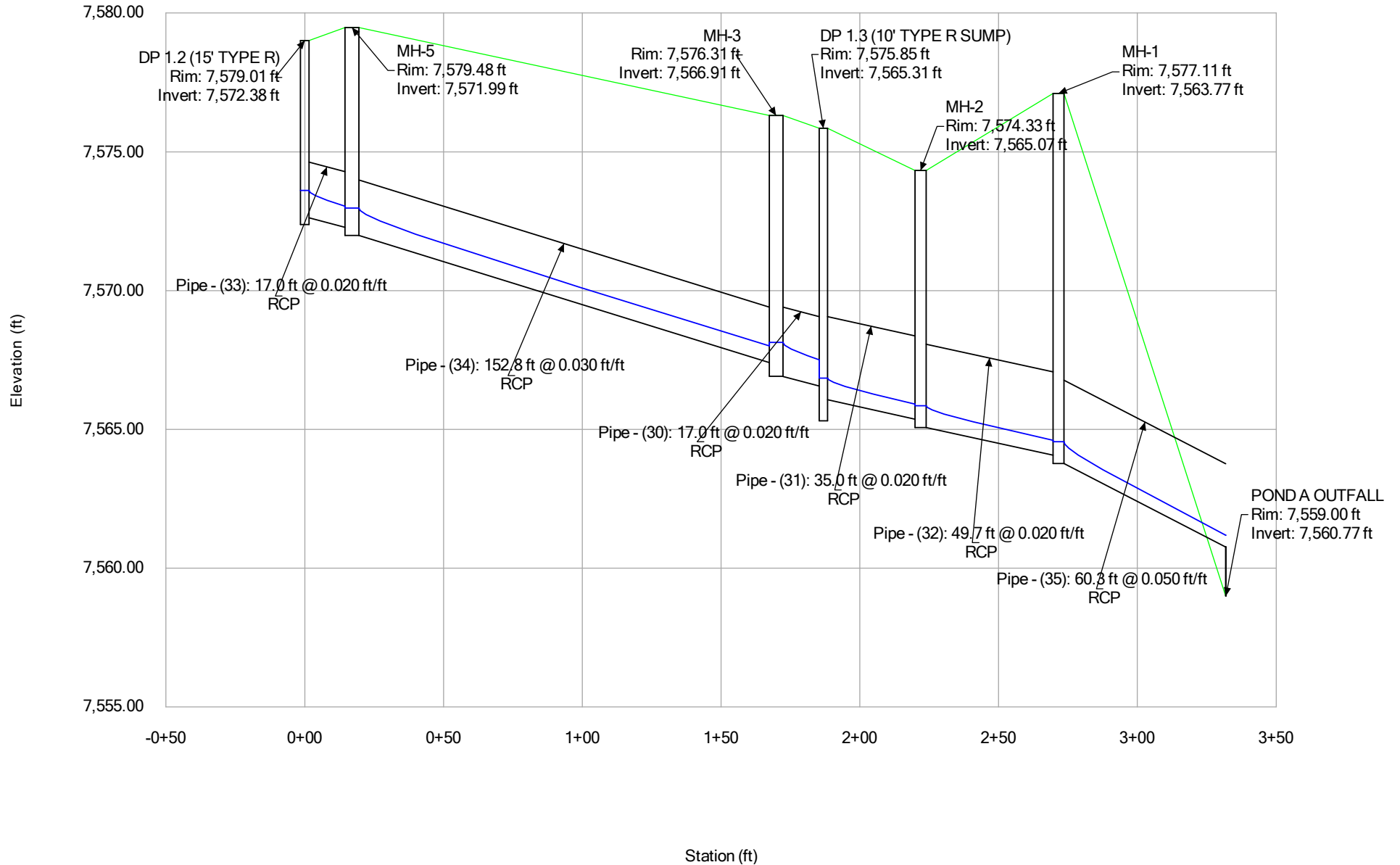
EXISTING STORM SYSTEM HYDRAULIC PERFORMANCE

## Profile Report

### Engineering Profile - DP 1.1 - POND (5YR-Estates-2-26-24.stsw)



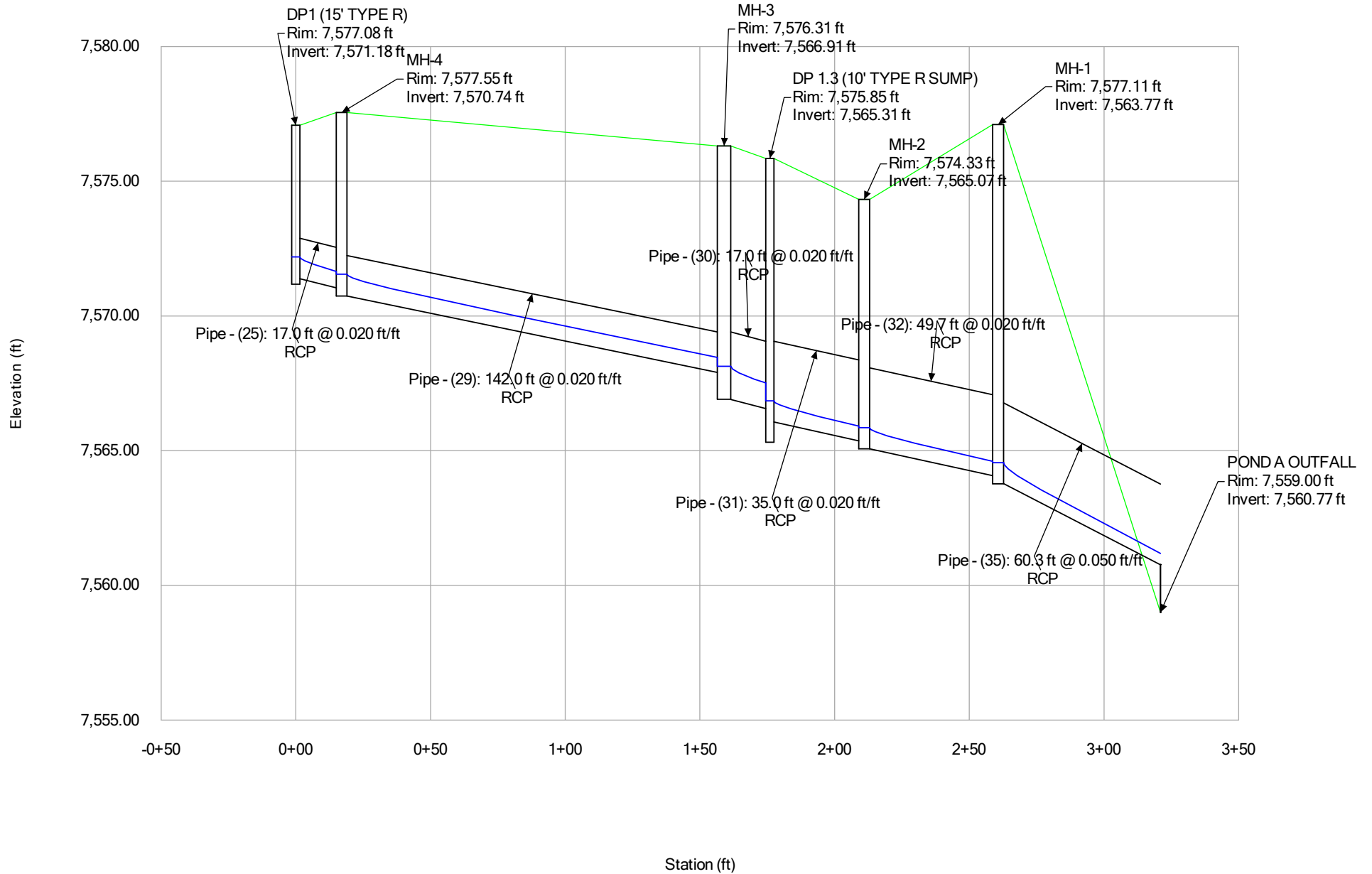
# Profile Report Engineering Profile - DP 1.2 - POND (5YR-Estates-2-26-24.stsw)



# EXISTING STORM SYSTEM HYDRAULIC PERFORMANCE

## Profile Report

### Engineering Profile - DP1 - POND (5YR-Estates-2-26-24.stsw)





FLYING HORSE NORTH FILING NO. 3  
5 YEAR STORM SCENARIO  
FlexTable: Conduit Table

Label	Invert (Start) (ft)	Invert (Stop) (ft)	Length (Unified) (ft)	Slope (Calculated) (ft/ft)	Diameter (in)	Flow (cfs)	Velocity (ft/s)	Manning's n	Froude Number (Normal)	Capacity (Full Flow) (cfs)	Headloss (ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Energy Grade Line (In) (ft)	Energy Grade Line (Out) (ft)	Depth (Out) (ft)	Flow / Capacity (Design) (%)
Pipe - (35)	7,563.77	7,560.77	60.3	0.050	36.0	6.20	10.40	0.013	3.423	149.04	3.37	7,564.56	7,561.18	7,564.83	7,562.86	0.42	4.2
Pipe - (31)	7,566.07	7,565.37	35.0	0.020	36.0	6.20	7.54	0.013	2.212	94.31	0.94	7,566.85	7,565.91	7,567.13	7,566.69	0.54	6.6
Pipe - (32)	7,565.07	7,564.08	49.7	0.020	36.0	6.20	7.54	0.013	2.212	94.31	1.25	7,565.85	7,564.61	7,566.13	7,565.44	0.53	6.6
Pipe - (33)	7,572.63	7,572.29	17.0	0.020	24.0	7.70	8.37	0.013	2.115	31.99	0.58	7,573.61	7,573.04	7,574.00	7,573.83	0.75	24.1
Pipe - (34)	7,571.99	7,567.41	152.8	0.030	24.0	7.70	9.69	0.013	2.594	39.17	4.97	7,572.98	7,568.01	7,573.36	7,569.46	0.60	19.7
Pipe - (25)	7,571.39	7,571.05	17.0	0.020	18.0	4.40	7.32	0.013	2.007	14.85	0.54	7,572.19	7,571.65	7,572.51	7,572.32	0.61	29.6
Pipe - (29)	7,570.74	7,567.91	142.0	0.020	18.0	4.40	7.32	0.013	2.007	14.85	3.08	7,571.55	7,568.46	7,571.87	7,569.30	0.56	29.6
Pipe - (30)	7,566.91	7,566.57	17.0	0.020	30.0	13.30	9.59	0.013	2.196	58.00	0.62	7,568.13	7,567.51	7,568.61	7,568.46	0.95	22.9
Pipe - (39)	7,567.75	7,567.41	17.0	0.020	24.0	1.20	4.87	0.013	2.015	31.99	-0.01	7,568.12	7,568.13	7,568.25	7,568.15	0.73	3.8

EXISTING STORM SYSTEM HYDRAULIC PERFORMACE

FLYING HORSE NORTH FILING NO. 3  
5 YEAR STORM SCENARIO  
FlexTable: Manhole Table

ID	Label	Notes	Elevation (Ground) (ft)	Set Rim to Ground Elevation?	Elevation (Rim) (ft)	Elevation (Invert in 1) (ft)	Flow (Total Out) (cfs)	Depth (Out) (ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Headloss Method
34	MH-2	SDMH	7,574.33	True	7,574.33	7,565.37	6.20	0.78	7,565.85	7,565.85	Standard
35	MH-5	SDMH	7,579.48	True	7,579.48	7,572.29	7.70	0.99	7,572.98	7,572.98	Standard
36	DP 1.2 (15' TYPE R)	15' TYPE-R INLET	7,579.01	True	7,579.01	(N/A)	7.70	1.24	7,573.61	7,573.61	Standard
37	MH-4	SDMH	7,577.55	True	7,577.55	7,571.05	4.40	0.80	7,571.55	7,571.55	Standard
38	MH-1	SDMH	7,577.11	True	7,577.11	7,564.08	6.20	0.78	7,564.56	7,564.56	Standard
39	DP1 (15' TYPE R)	15' TYPE-R INLET	7,577.08	True	7,577.08	(N/A)	4.40	1.01	7,572.19	7,572.19	Standard
40	MH-3	SDMH	7,576.31	True	7,576.31	7,567.41	13.30	1.23	7,568.13	7,568.13	Standard
41	DP 1.3 (10' TYPE R SUMP)	10' TYPE-R INLET	7,575.85	True	7,575.85	7,566.57	6.20	1.53	7,566.85	7,566.85	Standard
42	DP 1.1 (5' TYPE R SUMP)	5' TYPE-R INLET	7,575.85	True	7,575.85	(N/A)	1.20	1.22	7,568.12	7,568.12	Standard

EXISTING STORM SYSTEM HYDRAULIC PERFORMACE

FLYING HORSE NORTH FILING NO. 3  
5 YEAR STORM SCENARIO  
FlexTable: Outfall Table

ID	Label	Elevation (Ground) (ft)	Set Rim to Ground Elevation?	Elevation (Invert) (ft)	Boundary Condition Type	Boundary Element	Elevation (User Defined Tailwater) (ft)	Hydraulic Grade (ft)	Flow (Total Out) (cfs)	Notes
83	POND A OUTFALL	7,559.00	True	7,560.77	Free Outfall	<None>		7,561.18	6.20	Dummy Null Structure for LandXML purposes

EXISTING STORM SYSTEM HYDRAULIC PERFORMACE

## EXISTING STORM STREET & INLET CAPACITY ANALYSIS

MHFD-Inlet, Version 5.02 (August 2022)

### INLET MANAGEMENT

Worksheet Protected

INLET NAME	DP1	DP1.1	DP1.2
Site Type (Urban or Rural)	URBAN	URBAN	URBAN
Inlet Application (Street or Area)	STREET	STREET	STREET
Hydraulic Condition	On Grade	In Sump	On Grade
Inlet Type	CDOT Type R Curb Opening		CDOT Type R Curb Opening

#### USER-DEFINED INPUT

##### User-Defined Design Flows

Minor $Q_{Known}$ (cfs)	4.4	1.2	7.9
Major $Q_{Known}$ (cfs)	12.1	7.5	14.6

##### Bypass (Carry-Over) Flow from Upstream Inlets must be organized from upstream (left) to downstream (right) in order for bypass flows to be linked.

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

##### Watershed Characteristics

Subcatchment Area (acres)			
Percent Impervious			
NRCS Soil Type			

##### Watershed Profile

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

##### Minor Storm Rainfall Input

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

##### Major Storm Rainfall Input

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

#### CALCULATED OUTPUT

Minor Total Design Peak Flow, $Q$ (cfs)	4.4	1.2	7.9
Major Total Design Peak Flow, $Q$ (cfs)	12.1	7.5	14.6
Minor Flow Bypassed Downstream, $Q_b$ (cfs)	0.0	N/A	0.2
Major Flow Bypassed Downstream, $Q_b$ (cfs)	1.6	N/A	3.0

## EXISTING STORM STREET & INLET CAPACITY ANALYSIS

MHFD-Inlet, Version 5.02 (August 2022)

### INLET MANAGEMENT

Worksheet Protected

<b>INLET NAME</b>	DP1.3
Site Type (Urban or Rural)	URBAN
Inlet Application (Street or Area)	STREET
Hydraulic Condition	In Sump
Inlet Type	

#### USER-DEFINED INPUT

##### User-Defined Design Flows

Minor $Q_{\text{Known}}$ (cfs)	6.2
Major $Q_{\text{Known}}$ (cfs)	11.0

##### Bypass (Carry-Over) Flow from Upstream

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

##### Watershed Characteristics

Subcatchment Area (acres)	
Percent Impervious	
NRCS Soil Type	

##### Watershed Profile

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

##### Minor Storm Rainfall Input

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

##### Major Storm Rainfall Input

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

#### CALCULATED OUTPUT

<b>Minor Total Design Peak Flow, <math>Q</math> (cfs)</b>	<b>6.2</b>
<b>Major Total Design Peak Flow, <math>Q</math> (cfs)</b>	<b>11.0</b>
Minor Flow Bypassed Downstream, $Q_b$ (cfs)	N/A
Major Flow Bypassed Downstream, $Q_b$ (cfs)	N/A

## EXISTING STORM STREET & INLET CAPACITY ANALYSIS

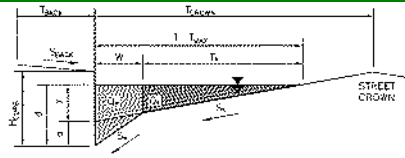
MHFD-Inlet, Version 5.02 (August 2022)

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

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

Project:

Inlet ID: DP1



#### Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb

Side Slope Behind Curb (leave blank for no conveyance credit behind curb)

Manning's Roughness Behind Curb (typically between 0.012 and 0.020)

Height of Curb at Gutter Flow Line

Distance from Curb Face to Street Crown

Gutter Width

Street Transverse Slope

Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)

Street Longitudinal Slope - Enter 0 for sump condition

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

T<sub>BACK</sub> = 9.0 ft  
S<sub>BACK</sub> = 0.020 ft/ft  
n<sub>BACK</sub> = 0.020

H<sub>CURB</sub> = 6.00 inches  
T<sub>CROWN</sub> = 17.0 ft  
W = 2.50 ft  
S<sub>X</sub> = 0.020 ft/ft  
S<sub>W</sub> = 0.083 ft/ft  
S<sub>O</sub> = 0.010 ft/ft  
n<sub>STREET</sub> = 0.016

Max. Allowable Spread for Minor & Major Storm

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

Allow Flow Depth at Street Crown (check box for yes, leave blank for no)

	Minor Storm	Major Storm
T <sub>MAX</sub>	17.0	17.0
d <sub>MAX</sub>	5.6	8.2

inches

☐ ☒

MINOR STORM Allowable Capacity is based on Depth Criterion

MAJOR STORM Allowable Capacity is based on Depth Criterion

Q<sub>allow</sub> = Minor Storm 9.2 Major Storm 33.2 cfs

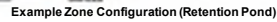
Minor storm max. allowable capacity GOOD - greater than the design peak flow of 4.40 cfs on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design peak flow of 12.10 cfs on sheet 'Inlet Management'

ALLEN RANCH  
ROAD STREET  
CAPACITY

*MHFD-Detention, Version 4.06 (July 2022)*

**Basin ID: DESIGN POINT 2 (FLATS/CONDO AREA)**



Depth Increment =

7559

Calculated Total Basin Volume ( $V_{\text{total}}$ ) = **user** acre-feet

	acre-feet
	acre-feet
1.19	inches
1.50	inches
1.75	inches
2.00	inches
2.25	inches
2.52	inches
	inches

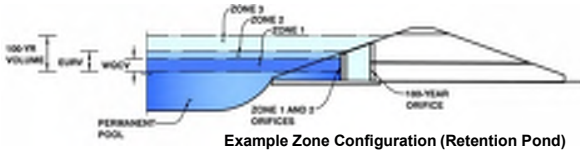
# EXISTING POND A: POND MODELING

## DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)

Project: FLYING HORSE NORTH FILING NO. 3

Basin ID: DESIGN POINT 2 (FLATS/CONDO AREA)



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	2.89	0.350	Orifice Plate
Zone 2 (EURV)	4.11	0.570	Orifice Plate
Zone 3 (100-year)	5.57	0.933	Weir&Pipe (Restrict)
Total (all zones)		1.853	

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)

Centroid of Lowest Orifice = 0.00 ft (relative to basin bottom at Stage = 0 ft)  
Depth at top of Zone using Orifice Plate = 4.00 ft (relative to basin bottom at Stage = 0 ft)  
Orifice Plate: Orifice Vertical Spacing = N/A inches  
Orifice Plate: Orifice Area per Row = N/A sq. inches

Calculated Parameters for Plate  
WQ Orifice Area per Row = N/A 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)	0.00	2.60						
Orifice Area (sq. inches)	2.00	4.50						

	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 = N/A ft (relative to basin bottom at Stage = 0 ft)  
Depth at top of Zone using Vertical Orifice = N/A ft (relative to basin bottom at Stage = 0 ft)  
Vertical Orifice Diameter = N/A inches

Calculated Parameters for Vertical Orifice  
Vertical Orifice Area = N/A ft<sup>2</sup>  
Vertical Orifice Centroid = N/A feet

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

Overflow Weir Front Edge Height, H<sub>o</sub> = 4.50 ft (relative to basin bottom at Stage = 0 ft)  
Overflow Weir Front Edge Length = 6.00 feet  
Overflow Weir Grate Slope = 0.00 H:V  
Horiz. Length of Weir Sides = 3.00 feet  
Overflow Grate Type = Type C Grate  
Debris Clogging % = 50% %

Calculated Parameters for Overflow Weir  
Height of Grate Upper Edge, H<sub>u</sub> = 4.50 feet  
Overflow Weir Slope Length = 3.00 feet  
Grate Open Area / 100-yr Orifice Area = 6.07  
Overflow Grate Open Area w/o Debris = 12.53 ft<sup>2</sup>  
Overflow Grate Open Area w/ Debris = 6.26 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 = 0.50 ft (distance below basin bottom at Stage = 0 ft)  
Outlet Pipe Diameter = 24.00 inches  
Restrictor Plate Height Above Pipe Invert = 15.00 inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate  
Outlet Orifice Area = 2.07 ft<sup>2</sup>  
Outlet Orifice Centroid = 0.71 feet  
Half-Central Angle of Restrictor Plate on Pipe = 1.82 radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage = 8.00 ft (relative to basin bottom at Stage = 0 ft)  
Spillway Crest Length = 23.00 feet  
Spillway End Slopes = 4.00 H:V  
Freeboard above Max Water Surface = 1.00 feet

Calculated Parameters for Spillway  
Spillway Design Flow Depth = 0.91 feet  
Stage at Top of Freeboard = 9.91 feet  
Basin Area at Top of Freeboard = 1.31 acres  
Basin Volume at Top of Freeboard = 5.30 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	3.14
One-Hour Rainfall Depth (in) =	N/A	N/A	0.896	1.390	1.839	2.496	3.004	3.671	4.979
CUHP Runoff Volume (acre-ft) =	N/A	N/A	0.896	1.390	1.839	2.496	3.004	3.671	4.979
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	4.0	10.9	16.1	28.3	35.4	44.3	61.5
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A							
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.16	0.43	0.64	1.12	1.40	1.75	2.43
Peak Inflow Q (cfs) =	N/A	N/A	16.5	26.5	33.7	46.4	55.6	67.6	90.0
Peak Outflow Q (cfs) =	0.2	0.3	0.3	2.1	7.3	18.1	22.8	24.0	26.0
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.2	0.5	0.6	0.6	0.5	0.4
Structure Controlling Flow =	Plate	Plate	Plate	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Outlet Plate 1	Outlet Plate 1	Outlet Plate 1
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	0.1	0.5	1.4	1.8	1.9	2.0
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) =	39	62	62	72	70	67	65	63	58
Time to Drain 99% of Inflow Volume (hours) =	40	65	65	76	75	74	74	73	71
Maximum Ponding Depth (ft) =	2.89	4.11	3.97	4.65	4.88	5.22	5.44	6.01	7.03
Area at Maximum Ponding Depth (acres) =	0.37	0.55	0.54	0.62	0.64	0.69	0.71	0.78	0.94
Maximum Volume Stored (acre-ft) =	0.351	0.922	0.845	1.238	1.383	1.609	1.763	2.190	3.059



## EXISTING POND A

### HR GREEN FOREBAY SIZING

PROJECT: FLYING HORSE NORTH FILING 3

DATE: 3/1/2024

DESIGNED BY: RDL

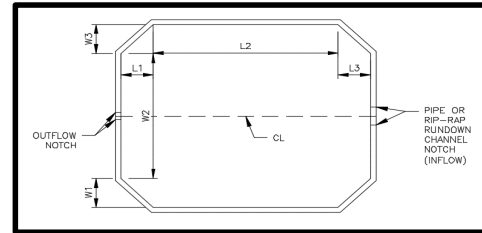
CHECKED BY: RDL

POND OR DP: POND A (DP2)

INNER DIMENSIONS		OUTER DIMENSIONS	
LENGTH			
L1	5 FT		5.83 FT
L2	20.000 FT		20.833 FT
L3	5 FT		5.83 FT
INNER L	30.000 FT	OUTER TOTAL L	31.666 FT

WIDTH			
W1	5 FT		5.83 FT
W2	15 FT (75% of L2)		15.83 FT
W3	5 FT		5.83 FT
INNER W	25.000 FT	OUTER TOTAL W	26.666 FT

**BAFFLE** (6'x0.83' + 4'x0.83')  
**AREA** 8.33 SF



TRIANGLES 50  
 RECTANGLE 300  
 BAFFLE 8.33  
**TOTAL SURFACE AREA 341.67 SQ FT**

FOREBAY HT. **1.5 FT**

FOREBAY VOLUME **513** CF  
**19.0** CY  
**0.012** AC-FT

SUFFICIENT VOLUME?	<b>YES</b>
--------------------	------------

REQ'D VOL (3% WQCV) 0.011 AC-FT  
 (per UD-BMP calc) 480 CF

### T-5 Extended Detention Basin (EDB)

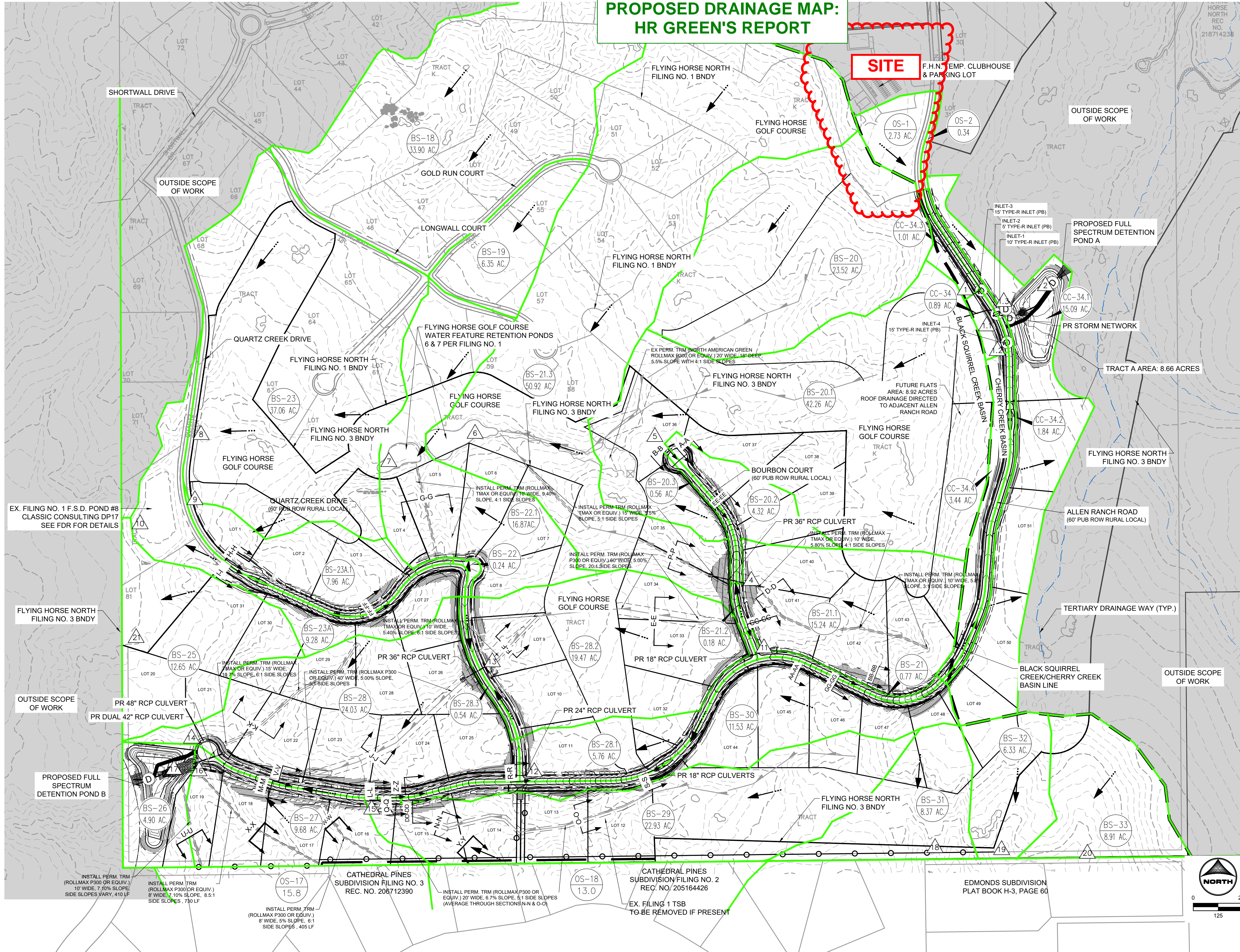
Table EDB-4. EDB component criteria

	On-Site EDBs for Watersheds up to 1 Impervious Acre <sup>1</sup>	EDBs with Watersheds between 1 and 2 Impervious Acres <sup>1</sup>	EDBs with Watersheds up to 5 Impervious Acres	EDBs with Watersheds over 5 Impervious Acres	EDBs with Watersheds over 20 Impervious Acres
Forebay Release and Configuration		Release 2% of the undetained 100-year peak discharge by way of a wall/notch configuration	Release 2% of the undetained 100-year peak discharge by way of a wall/notch configuration	Release 2% of the undetained 100-year peak discharge by way of a wall/notch configuration	Release 2% of the undetained 100-year peak discharge by way of a wall/notch or berm/pipe <sup>2</sup> configuration
Minimum Forebay Volume	EDBs should not be used for watersheds with less than 1 impervious acre.	1% of the WQCV	2% of the WQCV	3% of the WQCV	3% of the WQCV
Maximum Forebay Depth		12 inches	18 inches	18 inches	30 inches
Trickle Channel Capacity		≥ the maximum possible forebay outlet capacity	≥ the maximum possible forebay outlet capacity	≥ the maximum possible forebay outlet capacity	≥ the maximum possible forebay outlet capacity
Micropool		Area ≥ 10 ft <sup>2</sup>	Area ≥ 10 ft <sup>2</sup>	Area ≥ 10 ft <sup>2</sup>	Area ≥ 10 ft <sup>2</sup>
Initial Surcharge Volume		Depth ≥ 4 inches	Depth ≥ 4 inches	Depth ≥ 4 in. Volume ≥ 0.3% WQCV	Depth ≥ 4 in. Volume ≥ 0.3% WQCV

<sup>1</sup> EDBs are not recommended for sites with less than 2 impervious acres. Consider a sand filter or rain garden.

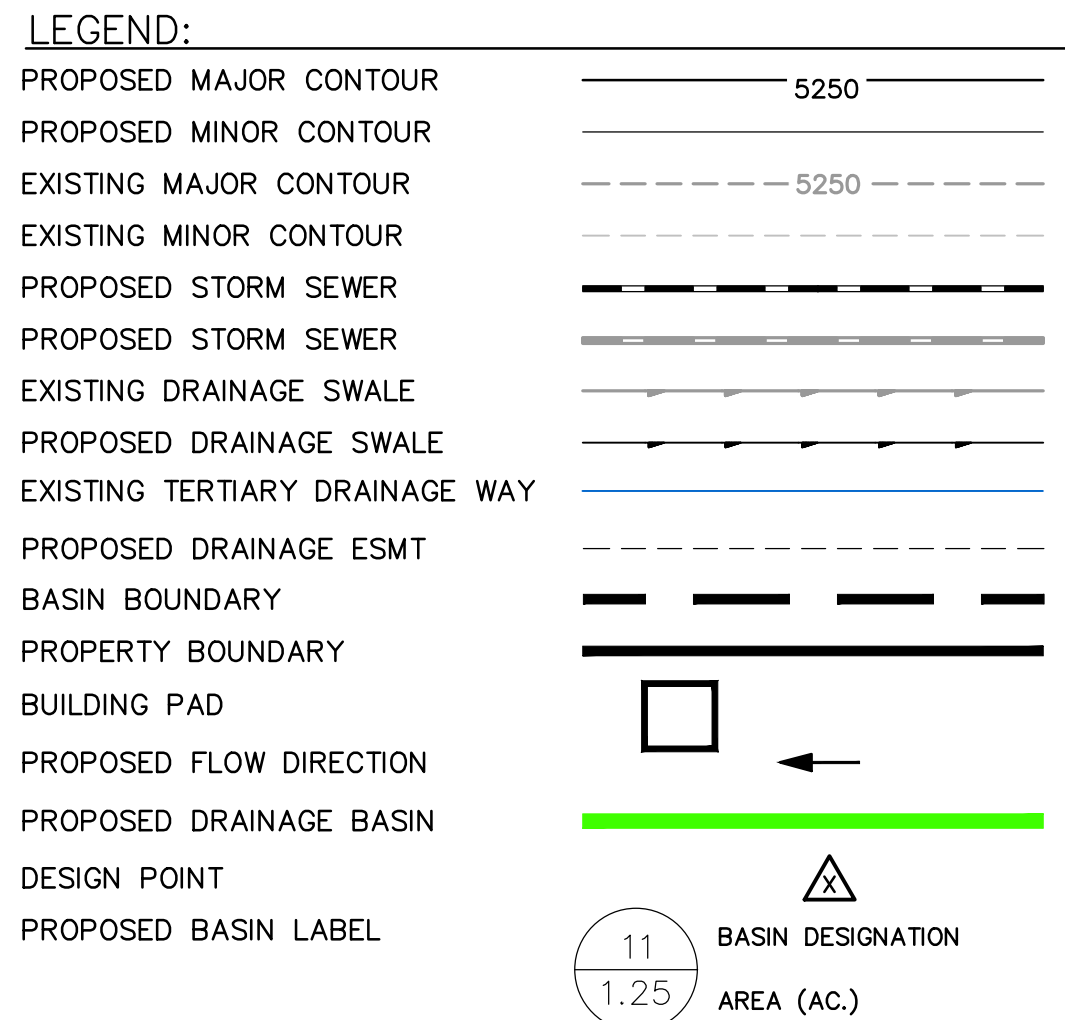
<sup>2</sup> Round up to the first standard pipe size (minimum 8 inches).





SUMMARY RUNOFF TABLE							
BASIN	AREA (ac)	% IMP.	C <sub>s</sub>	C <sub>100</sub>	Q <sub>s</sub> (cfs)	Q <sub>100</sub> (cfs)	
BS-18	33.90	7.77	0.14	0.39	12.6	60.1	
BS-19	6.35	11.00	0.17	0.42	4.1	16.8	
BS-20	23.79	6.83	0.13	0.39	9.6	48.5	
BS-20.1	42.26	8.49	0.14	0.39	16.3	77.7	
BS-20.2	4.32	11.00	0.17	0.42	2.5	10.1	
BS-20.3	0.56	100.00	0.90	0.96	2.3	4.1	
BS-21	0.77	100.00	0.90	0.96	3.0	5.4	
BS-21.1	15.24	11.95	0.17	0.42	8.5	34.3	
BS-21.2	0.18	100.00	0.90	0.96	0.8	1.5	
BS-21.3	50.92	7.83	0.14	0.39	17.7	85.0	
BS-22	0.24	100.00	0.90	0.96	1.1	2.0	
BS-22.1	16.87	9.63	0.16	0.41	8.8	38.4	
BS-23A	9.28	8.43	0.14	0.40	4.1	19.0	
BS-23A.1	7.96	10.69	0.17	0.41	4.2	17.4	
BS-23	37.06	7.26	0.13	0.39	15.6	76.7	
BS-25	12.65	8.49	0.15	0.40	6.1	28.1	
BS-26	4.90	3.74	0.10	0.36	1.7	10.6	
BS-27	9.68	11.00	0.17	0.42	5.6	22.9	
BS-28	24.03	11.00	0.17	0.42	12.3	50.6	
BS-28.1	5.76	9.56	0.16	0.41	2.8	12.5	
BS-28.2	19.47	8.75	0.15	0.40	9.0	41.0	
BS-28.3	0.54	100.00	0.90	0.96	2.5	4.5	
BS-29	22.93	7.78	0.14	0.39	8.3	39.7	
BS-30	11.53	10.84	0.17	0.42	4.9	20.4	
BS-31	8.40	4.57	0.11	0.37	3.2	18.6	
BS-32	6.33	6.73	0.13	0.39	3.0	15.4	
BS-33	8.91	10.39	0.16	0.41	5.2	21.9	
CC-34	0.89	26.22	0.28	0.50	1.0	2.9	
CC-34.1	15.09	5.82	0.12	0.38	6.7	36.1	
CC-34.2	1.84	100.00	0.90	0.96	4.9	8.7	
CC-34.3	1.01	40.81	0.40	0.59	1.6	3.9	
CC-34.4	3.44	91.66	0.76	0.83	7.9	14.6	
OS-1	2.70	29.55	0.29	0.51	2.8	8.2	
OS-2	0.34	100.00	0.90	0.96	1.3	2.3	
OS-17	15.80	11.00	0.17	0.42	9.9	40.6	
OS-18	13.00	11.00	0.17	0.42	8.2	33.7	

DESIGN POINT SUMMARY TABLE					
DESIGN POINT	CONTRIBUTING BASINS	ΣQ <sub>s</sub> (cfs)	ΣQ <sub>100</sub> (cfs)	Tributary Area (ac.)	Weighted % Impervious
1	OS-1 & CC-34.3	4.4	12.1	3.7	32.62%
1.1	CC-34, DP1, DP1.2	1.2	7.5	8.0	57.17%
1.2	CC-34.4	7.9	14.6	3.4	91.66%
1.3	CC-34.2, OS-2	6.2	11.0	2.2	100.00%
2	CC-34.3, OS-1-2	26.2	76.6	25.3	30.25%
4	BS-21.1	8.5	34.3	15.2	11.95%
5	BS-20.2-20.3	4.7	14.2	4.9	21.21%
6	BS-20-20.3, 21.1-21.3	57.7	261.3	137.3	8.92%
7	BS-19, BS-22-22.1, DP6	71.7	318.4	160.7	9.21%
8	BS-18, 23, DP7	99.8	455.3	231.7	8.69%
9	BS-23A.1	4.2	17.4	8.0	7.96%
10	BS-23A, DP8, DP9	108.1	491.7	248.9	8.74%
11	BS-21	3.0	5.4	0.8	100.00%
12	BS-28.1, DP11	5.9	17.9	6.5	20.23%
13	BS-28.2	9.0	41.0	19.5	8.75%
14	BS-28, BS-28.3, DP12, DP13	29.7	114.0	50.6	12.28%
15	OS-18, BS-28-30	21.4	93.8	47.5	9.41%
16	OS-17, BS-27, DP15	36.9	157.3	72.9	9.96%
17	BS-26, DP14, DP16	68.2	281.8	128.4	10.04%
18	BS-31	3.2	18.6	8.4	4.57%
19	BS-32	3.0	15.4	6.3	6.73%
20	BS-33	5.2	21.9	8.9	10.39%
21	BS-25	6.1	28.1	12.7	8.49%



DRAWN BY: DLH JOB DATE: 4/10/2024  
APPROVED: RDL JOB NUMBER: 211030  
CAD DATE: 6/14/2024  
CAD FILE: J:\2021\1211030\CAD\Drawings\CD\Drainage\Estates\Pr\_Drainage\_Map

BAR IS ONE INCH ON  
OFFICIAL DRAWINGS.  
0" = 100' IF NOT ONE INCH,  
ADJUST SCALE ACCORDINGLY.

NO.	DATE	BY	REVISION DESCRIPTION



HR GREEN - COLORADO SPRINGS  
1975 RESEARCH PARKWAY SUITE 230  
COLORADO SPRINGS, CO 80920  
PHONE: 719.300.4140  
FAX: 719.965.0044

FLYING HORSE NORTH FILING 3  
PRI #2, LLC.  
EL PASO COUNTY, CO

PROPOSED CONDITIONS  
DRAINAGE MAP

SHEET  
MAP





SCALE: NTS

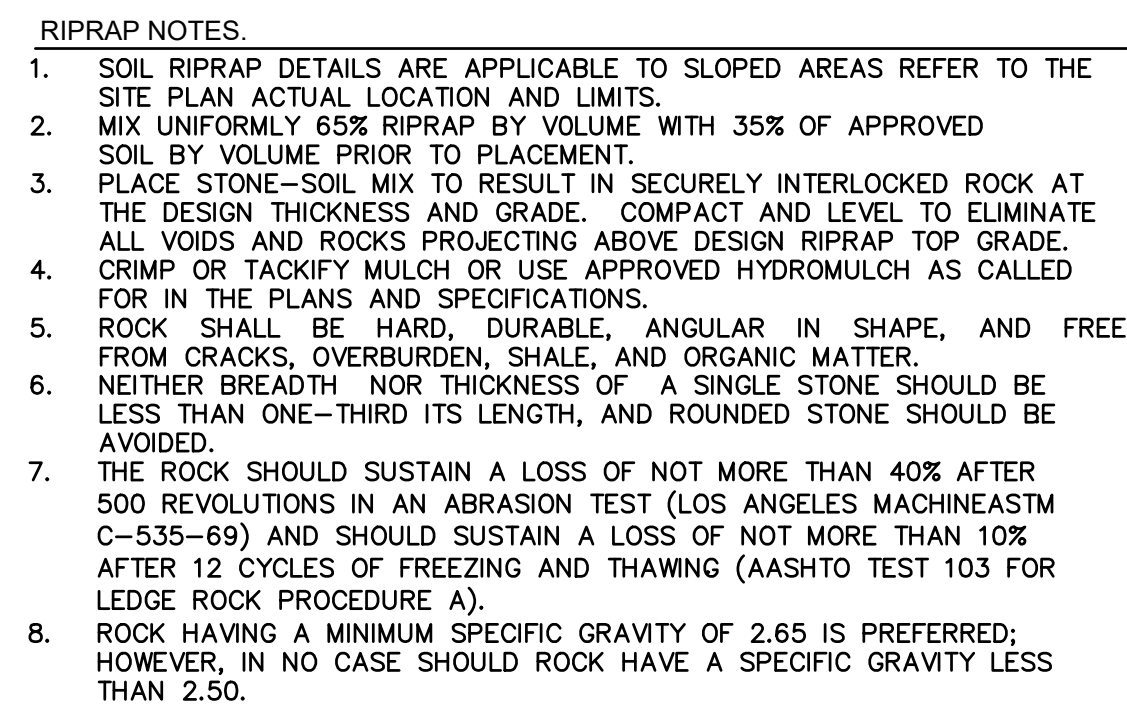


SCALE: NTS



SCALE: NTS

TRICKLE CHANNEL DESIGN NOTE:  
MAXIMUM DEPTH OF FLOW: 6"  
DEPTH OF FLOW DURING PEAK INFLOW: 2.4"

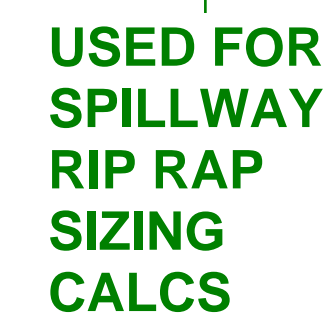


\*TYPE L RIPRAP D50=9":  
D50=MEAN PARTICLE SIZE  
(INTERMEDIATE DIMENSION) BY WEIGHT

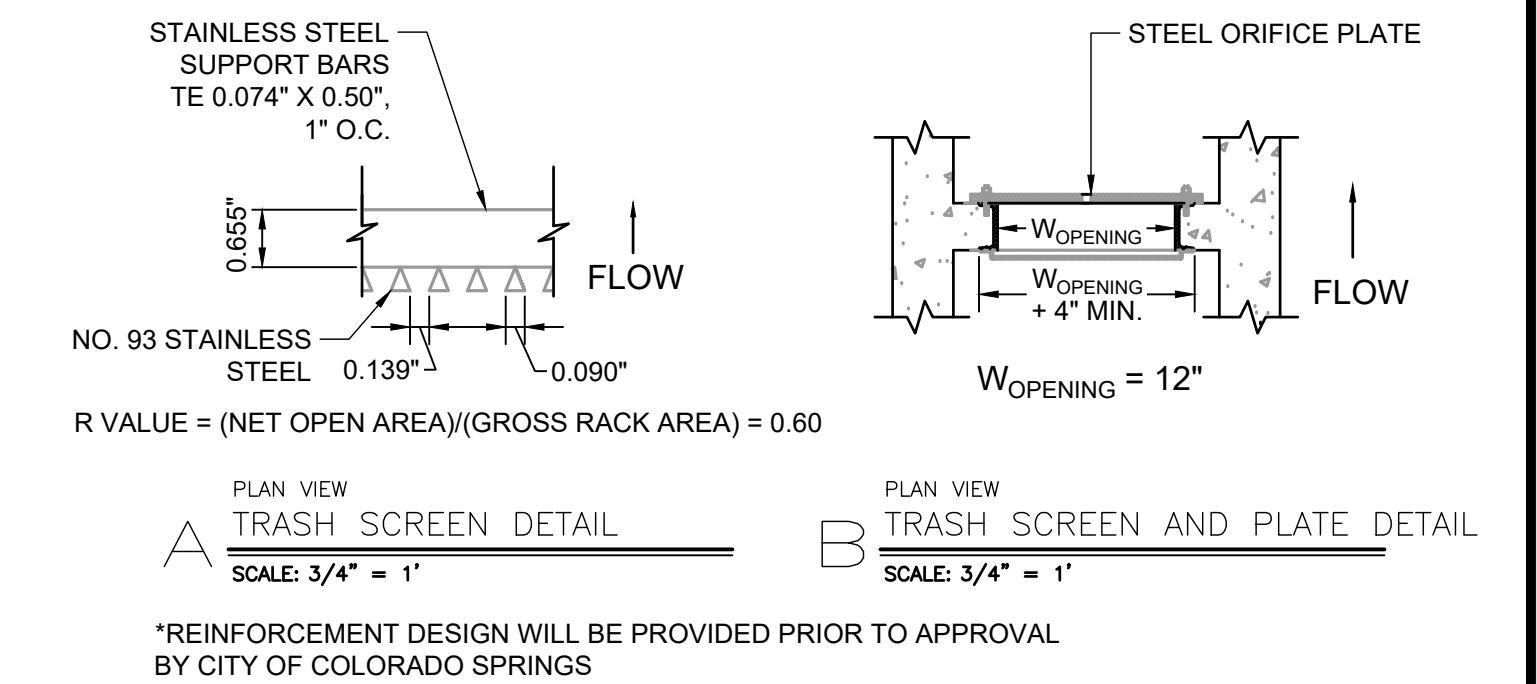
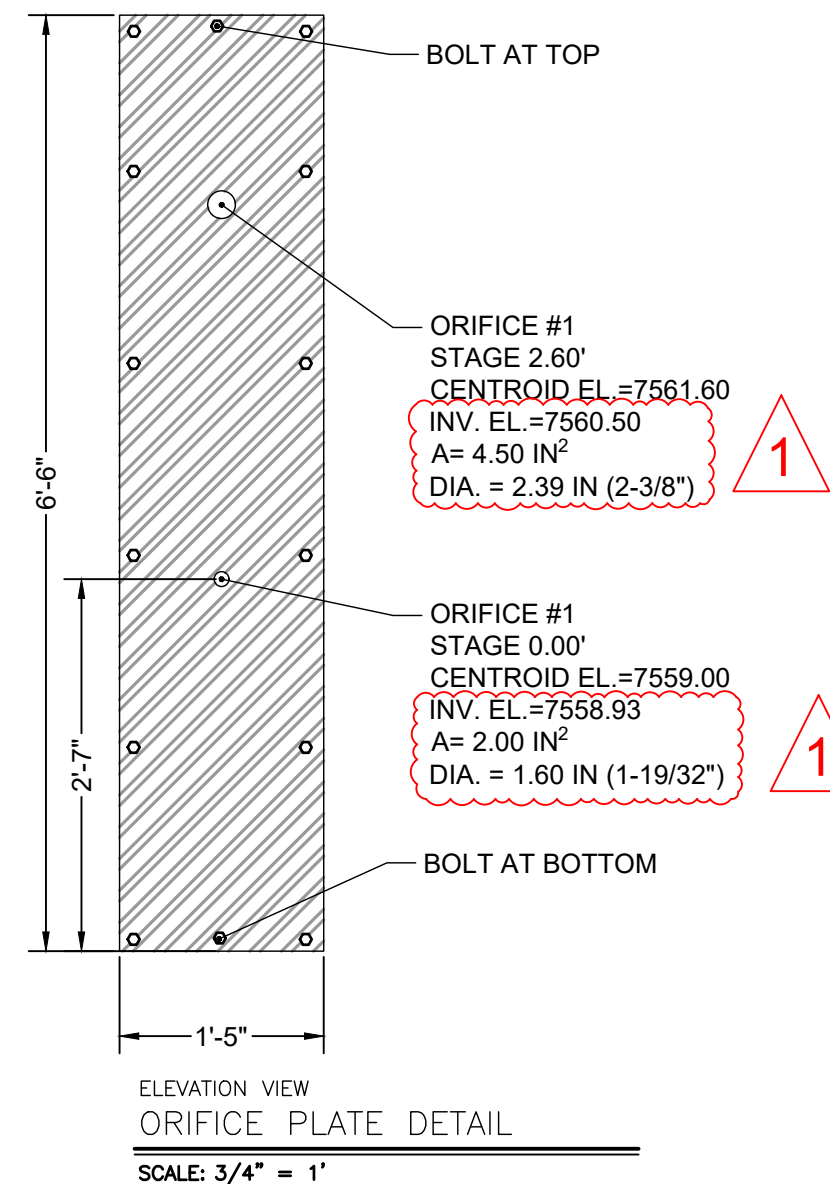
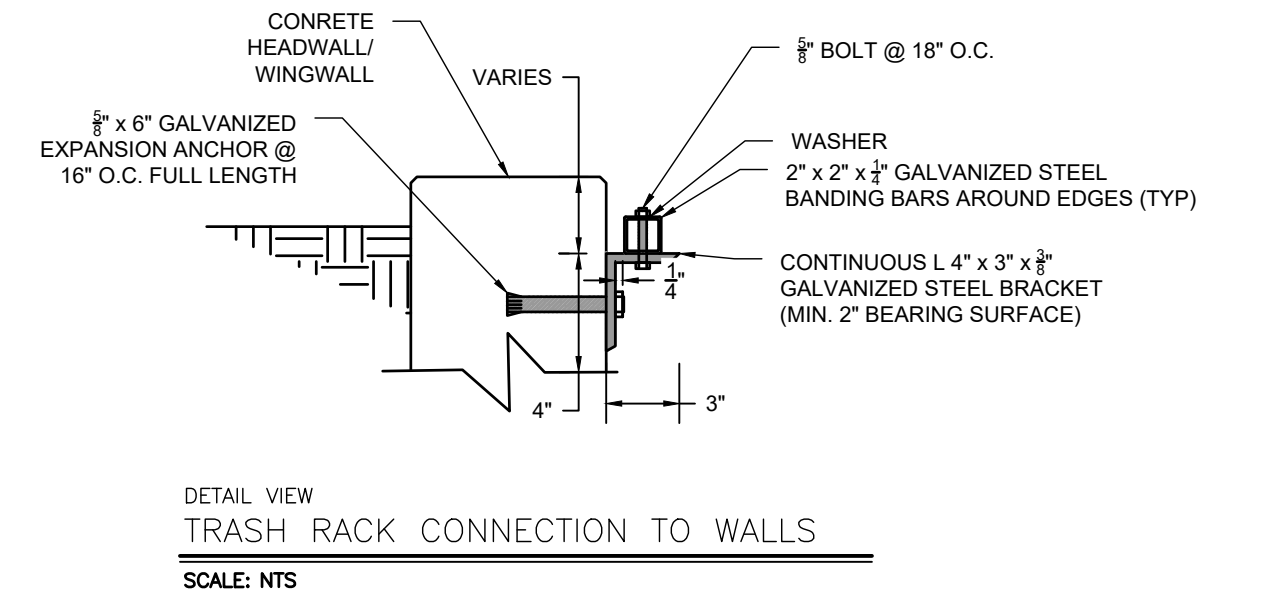
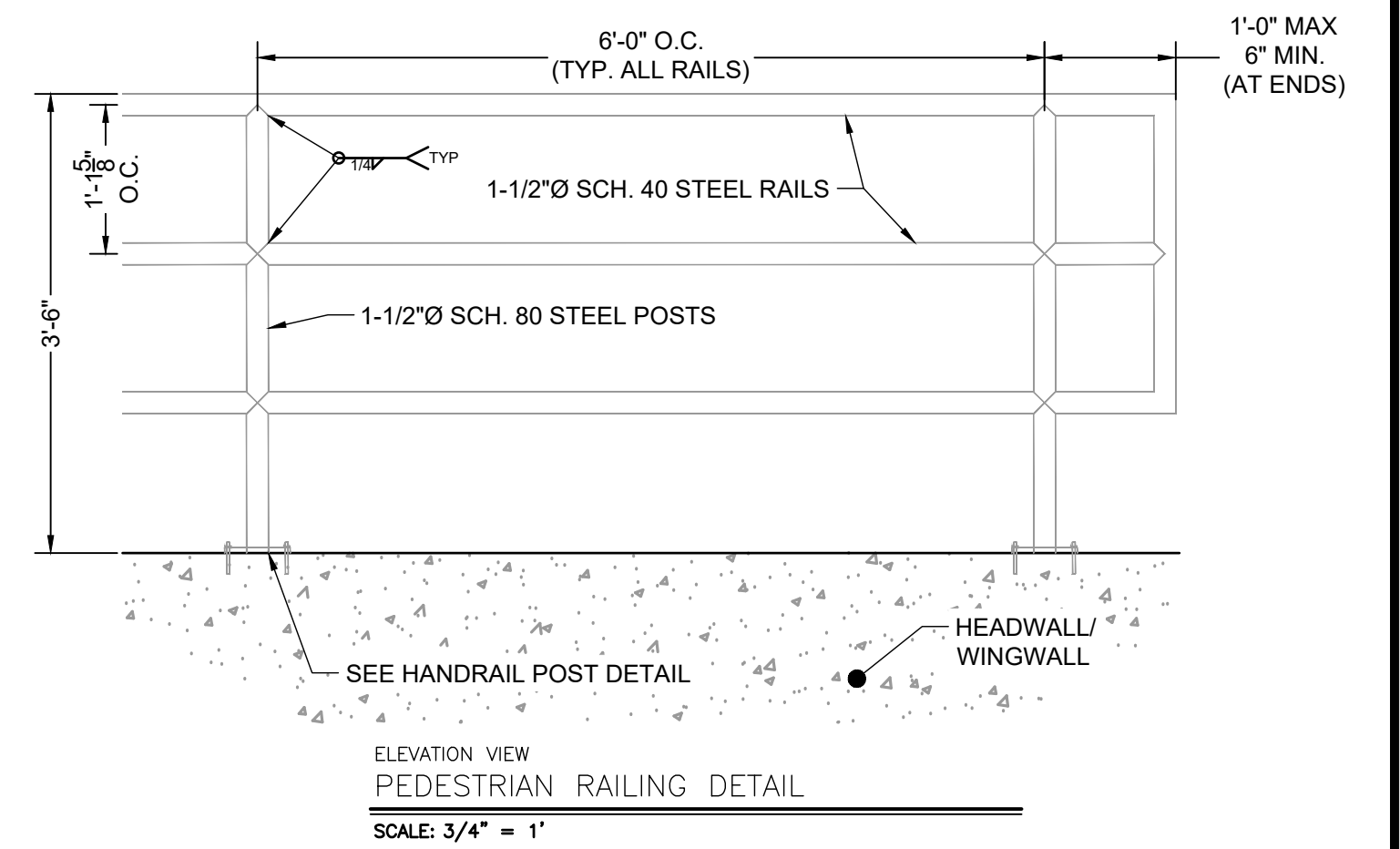
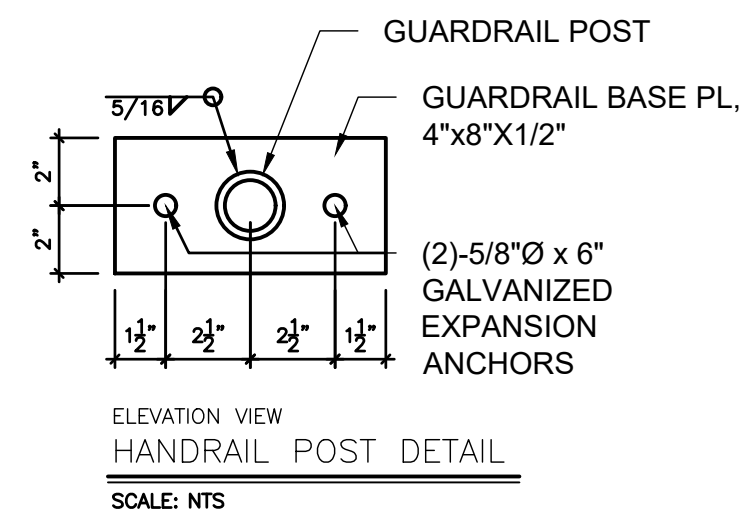
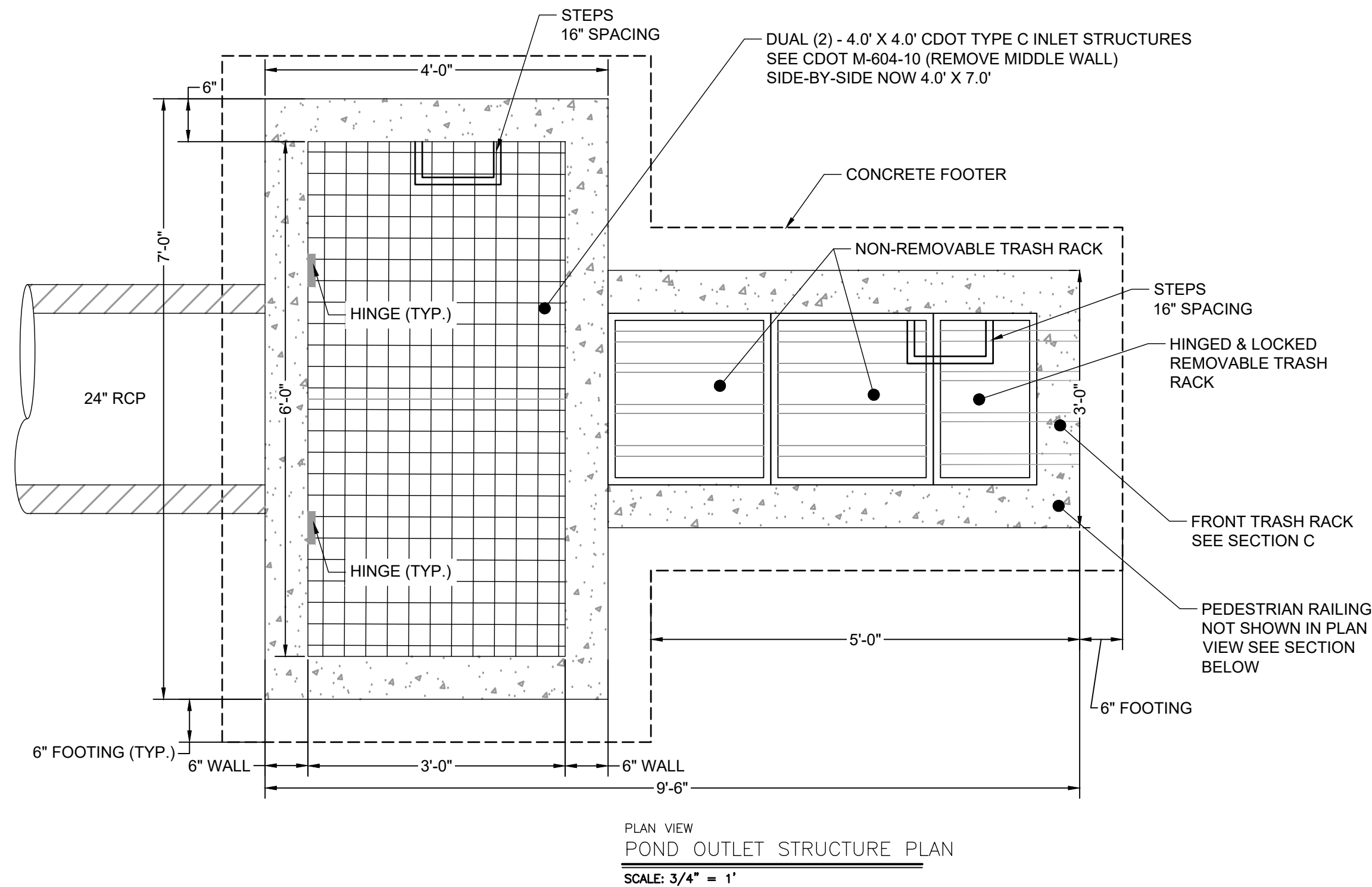
\*TYPE L RIPRAP D50=6":  
D50=MEAN PARTICLE SIZE  
(INTERMEDIATE DIMENSION) BY WEIGHT

\*TYPE L RIPRAP D50=12"  
D50=MEAN PARTICLE SIZE  
(INTERMEDIATE DIMENSION) BY WEIGHT

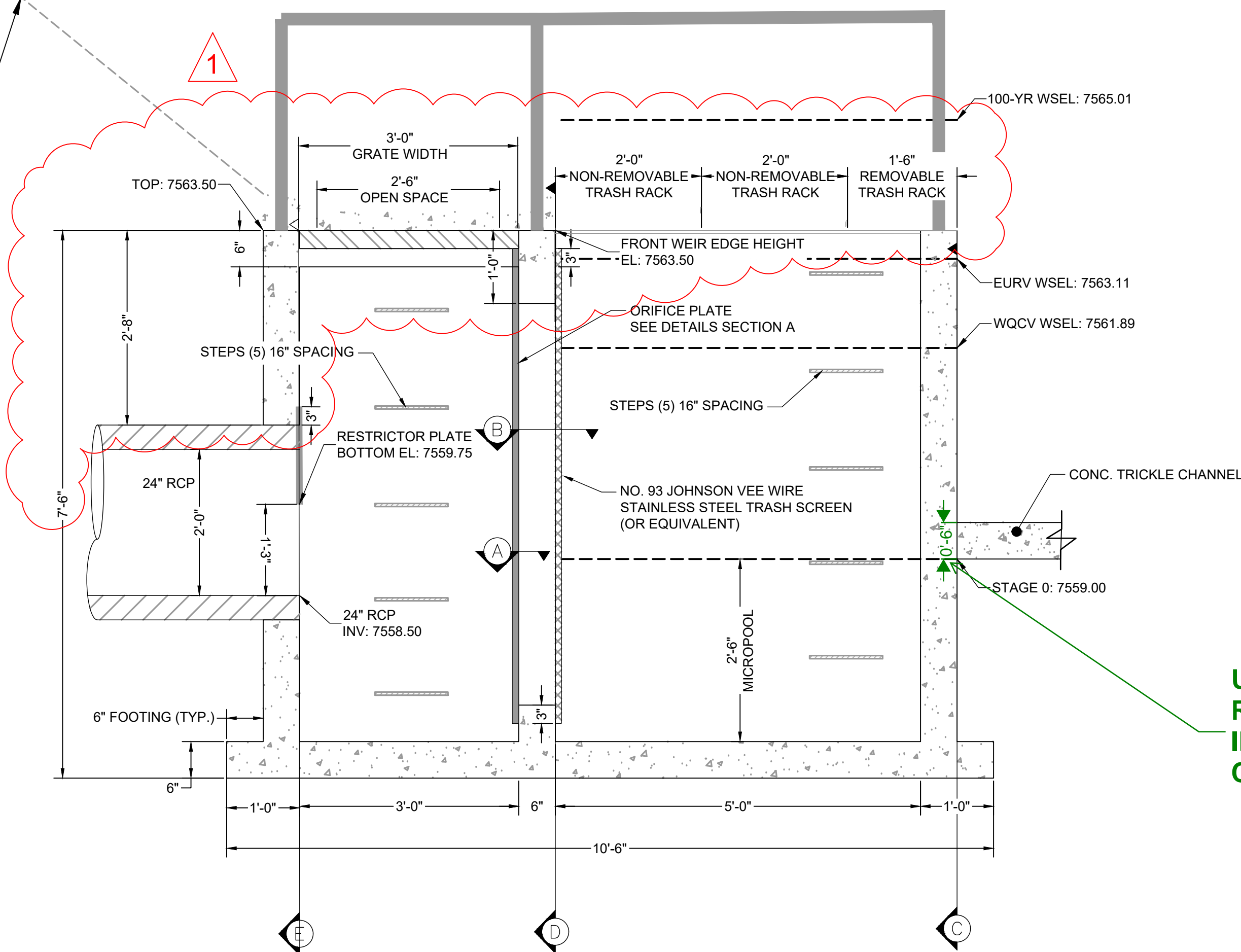
\*TYPE L RIPRAP D50=18"  
D50=MEAN PARTICLE SIZE  
(INTERMEDIATE DIMENSION) BY WEIGHT







POND SIDE SLOPE  
MAX 4:1



**WARNING**  
**THIS AREA IS A STORMWATER FACILITY**  
**AND IS SUBJECT TO PERIODIC FLOODING**

**POND WARNING SIGN**  
SCALE: NTS  
MINIMUM SIGN AREA = 3 FT²  
SIGNS SHALL BE FABRICATED OF DURABLE  
MATERIALS, SUCH AS METAL OR PLASTIC, USING  
RED LETTERING ON A WHITE BACKGROUND

TWO SIGNS, EACH WITH A MINIMUM AREA OF 3 SQUARE FEET, SHALL BE PROVIDED  
AROUND THE PERIMETER OF ALL DETENTION FACILITIES. THE SIGNS SHALL BE  
FABRICATED OF DURABLE MATERIALS, SUCH AS METAL OR PLASTIC, USING RED  
LETTERING ON A WHITE BACKGROUND WITH THE ABOVE MESSAGE

DRAWN BY: DLH JOB DATE: 8/7/2024  
APPROVED: RDL JOB NUMBER: 211030  
CAD DATE: 8/8/2024  
CAD FILE: J:\2021\211030\CAD\Drawings\Estates\_CDs\Outlet\_Structure\_Details

NO.	DATE	BY	REVISION DESCRIPTION
1	08/06/24	RDL	OUTLET STRUCTURE REDESIGN



HR GREEN - COLORADO SPRINGS  
1975 RESEARCH PARKWAY SUITE 230  
COLORADO SPRINGS, CO 80920  
PHONE: 719.300.4140  
FAX: 713.965.0044

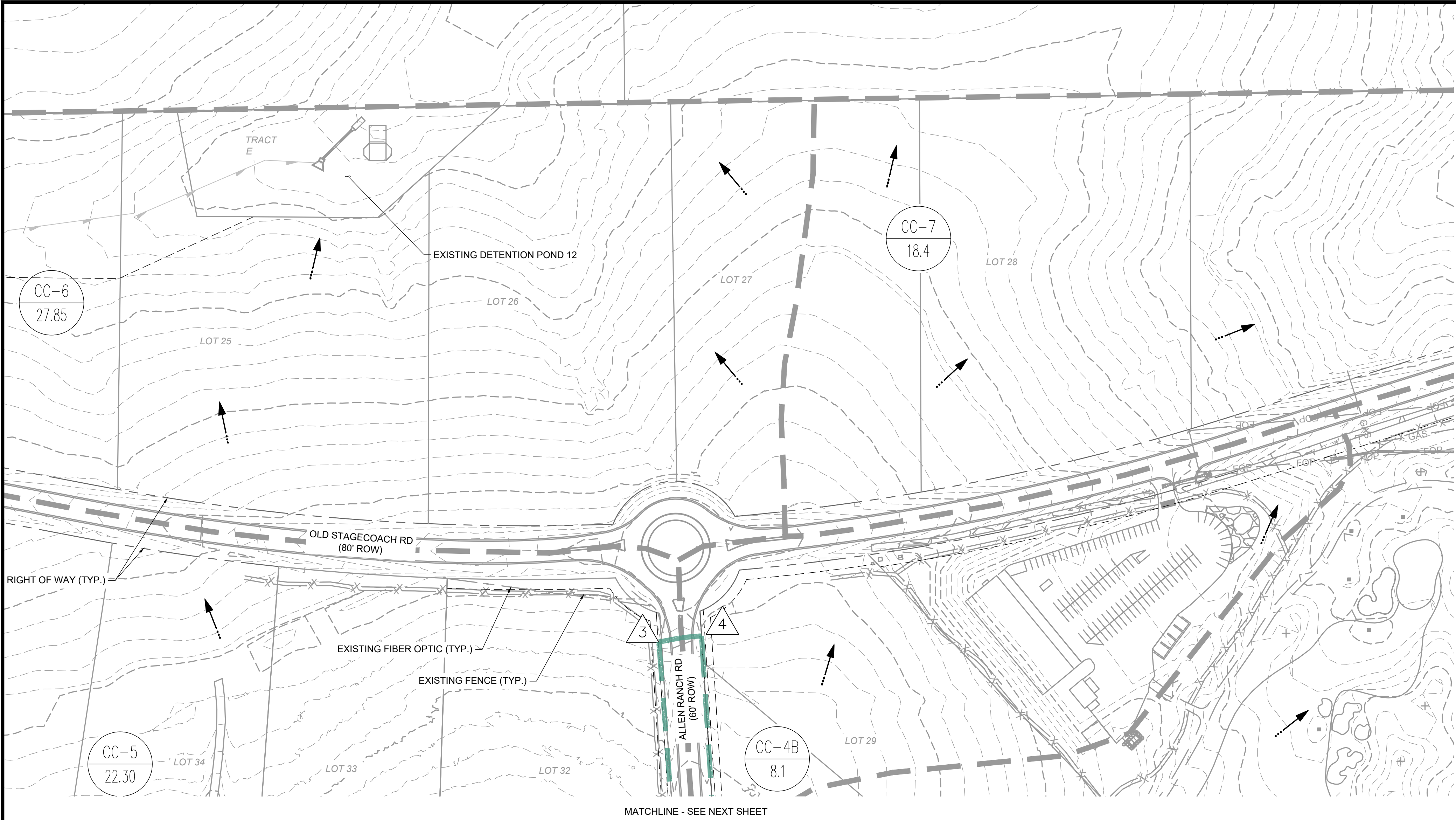
FLYING HORSE NORTH FILING 3  
PRI #2, LLC.  
EL PASO COUNTY, CO

CONSTRUCTION DOCUMENTS  
POND A OUTLET STRUCTURE DETAILS

SHEET  
PND  
26

## Appendix F: Site Drainage Maps





LEGEND:

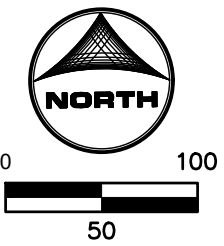
EXISTING MAJOR CONTOUR  
EXISTING MINOR CONTOUR  
EXISTING STORM SEWER  
EXISTING BASIN BOUNDARY  
PR. SUBBASIN BOUNDARY  
MAJOR BASIN BOUNDARY  
PROPERTY BOUNDARY  
EXISTING FLOW DIRECTION  
DESIGN POINT  
PROPOSED BASIN LABEL

5250  
11  
1.25  
BASIN DESIGNATION  
AREA (AC.)

NOTES:  
1.) REFER TO "PRELIMINARY DRAINAGE REPORT FOR FLYING HORSE NORTH PRELIMINARY PLAN AND FINAL DRAINAGE REPORT FOR FLYING HORSE FILING NO. 1", APPROVED SEPTEMBER 25TH, 2018, BY CLASSIC CONSULTING FOR ENTIRE BASINS CC-5, CC-4B, CC-7 AND CC-48 DELINEATION AND CALCULATIONS.  
3.) REFER TO "FLYING HORSE NORTH FILING NO. 3 FINAL DRAINAGE REPORT", APPROVED JULY 8TH, 2024, BY HR GREEN FOR ENTIRE BASINS BS-18, BS-19, BS-21.3, BS-20.1, CC-34.4, AND CC-34.2 DELINEATIONS AND RATIONAL CALCULATIONS.

SUMMARY RUNOFF TABLE							
BASIN	AREA (ac)	% IMP.	C5	C100	Q5 (cfs)	Q100 (cfs)	POND
CC-34	0.89	26.22	0.28	0.50	1.0	2.9	F3-A
CC-34.1	15.09	5.82	0.12	0.38	6.7	36.1	F3-A
CC-34.2	1.84	100.00	0.90	0.96	4.9	8.7	F3-A
CC-34.3	1.01	40.81	0.40	0.59	1.6	3.9	F3-A
CC-34.4	3.44	91.66	0.76	0.83	7.9	14.6	F3-A
EX-1	2.69	28.20	0.28	0.50	2.7	8.0	F3-A
OS-2	0.30	100.00	0.90	0.96	1.1	2.0	F3-A
EX-2	4.72	40.23	0.40	0.59	8.0	19.8	F1-12
OS-3	0.48	100.00	0.90	0.96	2.2	3.9	F1-12
OS-4	0.48	100.00	0.90	0.96	2.2	3.9	F1-13
EX-3	1.04	10.80	0.15	0.40	0.7	20.3	F1-6
EX-4	1.33	2.00	0.08	0.35	0.5	21.3	F1-6

DESIGN POINT SUMMARY TABLE					
DESIGN POINT	CONTRIBUTING BASINS	SQ5 (cfs)	SQ100 (cfs)	Tributary Area (ac.)	Weighted % Impervious
1	EX-1 & CC-34.3	4.3	11.9	3.7	31.64%
1.1	CC-34, DP1, DP1.2	1.2	7.3	8.0	56.75%
1.2	CC-34.4	7.9	14.6	3.4	91.66%
1.3	CC-34.2, OS-2	6.0	10.8	2.1	100.00%
2	CC-34-34.4, EX-1, OS-2	25.9	76.2	25.3	29.99%
3	EX-2, OS-3	9.9	23.1	5.2	45.74%
4	OS-4	2.2	3.9	0.5	100.00%
5	EX-3	0.7	20.3	1.0	10.80%
6	EX-4	0.5	21.3	1.3	2.00%



HR GREEN Xrefs: xv-dsgn-1030; xv-row-1030; xv-util-1030; xc-dsgn-2403816; xc-dsgn-030.202; xgl-1-dh01; xc-dsgn-030.202

DRAWN BY: CVW

APPROVED: RDL

CAD DATE: 5/20/2025

CAD FILE: J:\2024\2403816\CAD\Drawings\CD\Drainage\Ex\_Drainage

JOB DATE: 4/7/2025

JOB NUMBER: 2403816

BAS IS ONE INCH ON OFFICIAL DRAWINGS.

0 1"

IF NOT ONE INCH, ADJUST SCALE ACCORDINGLY.

NO.	DATE	BY	REVISION DESCRIPTION

HR GREEN - COLORADO SPRINGS

1975 RESEARCH PARKWAY SUITE 230

COLORADO SPRINGS, CO 80920

PHONE: 719.300.4140

FAX: 713.965.0044

THE CLUBHOUSE AT FLYING HORSE NORTH

FLYING HORSE COUNTRY CLUB, LLC.

EL PASO COUNTY, CO

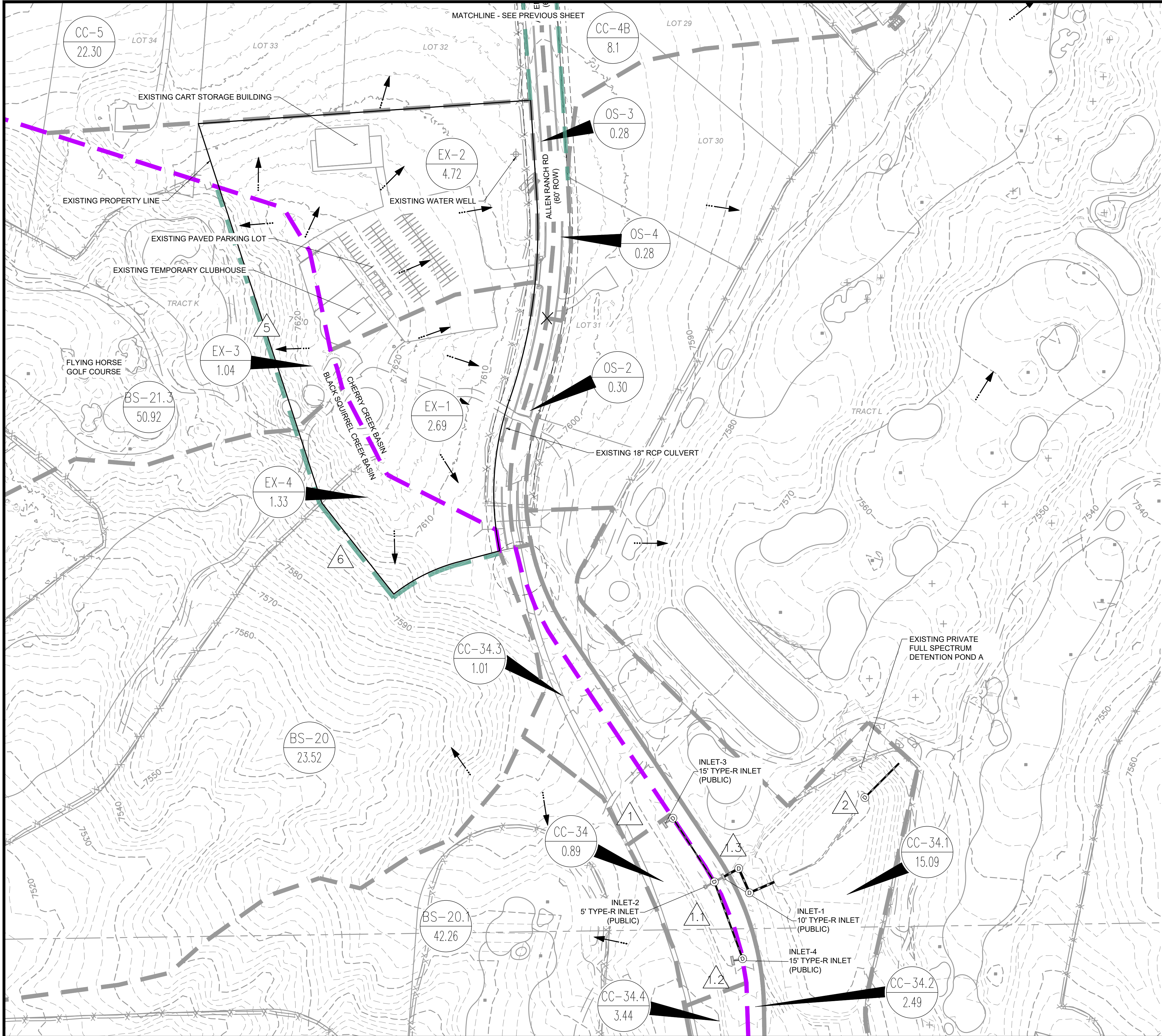
EXISTING CONDITIONS

DRAINAGE MAP

SHEET NO.

EX 1





LEGEND:

EXISTING MAJOR CONTOUR

EXISTING MINOR CONTOUR

EXISTING STORM SEWER

EXISTING BASIN BOUNDARY

PR. SUBBASIN BOUNDARY

MAJOR BASIN BOUNDARY

PROPERTY BOUNDARY

EXISTING FLOW DIRECTION

DESIGN POINT

PROPOSED BASIN LABEL

---

5250

---

---

---

---

---

←

▲

11

1.25

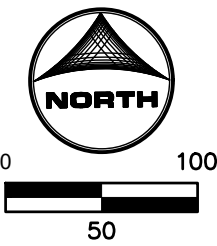
BASIN DESIGNATION

AREA (AC.)

NOTES:  
1.) REFER TO "PRELIMINARY DRAINAGE REPORT FOR FLYING HORSE NORTH PRELIMINARY PLAN AND FINAL DRAINAGE REPORT FOR FLYING HORSE FILING NO. 1", APPROVED SEPTEMBER 25TH, 2018, BY CLASSIC CONSULTING FOR ENTIRE BASINS CC-5, CC-4B, CC-7 AND CC-48 DELINEATION AND CALCULATIONS.  
3.) REFER TO "FLYING HORSE NORTH FILING NO. 3 FINAL DRAINAGE REPORT", APPROVED JULY 8TH, 2024, BY HR GREEN FOR ENTIRE BASINS BS-18, BS-19, BS-21.3, BS-20.1, CC-34.4, AND CC-34.2 DELINEATIONS AND RATIONAL CALCULATIONS.

SUMMARY RUNOFF TABLE							
BASIN	AREA (ac)	% IMP.	C5	C100	Q5 (cfs)	Q100 (cfs)	POND
CC-34	0.89	26.22	0.28	0.50	1.0	2.9	F3-A
CC-34.1	15.09	5.82	0.12	0.38	6.7	36.1	F3-A
CC-34.2	1.84	100.00	0.90	0.96	4.9	8.7	F3-A
CC-34.3	1.01	40.81	0.40	0.59	1.6	3.9	F3-A
CC-34.4	3.44	91.66	0.76	0.83	7.9	14.6	F3-A
EX-1	2.69	28.20	0.28	0.50	2.7	8.0	F3-A
OS-2	0.30	100.00	0.90	0.96	1.1	2.0	F3-A
EX-2	4.72	40.23	0.40	0.59	8.0	19.8	F1-12
OS-3	0.48	100.00	0.90	0.96	2.2	3.9	F1-12
OS-4	0.48	100.00	0.90	0.96	2.2	3.9	F1-13
EX-3	1.04	10.80	0.15	0.40	0.7	20.3	F1-6
EX-4	1.33	2.00	0.08	0.35	0.5	21.3	F1-6

DESIGN POINT SUMMARY TABLE					
DESIGN POINT	CONTRIBUTING BASINS	SQ5 (cfs)	SQ100 (cfs)	Tributary Area (ac.)	Weighted % Impervious
1	EX-1 & CC-34.3	4.3	11.9	3.7	31.64%
1.1	CC-34, DP1, DP1.2	1.2	7.3	8.0	56.75%
1.2	CC-34.4	7.9	14.6	3.4	91.66%
1.3	CC-34.2, OS-2	6.0	10.8	2.1	100.00%
2	CC-34-34.4, EX-1, OS-2	25.9	76.2	25.3	29.99%
3	EX-2, OS-3	9.9	23.1	5.2	45.74%
4	OS-4	2.2	3.9	0.5	100.00%
5	EX-3	0.7	20.3	1.0	10.80%
6	EX-4	0.5	21.3	1.3	2.00%



DRAWN BY: CVW  
APPROVED: RDL  
CAD DATE: 5/20/2025  
CAD FILE: J:\2024\2403816\CAD\Drawings\Ex\_Drainage

JOB DATE: 4/7/2025  
JOB NUMBER: 2403816  
BAR IS ONE INCH ON OFFICIAL DRAWINGS.  
IF NOT ONE INCH, ADJUST SCALE ACCORDINGLY.

NO.	DATE	BY	REVISION DESCRIPTION

HRGreen

HR GREEN - COLORADO SPRINGS  
1975 RESEARCH PARKWAY SUITE 230  
COLORADO SPRINGS, CO 80920  
PHONE: 719.300.4140  
FAX: 713.965.0044

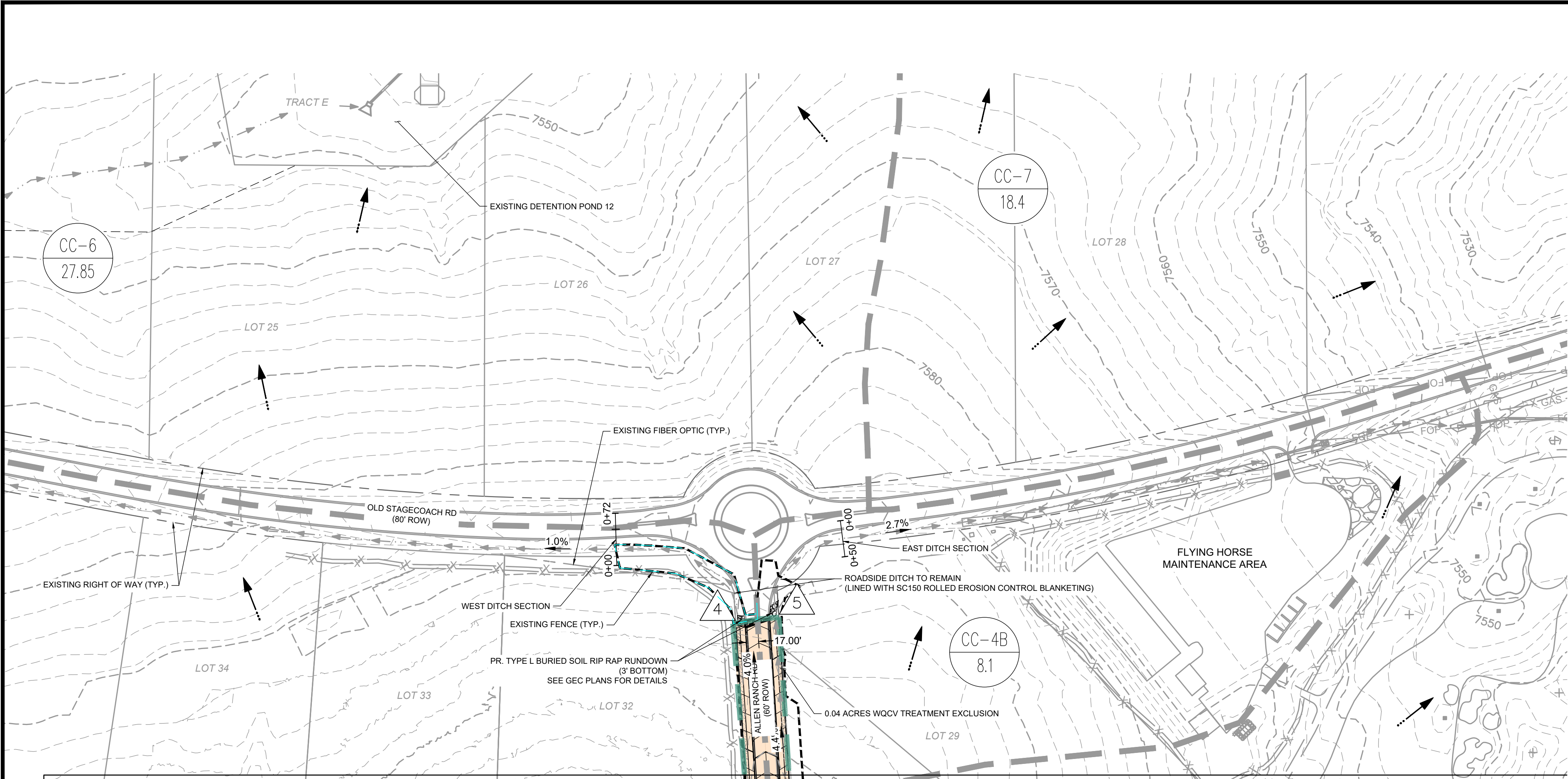
THE CLUBHOUSE AT FLYING HORSE NORTH  
FLYING HORSE COUNTRY CLUB, LLC.  
EL PASO COUNTY, CO

EXISTING CONDITIONS  
DRAINAGE MAP

SHEET NO.  
EX 2

HR GREEN Xrefs: xv-dsgn-1030; xv-row-1030; xv-uti-1030; xc-dsgn-2403816; xgl-1-dh01; xc-dsgn-030.202





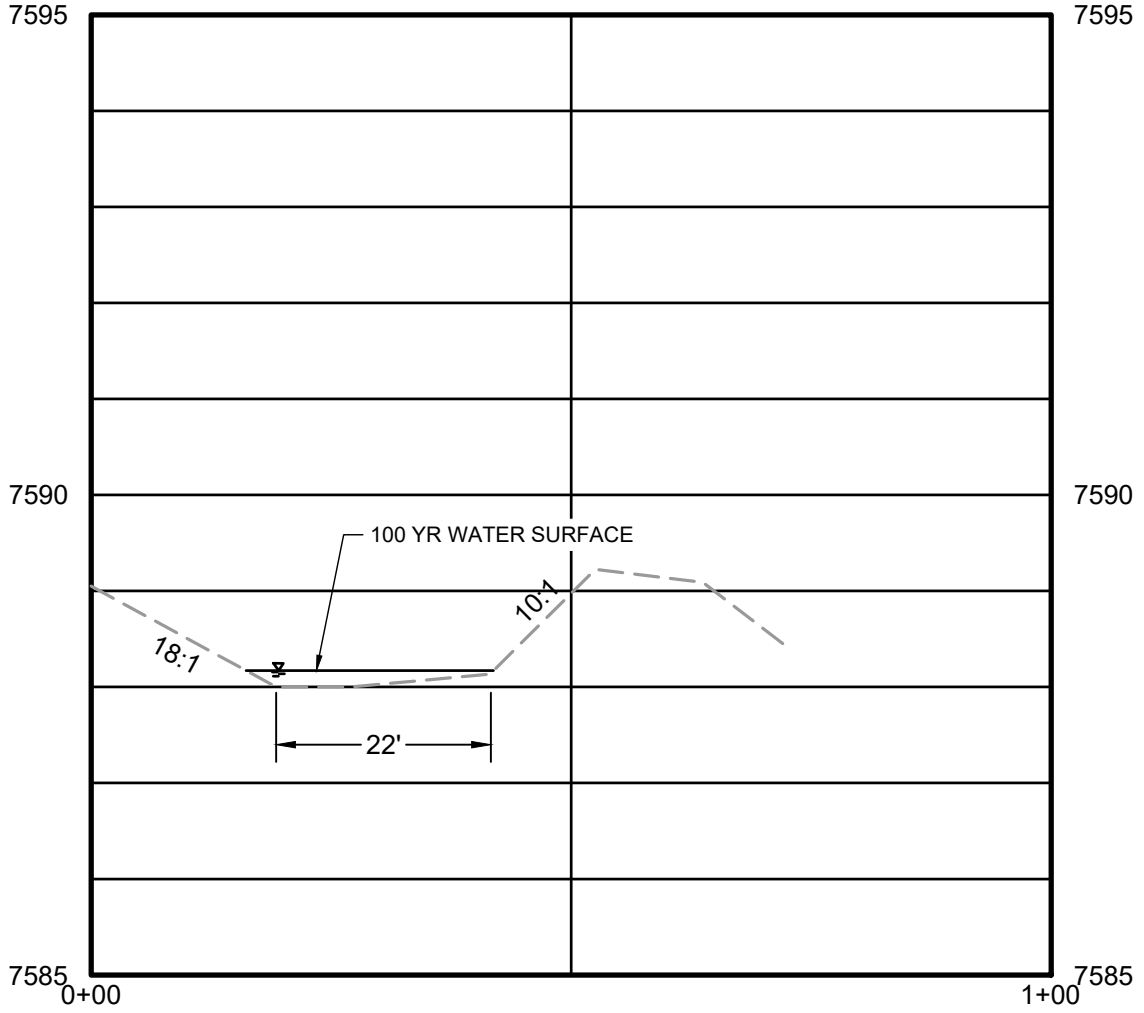
LEGEND:

EXISTING MAJOR CONTOUR  
EXISTING MINOR CONTOUR  
EXISTING STORM SEWER  
PROPOSED STORM SEWER  
EXISTING BASIN BOUNDARY  
PR. SUBBASIN BOUNDARY  
MAJOR BASIN BOUNDARY  
PROPERTY BOUNDARY  
PR. RETAINING WALL  
PR. MAINTENANCE ACCESS  
ECM EXCLUSION I.7.1.B.2.2  
(EXCLUDED ROADWAY REDEVELOPMENT)  
0.98 AC. TOTAL  
ECM EXCLUSION I.7.1.B.7  
(LAND DISTURBANCE TO UNDEVELOPED  
LAND THAT WILL REMAIN UNDEVELOPED)  
1.19 AC. TOTAL  
ECM EXCLUSION I.7.1.C.1  
(UP TO 20% OF APPLICABLE DEVELOPMENT  
SITE AREA, NOT TO EXCEED 1 ACRE)  
0.15 AC. TOTAL  
FLOW DIRECTION  
DESIGN POINT  
PROPOSED BASIN LABEL

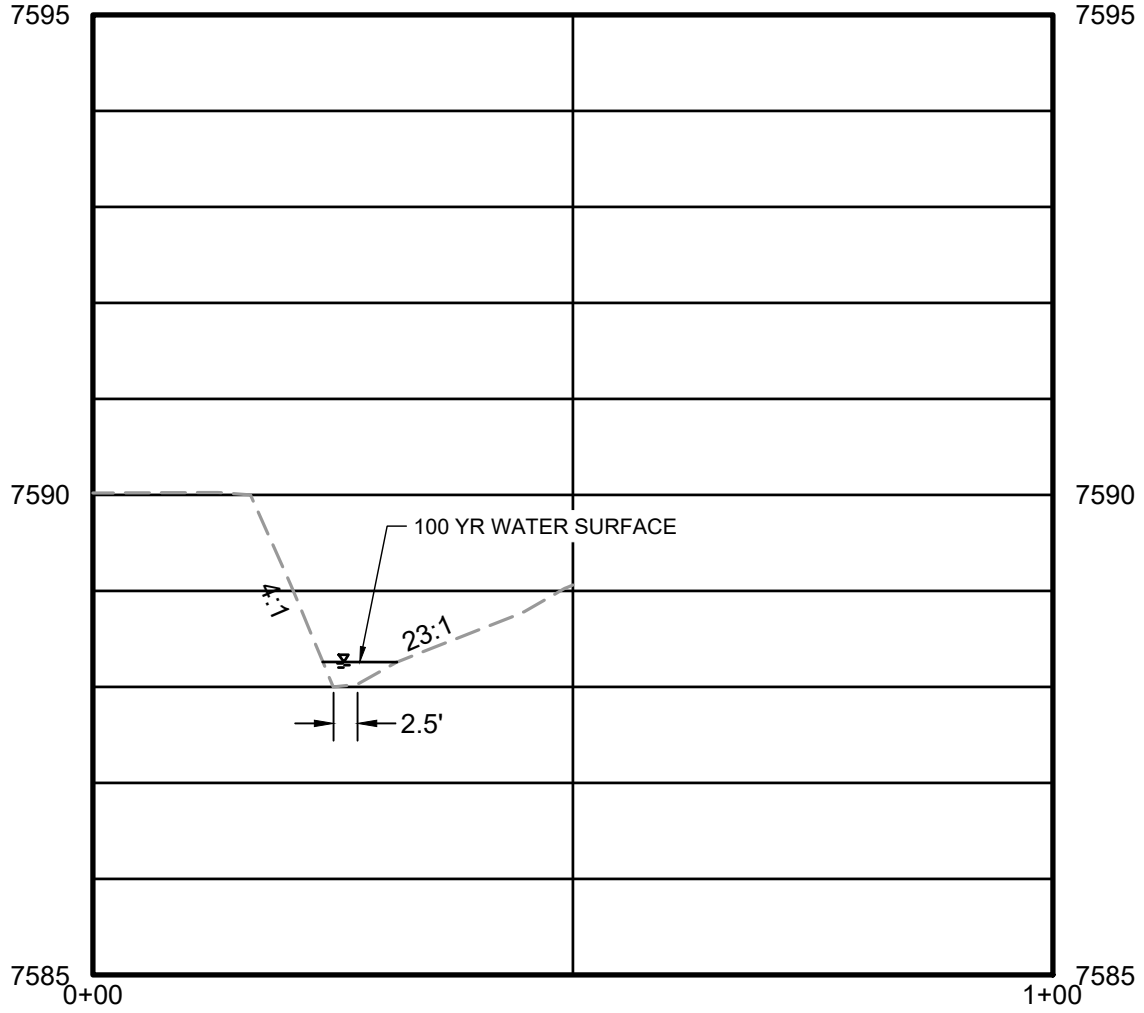
NOTES:  
1.) REFER TO "PRELIMINARY DRAINAGE REPORT FOR FLYING HORSE NORTH PRELIMINARY PLAN AND FINAL DRAINAGE REPORT FOR FLYING HORSE FILING NO. 1", APPROVED SEPTEMBER 25TH, 2018, BY CLASSIC CONSULTING FOR ENTIRE BASINS CC-5, CC-4B, CC-7, AND CC-48 DELINEATION AND CALCULATIONS.  
2.) REFER TO "FLYING HORSE NORTH FILING NO. 3 FINAL DRAINAGE REPORT", APPROVED JULY 8TH, 2024, BY HR GREEN FOR ENTIRE BASINS BS-18, BS-19, BS-21.3, BS-20.1, CC-34.4, AND CC-34.2 DELINEATIONS AND RATIONAL CALCULATIONS.

SUMMARY RUNOFF TABLE							
BASIN	AREA (ac)	% IMP.	C5	C100	Q5 (cfs)	Q100 (cfs)	POND
CC-34	0.89	26.22	0.28	0.50	1.0	2.9	F3-A
CC-34.1	15.09	5.82	0.12	0.38	6.7	36.1	F3-A
CC-34.2	1.84	100.00	0.90	0.96	4.9	8.7	F3-A
CC-34.3	1.01	40.81	0.40	0.59	1.6	3.9	F3-A
CC-34.4	3.44	91.66	0.76	0.83	7.9	14.6	F3-A
PR-2	1.66	79.32	0.72	0.83	4.8	9.1	F3-A
OS-2	0.34	100.00	0.90	0.96	1.3	2.3	F3-A
PR-3	2.16	85.28	0.77	0.86	7.1	13.3	F3-A
EX-3	0.73	2.00	0.08	0.35	0.3	18.7	F1-6
EX-4	1.33	2.00	0.08	0.35	0.5	21.3	F1-6
PR-1	0.27	90.00	0.73	0.81	1.0	1.9	F3-A
OS-3	0.71	100.00	0.90	0.96	3.2	3.9	F1-12
OS-4	0.48	100.00	0.90	0.96	2.2	3.9	F1-13
PR-4	1.48	2.00	0.08	0.35	0.5	3.3	F1-12
PR-5	1.95	2.00	0.19	0.43	1.4	5.4	F3-A

DESIGN POINT SUMMARY TABLE					
DESIGN POINT	CONTRIBUTING BASINS	SQ5 (cfs)	SQ100 (cfs)	Tributary Area (ac.)	Weighted % Impervious
1	PR-5 & CC-34.3	2.9	9.2	1.3	35.23%
1.1	CC-34, DP1, DP1.2	1.0	5.6	5.3	71.13%
1.2	CC-34.4	7.9	14.6	3.4	91.66%
1.3	CC-34.2, OS-2	6.2	11.0	2.2	100.00%
2	DP1.3, CC-34.1	30.7	79.1	28.7	35.95%
3	PR-3	7.1	13.3	2.2	85.28%
4	OS-3	3.2	5.8	0.7	100.00%
5	OS-4	2.2	3.9	0.5	100.00%
6	EX-3	0.3	18.7	0.7	2.00%
7	EX-4	0.5	21.3	1.3	2.00%
8	PR-4	0.5	3.3	1.5	2.00%
9	PR-1, PR-2	5.7	10.9	1.9	84.66%



WEST DITCH SECTION  
(SCALE: N.T.S.)  
100 YR DEPTH = 0.17'  
100 YR VELOCITY = 1.39 FT/SEC



EAST DITCH SECTION  
(SCALE: N.T.S.)  
100 YR DEPTH = 0.26'  
100 YR VELOCITY = 2.43 FT/SEC

HR GREEN Xrefs: xv-dsgn-1030; xv-row-1030; xv-util-1030; xc-dsgn-030.202; xgl-1-dh01; xc-dsgn-030.202

DRAWN BY: CVW JOB DATE: 5/19/2025  
APPROVED: RDL JOB NUMBER: 2403816  
CAD DATE: 5/20/2025  
CAD FILE: J:\2024\2403816\CAD\Drawings\CD\Drainage\Pr\_Drainage

BAR IS ONE INCH ON  
OFFICIAL DRAWINGS.  
0" = 1"  
IF NOT ONE INCH,  
ADJUST SCALE ACCORDINGLY.

NO.	DATE	BY	REVISION DESCRIPTION



HR GREEN - COLORADO SPRINGS  
1975 RESEARCH PARKWAY SUITE 230  
COLORADO SPRINGS, CO 80920  
PHONE: 719.300.4140  
FAX: 713.965.0044

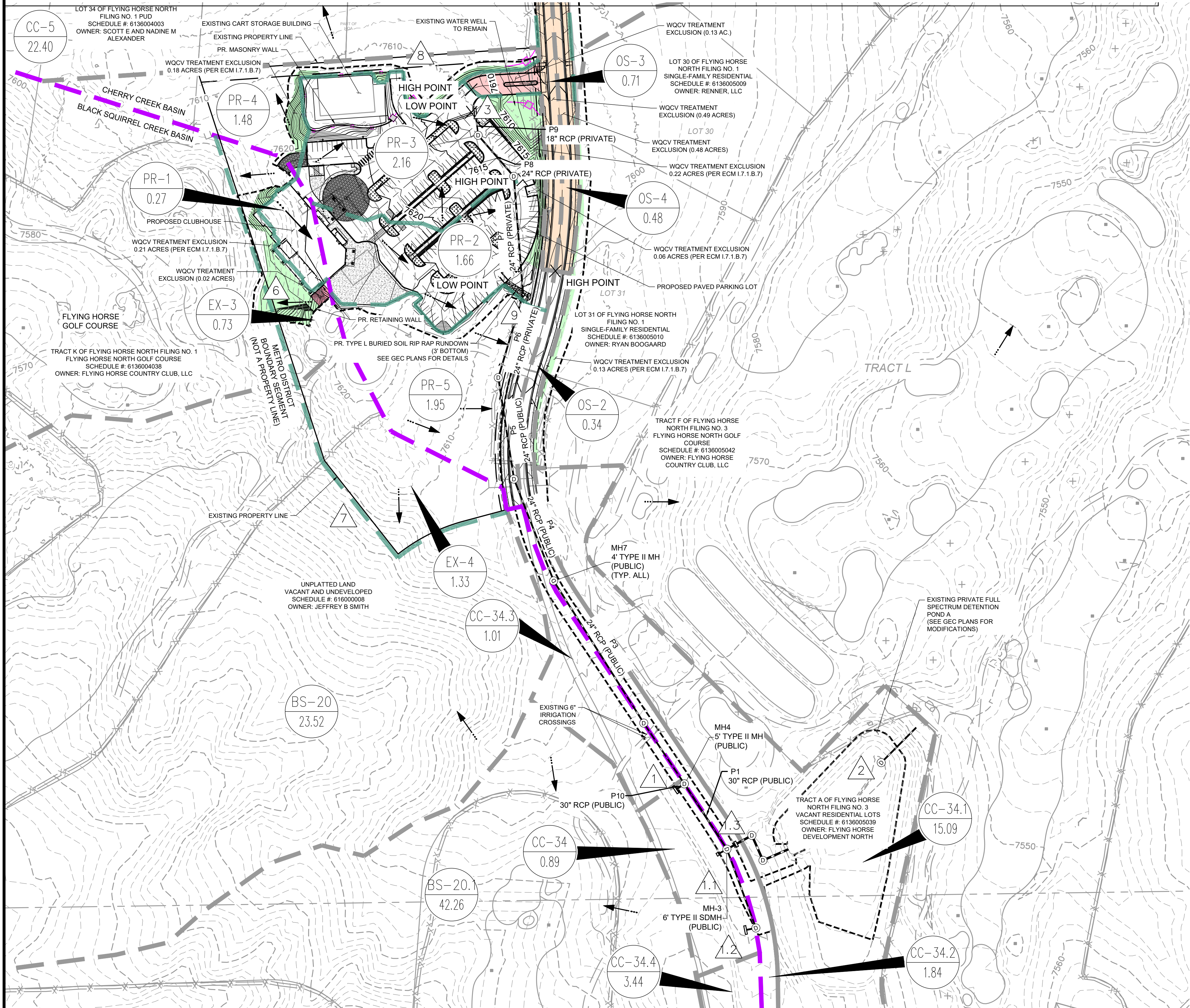
THE CLUBHOUSE AT FLYING HORSE NORTH  
FLYING HORSE COUNTRY CLUB, LLC.  
EL PASO COUNTY, CO

PROPOSED CONDITIONS  
DRAINAGE MAP

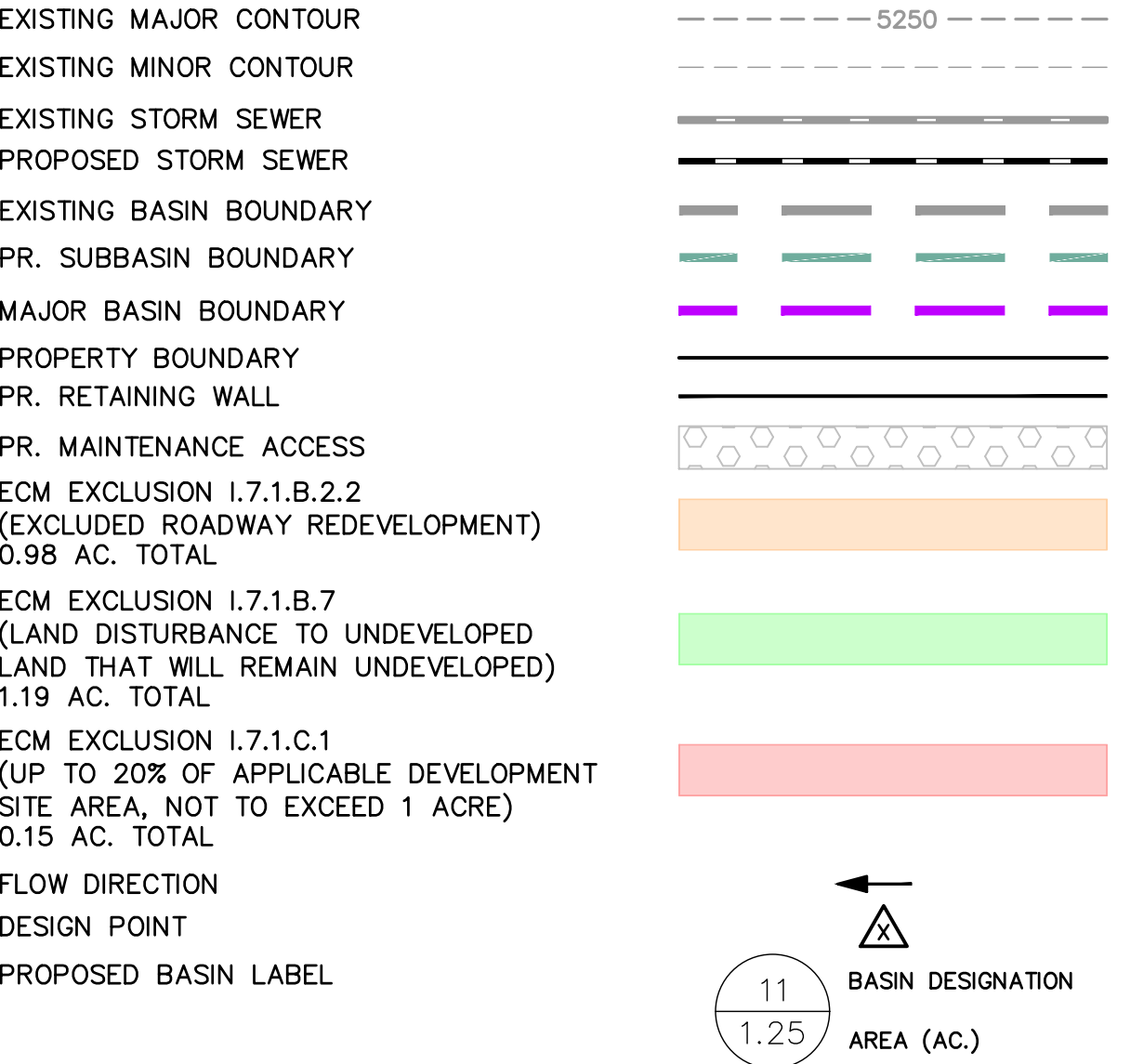
SHEET NO.  
PR 1



MATCHLINE - SEE PREVIOUS SHEET



LEGEND:



NOTES:  
1.) REFER TO "PRELIMINARY DRAINAGE REPORT FOR FLYING HORSE NORTH PRELIMINARY PLAN AND FINAL DRAINAGE REPORT FOR FLYING HORSE FILING NO. 1", APPROVED SEPTEMBER 25TH, 2018, BY CLASSIC CONSULTING FOR ENTIRE BASINS CC-5, CC-4B, CC-7, AND CC-48 DELINEATION AND CALCULATIONS.  
2.) REFER TO "FLYING HORSE NORTH FILING NO. 3 FINAL DRAINAGE REPORT", APPROVED JULY 8TH, 2024, BY HR GREEN FOR ENTIRE BASINS BS-18, BS-19, BS-21.3, BS-20.1, CC-34.4, AND CC-34.2 DELINEATIONS AND RATIONAL CALCULATIONS.

SUMMARY RUNOFF TABLE							
BASIN	AREA (ac)	% IMP.	C5	C100	Q5 (cfs)	Q100 (cfs)	POND
CC-34	0.89	26.22	0.28	0.50	1.0	2.9	F3-A
CC-34.1	15.09	5.82	0.12	0.38	6.7	36.1	F3-A
CC-34.2	1.84	100.00	0.90	0.96	4.9	8.7	F3-A
CC-34.3	1.01	40.81	0.40	0.59	1.6	3.9	F3-A
CC-34.4	3.44	91.66	0.76	0.83	7.9	14.6	F3-A
PR-2	1.66	79.32	0.72	0.83	4.8	9.1	F3-A
OS-2	0.34	100.00	0.90	0.96	1.3	2.3	F3-A
PR-3	2.16	85.28	0.77	0.86	7.1	13.3	F3-A
EX-3	0.73	2.00	0.08	0.35	0.3	18.7	F1-6
EX-4	1.33	2.00	0.08	0.35	0.5	21.3	F1-6
PR-1	0.27	90.00	0.73	0.81	1.0	1.9	F3-A
OS-3	0.71	100.00	0.90	0.96	3.2	3.9	F1-12
OS-4	0.48	100.00	0.90	0.96	2.2	3.9	F1-13
PR-4	1.48	2.00	0.08	0.35	0.5	3.3	F1-12
PR-5	1.95	2.00	0.19	0.43	1.4	5.4	F3-A

DESIGN POINT SUMMARY TABLE					
DESIGN POINT	CONTRIBUTING BASINS	SQ5 (cfs)	SQ100 (cfs)	Tributary Area (ac.)	Weighted % Impervious
1	PR-5 & CC-34.3	2.9	9.2	1.3	35.23%
1.1	CC-34, DP1, DP1.2	1.0	5.6	5.3	71.13%
1.2	CC-34.4	7.9	14.6	3.4	91.66%
1.3	CC-34.2, OS-2	6.2	11.0	2.2	100.00%
2	DP1.3, CC-34.1	30.7	79.1	28.7	35.95%
3	PR-3	7.1	13.3	2.2	85.28%
4	OS-3	3.2	5.8	0.7	100.00%
5	OS-4	2.2	3.9	0.5	100.00%
6	EX-3	0.3	18.7	0.7	2.00%
7	EX-4	0.5	21.3	1.3	2.00%
8	PR-4	0.5	3.3	1.5	2.00%
9	PR-1, PR-2	5.7	10.9	1.9	84.66%

HR GREEN Xrefs: xv-dsgn-1030; xv-row-1030; xv-util-1030; xc-dsgn-2403816; xgl-1-dh01; xc-dsgn-030.202

DRAWN BY: CVW JOB DATE: 5/19/2025  
APPROVED: RDL JOB NUMBER: 2403816  
CAD DATE: 5/20/2025  
CAD FILE: J:\2024\2403816\CAD\DWG\IC\Drainage\Pr\_Drainage

BAR IS ONE INCH ON OFFICIAL DRAWINGS.  
IF NOT ONE INCH, ADJUST SCALE ACCORDINGLY.

NO.	DATE	BY	REVISION DESCRIPTION

HRGreen  
HR GREEN - COLORADO SPRINGS  
1975 RESEARCH PARKWAY SUITE 230  
COLORADO SPRINGS, CO 80920  
PHONE: 719.300.4140  
FAX: 713.965.0044

THE CLUBHOUSE AT FLYING HORSE NORTH  
FLYING HORSE COUNTRY CLUB, LLC.  
EL PASO COUNTY, CO

PROPOSED CONDITIONS  
DRAINAGE MAP

SHEET NO.  
PR 2