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Flying Horse North Filing No. 7
Final Drainage Report

August 2026

Prepared For:

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Engineer's Statement

This report and plan for the drainage design of the development, Flying Horse North Filing No. 7, 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

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 Development, LLC

_____

Drew Balsick Date

Vice President

Flying Horse Development, 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 J. Palmer, P.E. Date

County Engineer/ECM Administrator

Final Drainage Report – Flying Horse North

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 the subdivision to be platted. The FDR is to 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, the planned storm water management for the Flying Horse North development for Filing No. 7.

The 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 is included in Appendix E.

A more recent Master Development Drainage Plan (MDDP) was prepared by HR Green Development, LLC. and was approved by the County in September of 2022, entitled *Flying Horse North Master Development Drainage Plan* latest revision date of September 9, 2022. This MDDP also referenced the Classic Consulting report from 2018 for master drainage design of the proposed Filing No. 7 area.

The items discussed in this FDR include final plat layout, land uses, and drainage patterns for Flying Horse North Filing No. 7. Included in this report are final hydrologic and hydraulic drainage calculations and design as required for the final design of the development of the single-family residential estate lot areas. 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

Flying Horse North is split by the Arkansas River Basin and South Platte Basin. Within the South Platte Basin, the site is within the East Cherry Creek Drainage Basin. A Drainage Basin Planning Study (DBPS) does not currently exist for the East Cherry Creek Drainage Bain. This FDR is consistent with the 2022 MDDP which complies with standard El Paso County regulations regarding drainage within this corridor.

The Filing No. 7 area falls within the East Cherry Creek Basin and consists of 47 single single-family residential estate lots of 2.5-acres minimum area. Proposed developed areas are provided with water quality treatment and full spectrum detention (FSD) prior to release offsite apart from excluded areas per county criteria. Areas that are tributary to Flying Horse Filing No. 7 have no increase in required stormwater quality or detention volumes. There is no proposed basin transfer and therefore the historical drainage patterns are to remain in place including at the roadway and lots at the major basin delineation.

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

Flying Horse North Filing No. 7 is in El Paso County jurisdiction and is located within the larger Flying Horse North subdivision. The overall Flying Horse North development is bordered by Highway 83 to the west, Black Forest Road to the east, Cathedral Pines to the south, and High Forest Ranch to the north. The greater Flying Horse North area contains approximately 1,459 acres within the whole Section 36, Township 11 South, Range 66 West of the Sixth Principal Meridian, and a portion of Section 30 and 31, Township 11 South, and Range 65 West of the Sixth Principal Meridian.

This FDR covers Flying Horse North Filing No. 7 and includes offsite upstream and downstream areas to analyze existing and proposed drainageways and facilities. The Filing No. 7 area totals approximately 267 acres including 47 total 2.5-acre single family residential estates lots and 2 tracts for drainage and open space use. The development includes the single-family residential estate lots, two full spectrum detention pond facilities and the proposed public roadways of Scotch Court, Backswing Trail, Bogey Court, Long Iron Trail, Rainmaker Way, and an extension of Rubble Drive. The 60’ width rights-of-way consist of 28’ width asphalt paved rural local roadways with 2’ gravel shoulders and roadside ditches, public improvement easements, public utility easements, and trail easements as needed.

Filing No. 7 was previously assessed in the 2018 Classic Consulting report with a similar land use plan that included 2-acre single-family residential estate lots and roadways. This report assesses the lots as 2.5-acre lots. The layout shown in the developed conditions hydrology map of this report and the corresponding construction drawings differs slightly from the approved FDR/PDR with adjusted roadway alignments and lot lines. However, the drainage patterns, typical roadway section, and land use densities are similar. A more recent 2025 PDR for the Major PUD Amendment to amend future Filings 6, 7, & 8 (PUDSP252) was prepared by HR Green Development, LLC. and is referenced in this FDR to demonstrate compliance with criteria and future planning for stormwater infrastructure.

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

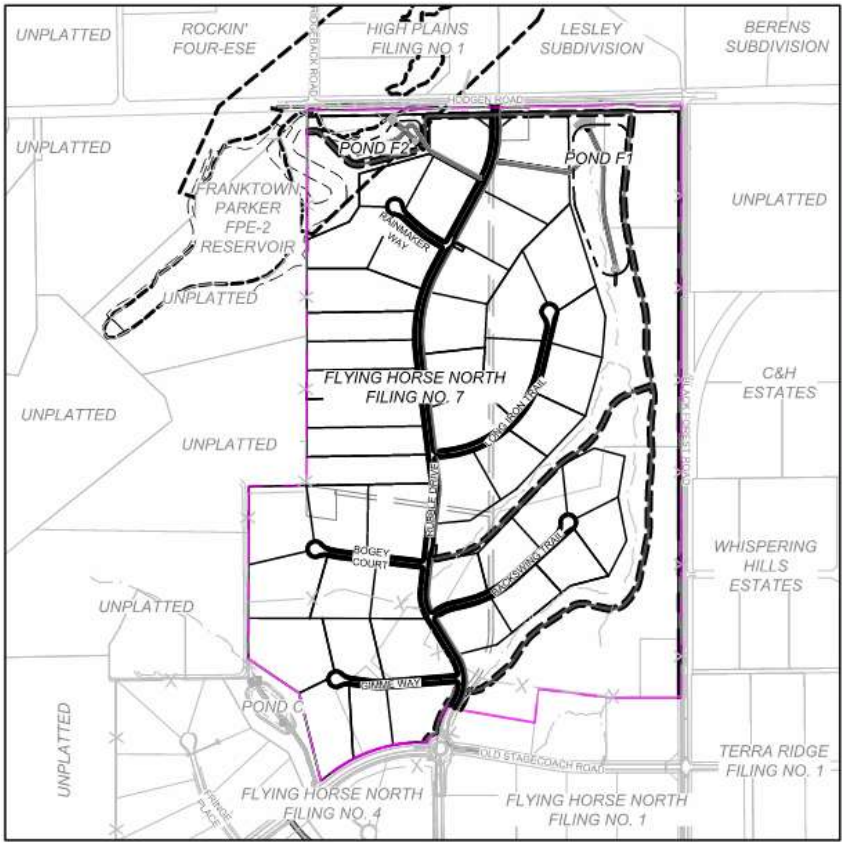


Figure 1 – Vicinity Map

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 08041C0305G and 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 Master Development Drainage Report prepared by HR Green Development, LLC. – latest revision September 9, 2022

Flying Horse North Major PUD Amendment Filings 6, 7, & 8 - Preliminary Drainage Report prepared by HR Green Development, LLC. – latest revision September 2025

g. Applicable Criteria and Standards

Per El Paso County Criteria Manual, flows from the proposed site will be limited to historic flows to maintain the stability of the existing channels within the drainage basins. The final drainage plan follows the Drainage Criteria Manual for El Paso County which refers to the City of Colorado Springs Drainage Criteria Manuals as amended. Criteria within the County and City manuals refer to the Mile High Flood District manuals, particularly for extended detention basin design.

A distinct difference in the 2018 FDR/PDR and the PDR Amendment report (PUDSP252) 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 future development of Filing No. 5 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. The resultant hydraulics in this report are similar to that of the approved 2018 FDR/PDR on a basin-by-basin basis, however, any differences in calculated stormwater runoff will be discussed. The difference in methodologies between the 2018 report and this report result in larger cumulative stormwater runoff values reported for the minor and major storm events. Due to the more conservative nature of the Rational Method, cumulative peak flow rates are greater than that of the 2018 FDR/PDR for the minor and major storm events for downstream design points.

HR Green has discussed this discrepancy in hydrologic methodology with El Paso County engineering staff and it has been expressed that the chosen method for hydrologic computations is the Rational Method for this report to ensure sound design of the storm infrastructure for Filing No. 7 including swales, channels, culvert pipes, inlets, and roadway capacities. Due to the use of the NRCS Curve Number method in the 2018 FDR/PDR, the peak runoff values in this report are larger than that of the approved 2018 FDR/PDR. To complete a fair assessment of the impacts downstream of the site, existing hydrology calculations have been completed and included in Appendix B. There are no anticipated negative impacts to downstream offsite infrastructure because of this development as all other drainage parameters remain consistent with the 2018 FDR/PDR.

II. Project Characteristics

a. Location in Drainage Basin, Offsite Flows, Size

Filing No. 7 is located within the East Cherry Creek Basin. There is not a current planning study of the drainage basin, but generally it slopes from southwest to northeast. The basin eventually flows into the South Platte River.

Within the portion of the East Cherry Creek Basin investigated with this report, one drainage basin has been designated within the 2025 PDR for the Major PUD Amendment (PUDSP252), Basin F. Runoff from basins east of Rubble Drive flowing north are captured and treated by Pond F1 and basins west of Rubble drive flowing north are captured and treated by Pond F2.

This Filing No. 7 FDR utilizes similar tributary areas, runoff coefficients (when comparing the NRCS Curve Number method and the Rational Method), and percent imperviousness for respective sub-basins and downstream detention facilities compared to 2018 Classic Consulting FDR/PDR and the PDR

Amendment (PUDSP252). Any deviation in the sub-basin area, coefficient, or percent imperviousness is due to slight roadway alignment adjustments for the final design as compared to the preliminary layout in the 2018 report. Any change in the peak runoff numbers as compared to the 2018 report is due to the change in hydrologic computation methodology as discussed in a previous section of this report. Due to these differences in the computational methodology between the previously approved 2018 FDR/PDR and the values being reported in this report, additional analysis of existing conditions has been completed on the entire site. The existing conditions flow values have been added to Appendix B.

It is important to note that while there is an increase in peak runoff for these basins as compared to the 2018 report, there is a discrepancy in methodology. The difference in flow rates provided in the table may have significant differences as the basin area being analyzed in one report may be significantly bigger than in the other report. The proposed improvements will be designed using the updated values and pond sizing, which relies on a historic model, in the CUHP / SWMM to ensure that the developed flow rates are less than the historical flow rates. It is shown in the PDR for the Major PUD Amendment that the total flowrates being released off-site into Cherry Creek basin are being reduced overall based on preliminary stormwater planning, and this FDR complies with that preliminary report.

b. Compliance with DBPS

This FDR is in general conformance with the current drainage flows of the East Cherry Creek Basin. Flying Horse North will construct multiple full spectrum detention facilities to limit the effects of development and mimic natural flow patterns. The Filing No. 7 development will follow historic drainage patterns and utilize the existing natural swales throughout the area for conveyance of stormwater runoff toward respective proposed detention facilities including proposed private FSD ponds (Pond F1 and Pond F2).

c. Site Characteristics

Per the NRCS web soil survey, the site is made up entirely of Type B soils. Filing No. 7 is within the East Cherry Creek Basin and consists of Peyton sandy loam and Peyton-Pring complex. See Appendix A for the NRCS soil map.

The current ground cover in Filing No. 7 is short to mid-grass prairie grasslands and former farmland which consists of non-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; however, small tertiary tributaries are within the site currently and function to convey flows to unnamed tributaries. These informal drainage ways are assessed within this report for stormwater runoff capacity and water surface elevations during the 100-year event as future development of single-family residential lots with basement or walkout conditions is considered. Roadside swales are included as a part of the typical roadway section and are assessed within sub-basins to ensure that swale and culvert pipe capacities are met and do not result in excessive pooling in the roadway sections, per code.

The existing minor drainage channels within the site are planned to be maintained to the maximum extent possible. These channels will continue to be used for conveyance of storm drainage flows in their natural state. The limits of construction and disturbance plan for no significant earthwork alterations to the

existing minor drainage channels that would affect the drainage patterns or capacity of the sections throughout the filing as they are proven to have sufficient capacities for their respective tributary areas and to maintain the existing vegetation. These natural tertiary channels do not have the requisite velocities or scouring to justify permanent control measures such as turf rolled matting.

Proposed drainageways including roadside swales and swales through lots are described within this report with parameters to demonstrate compliance with open channel design criteria and capacities. Culvert pipes are sized to convey upstream flow under proposed roadways and maintain historic drainage patterns. Roadside swales are prescribed matting products for various areas in order to minimize erosion and sediment runoff downstream per hydraulic analysis.

e. Existing and proposed land uses

The existing Filing No. 7 area is open rangeland within a prairie area consisting of native grasses, weeds, as well as baren pervious soil. The Filing No. 7 area contains existing utilities including gas, water, stormwater, and electric. No existing structures are within the Filing No. 7 area, however berms and stock ponds have been previously graded. A short section of Rubble Drive north of Old Stagecoach Road is existing from Filing No. 1.

The 2018 Classic Consulting PDR/FDR assumed 2-acre single-family residential estate lot development within the filing area. This report includes the final design layout of 47 total 2.5-acre lots with rural roadway sections and 2 tracts for drainage and open space, which is in accordance with the PDR Amendment (PUDSP252). Any deviations in basin areas, land use acreages, and resultant composite coefficients are shown within this report and demonstrated to meet downstream stormwater runoff and volume capacities for proposed and existing facilities.

III. Hydrologic Analysis

a. Major Basins and Sub-basins

Major Basin Description

Per FEMA FIRM 08041C0305G and 08041C0315G (eff. 12/7/2018), Flying Horse North has the East Cherry Creek run through the Filing No. 7 area. Currently, FEMA shows a LOMR effective April 4th, 2019 Base Flood Elevations and Zone A. Per the El Paso County Land Development Code Chapter 8 Section 8.4.2.B.1.e.i, the base flood elevations for Zone A will be determined once the platted lots are solidified and are confirmed within 300-ft of the current floodplain designation. A draft floodplain, which is not yet effective and subject to change, has been added to the drainage maps in Appendix F. Certification of the flood elevations will be via the FEMA CLOMR/LOMR process or Floodplain Certification Letter.

The site has been divided into several major drainage basins where each basin is tributary to a full spectrum detention pond facility with the exception of basins that drain directly offsite which have supporting water quality runoff reduction calculations. These basins and associated sub-basins are described in more detail in the next section of this report.

Existing Subbasin Description

The existing conditions for Filing No. 7 have been analyzed and the delineated basins presented in the Existing Conditions Map in Appendix F are described as below. Basins F3, F4, F5, F6, F7, F8, F9, and all OS basins remain unchanged from the PDR Amendment.

Existing Basin F1: 12.18 acres, 2.5 acre residential (Q_5 = 7.3 cfs, Q_{100} = 30.0 cfs)

Runoff generated in this basin sheet flows across existing topography and concentrates in the existing roadside ditches along Rubble Drive and Old Stagecoach Road. Flows from this basin ultimately travel through design point F1, an existing public 30-inch culvert under Old Stagecoach Road and outfall to basin F4 to the north as concentrated runoff.

Existing Basin F2: 30.64 acres, undeveloped / 2.5 acre residential (Q_5 = 16.5 cfs, Q_{100} = 71.7 cfs)

Runoff generated in this basin sheet flows across existing topography and concentrates in the existing roadside ditches along Rubble Drive and Old Stagecoach Road. Flows within the roadside ditches flow to the east and ultimately enter design point F2, the existing public 36-inch culvert, which outfalls to the north in basin F3.

Existing Basin F3: 37.49 acres, undeveloped / 2.5-acre residential (Q_5 = 12.1 cfs, Q_{100} = 68.7 cfs)

Within this basin is undeveloped land, 2.5-acre single family residential lots, and public roadway. Flows from basin F2 combine with flows from basin F3. Runoff generated in this basin sheet flows generally from the south to the north over existing topography through native grass. Sheet flow is concentrated in one of two existing natural drainage channels within the basin. The natural channel on the east flows generally north to an existing stock pond within the center of the basin. The center stock pond releases concentrated flow into the natural drainage channel which flows to the other stock pond at the north of the basin, design point F3. Within the natural drainage channel on the west, flows move northeast directly to design point F3. Concentrated flow at design point F3 is discharged to the natural drainage channel flowing north once the stock pond fills to the spillway elevation.

Existing Basin F4: 76.98 acres, undeveloped / roadway (Q_5 = 16.1 cfs, Q_{100} = 112.8 cfs)

Runoff generated in this basin sheet flows generally from the south to the north over existing topography through native grass till it is concentrated in one of the two existing natural tertiary channels. The basin receives offsite flow from culverts that pass under Black Forest Road from basins OS1, OS2, and OS3. On the west side of the basin, an existing natural tertiary channel begins and flows to the northeast. On the east side of the basin, the existing natural tertiary channel continues north from design point F4. The east and west channels within the basin converge at design point F5.

Existing Basin F5: 79.17 acres, undeveloped (Q_5 = 16.6 cfs, Q_{100} = 121.7 cfs)

Runoff generated in this basin sheet flows generally from the south to the north over existing topography through native grass till it is concentrated in an existing natural tertiary channel. The basin receives offsite flow from culverts that pass under Black Forest Road from basins OS4 and OS5. The existing natural tertiary channel continues north from design point F5 through the basin. The flows from this basin reach design point F5, where concentrated flow is discharged under Hodgen Road through an existing public 54-inch reinforced concrete culvert.

Existing Basin F6: 9.76 acres, undeveloped (Q_5 = 2.7 cfs, Q_{100} = 19.9 cfs)

Runoff generated in this basin sheet flows generally from the east to the west over existing topography through native grass till it is concentrated in an existing natural tertiary channel. Flows from this basin collect at design point F6.

Existing Basin F7: 24.74 acres, undeveloped (Q_5 = 6.4 cfs, Q_{100} = 47.1 cfs)

Runoff generated in this basin sheet flows generally from the south to the northwest over existing topography through native grass. The flows from this basin outfall at design point F7.

Existing Basin F8: 25.35 acres, undeveloped / reservoir / stock pond (Q_5 = 6.5 cfs, Q_{100} = 48.0 cfs)

Runoff generated in this basin sheet flows generally from the south to the north over existing topography through native grass till it is concentrated in an existing natural tertiary channel. The channel directs some flow within the basin to an existing stock pond. Flows from this basin ultimately outfall via sheet flow at design point F8 towards the existing Franktown Parker FPE-2 Reservoir.

Existing Basin F9: 17.60 acres, undeveloped (Q_5 = 4.8 cfs, Q_{100} = 35.5 cfs)

Runoff generated in this basin sheet flows generally from south to north over existing topography through native grass then flows to design point F9. Concentrated flow at design point F9 is discharged through an existing public dual 48-inch reinforced concrete culvert.

Existing Basin T1: 5.08 acres, undeveloped / 2.5-acre residential (Q5 = 2.9 cfs, Q100 = 12.0 cfs)

Within this basin is undeveloped land, 2.5-acre single family residential lots, and public roadway. Runoff generated in this basin flows generally from the south to the north over existing topography through native grass. Sheet flow concentrates in the roadside ditch along the south side of Old Stagecoach Road where it flows to the north to design point T1. Concentrated flow at design point T1 is discharged through an existing public 24-inch reinforced concrete culvert.

Existing Basin T2: 3.92 acres, undeveloped / 2.5-acre residential (Q5 = 2.1 cfs, Q100 = 9.4 cfs)

Within this basin is undeveloped land, 2.5-acre single family residential lots, and public roadway. Runoff generated in this basin flows generally to the east over existing topography through native grass. Concentrated flow is released offsite at design point T2 through an existing public 24-inch CMP culvert under Black Forest Road.

Existing Basin OS1: 2.99 acres, 5.0 acre single family residential (Q_5 = 1.5 cfs, Q_{100} = 7.4 cfs)

Runoff generated in this offsite basin sheet flows from east to west across existing topography through native grass until reaching design point OS1, an existing public 24-inch CMP culvert under Black Forest Road which discharges concentrated flow into Basin F4 onsite.

Existing Basin OS2: 4.65 acres, 5.0 acre single family residential (Q_5 = 2.4 cfs, Q_{100} = 11.4 cfs)

Runoff generated in this offsite basin sheet flows from east to west across existing topography through native grass until reaching design point OS2, an existing public 24-inch CMP culvert under Black Forest Road which discharges concentrated flow into Basin F4 onsite.

Existing Basin OS3: 4.46 acres, 5.0 acre single family residential (Q_5 = 2.3 cfs, Q_{100} = 11.1 cfs)

Runoff generated in this offsite basin sheet flows from east to west across existing topography through native grass until reaching design point OS3, an existing public 24-inch CMP culvert under Black Forest

Road which discharges concentrated flow into Basin F4 onsite. This basin remains unchanged from the PDR Amendment.

Existing Basin OS4: 7.34 acres, 5.0 acre single family residential (Q_5 = 3.7 cfs, Q_{100} = 17.9 cfs)

Runoff generated in this offsite basin sheet flows from east to west across existing topography through native grass until reaching design point OS4, an existing public 24-inch CMP culvert under Black Forest Road which discharges concentrated flow into Basin F5 onsite. This basin remains unchanged from the PDR Amendment.

Existing Basin OS5: 11.09 acres, 5.0 acre single family residential (Q_5 = 5.4 cfs, Q_{100} = 25.8 cfs)

Runoff generated in this offsite basin sheet flows from east to west across existing topography through native grass until reaching design point OS5, an existing public 24-inch CMP culvert under Black Forest Road which discharges concentrated flow into Basin F5 onsite. This basin remains unchanged from the PDR Amendment.

Proposed Subbasin Description

The following basins are presented on the Developed Conditions Drainage Map within the appendix and are described as follows:

Proposed Basin F1: 12.18 acres, residential (2.5 acre lots) (Q_5 = 7.3 cfs, Q_{100} = 30.0 cfs)

Remains unchanged from the existing condition

Proposed Basin F2: 30.64 acres, undeveloped / residential (2.5 acre lots) (Q_5 = 16.5 cfs, Q_{100} = 71.7 cfs)

Remains unchanged from the existing condition

Proposed Basin F3: 38.36 acres, undeveloped / 2.5 acre residential (Q_5 = 20.2 cfs, Q_{100} = 88.3 cfs)

Runoff from Basin F2 and Basin F10.1 combine with the flows from Basin F3. The existing stock ponds within the basin are removed in the developed condition, which includes restoration of the flow through the existing tertiary drainage channels. Runoff generated in this basin sheet flows across existing topography and becomes concentrated in existing or restored tertiary channels within the basin that flow from south to north. A proposed 54” RCP culvert allows for flows to continue under a trail crossing. The tertiary channels combine at design point F3, where the channel continues to the north. Water quality treatment of this basin is provided by the downstream Full Spectrum Detention Pond F1. This basin remains unchanged from the PDR Amendment.

Proposed Basin F4: 5.08 acres, residential (2.5 acre lots) (Q_5 = 2.6 cfs, Q_{100} = 10.8 cfs)

Sheet flow from the east half of the Rubble Drive roadway concentrates in the roadside ditch and flows north. Runoff sheet flows over existing topography and the Backswing Trail roadway until it concentrates within the roadside ditches which flow to the northeast along both sides of Backswing Trail. Runoff from this basin ultimately reaches design point F4 where flows are conveyed through a proposed private 18-inch RCP culvert to Basin F5. Water quality treatment of this basin is provided by the downstream Full Spectrum Detention Pond F1. This basin remains unchanged from the PDR Amendment.

Proposed Basin F5: 50.79 acres, undeveloped / residential (2.5 acre lots) (Q_5 = 18.9 cfs, Q_{100} = 97.4 cfs)

This basin accepts flows from Basins OS-1, OS-2, and OS-3 via existing public culverts running under Black Forest Road. Runoff enters Basin F5 from Basin F3 and Basin F4 as concentrated flow within existing natural tertiary channels. The existing stock pond at the north end of the basin is removed in the developed condition, which restores the flow through the existing tertiary drainage channel by re-grading the area and removing the existing berm. Runoff generated in this basin sheet flows across existing topography until it becomes concentrated in existing natural tertiary channels that flow from the south to the north. Concentrated runoff from Basin F4 is conveyed into an existing natural tertiary channel within Basin F5 via a proposed swale within a drainage easement. Water quality treatment of this basin is provided by the downstream Full Spectrum Detention Pond F1. This basin remains unchanged from the PDR Amendment.

Proposed Basin F6: 15.08 acres, residential (2.5 acres lots) (Q_5 = 7.2 cfs, Q_{100} = 29.5 cfs)

Runoff within the basin sheet flows over existing topography until it concentrates on the north roadside ditch along Long Iron Trail. Sheet flow from the Long Iron Trail roadway concentrates in the northern and southern roadside ditches which flow to the northeast. The drainage from this basin collects at design point F6 where it is conveyed via a proposed swale to Basin F7. Water quality treatment of this basin is provided by the downstream Full Spectrum Detention Pond F1. This basin remains unchanged from the PDR Amendment.

Proposed Basin F7: 13.13 acres, undeveloped / residential (2.5 acre lots) (Q_5 = 5.1 cfs, Q_{100} = 26.5 cfs)

This basin accepts off-site flows from Basin OS-4 via a public culvert running under Black Forest Road and on-site channelized flows via the existing natural drainage channel from Basin F5 and via the proposed swale from Basin F6. Runoff generated in this basin sheet flows across existing topography until becoming concentrated in the existing tertiary channel or proposed swale that flow to design point F7, where the combined runoff outfalls into the Full Spectrum Detention Pond F1 via dual 48” RCP culverts.

Proposed Basin F8: 14.88 acres, residential (2.5 acre lots) (Q_5 = 7.1 cfs, Q_{100} = 29.2 cfs)

Runoff from the east half of the Rubble Drive roadway sheet flows until it concentrates in the roadside ditch and flows north. Stormwater outside of the roadway sheet flows across existing topography and concentrates in the roadside ditch which flows to the north. The concentrated flow moves north until being directed east to the Full Spectrum Detention Pond F1 via a proposed swale at design point F8 on the northern edge of the basin.

Proposed Basin F9: 27.32 acres, undeveloped / residential (2.5 acre lots) / pond (Q_5 = 8.4 cfs, Q_{100} = 50.4 cfs)

Basin F9 consists of residential land, undeveloped land, and detention Pond F1. Runoff generated in this basin sheet flows to the proposed Full Spectrum Detention Pond F1, where it is detained and treated before outfalling through a proposed outlet structure. Runoff outfalls from the site to the north through an existing public 54-inch RCP culvert under Hodgen Road.

Proposed Basin F10.1: 6.77 acres, residential (2.5 acre lots) (Q_5 = 4.2 cfs, Q_{100} = 17.1 cfs)

Runoff generated in this basin sheet flows across existing topography and proposed roadways and is collected in proposed roadside ditches along Scotch Court and the western half of Rubble Drive. Runoff from Basin F1 combines with the runoff from Basin F10.1 and flows to the north in the roadside ditch along the west side of Rubble Drive until ultimately flowing to design point F10.1 where a proposed public culvert under Rubble Drive directs concentrated flow to Basin F3. Water quality treatment of this basin is provided by the downstream Full Spectrum Detention Pond F1.

Proposed Basin F10.2: 13.87 acres, residential (2.5 acre lots) (Q_5 = 8.5 cfs, Q_{100} = 35.1 cfs)

Runoff generated in this basin sheet flows across existing topography and proposed roadways and is collected in proposed roadside ditches along Scotch Court, Bogey Court, and the western half of Rubble Drive. Runoff generated within the basin ultimately flows to design point F10.2 where a proposed public culvert under Rubble Drive directs concentrated flow to Basin F5. Water quality treatment of this basin is provided by the downstream Full Spectrum Detention Pond F1.

Proposed Basin F10.3: 7.73 acres, residential (2.5 acre lots) (Q_5 = 3.8 cfs, Q_{100} = 15.7 cfs)

Runoff generated in this basin sheet flows across existing topography and proposed roadways and is collected in proposed roadside ditches along Bogey Court, Rainmaker Way, and the western half of Rubble Drive. Runoff generated within the basin ultimately flows to design point F10.3 where a proposed swale within Basin F11 begins. Water quality treatment of this basin is provided by the downstream Full Spectrum Detention Pond F2.

Proposed Basin F11: 7.73 acres, residential (2.5 acre lots) / pond (Q_5 = 4.9 cfs, Q_{100} = 20.2 cfs)

Runoff generated in this basin sheet flows across existing topography and is concentrated in proposed swales within the basin that direct combined runoff from Basins F10N and F11 to the proposed Pond F2 at design point F11 where water quality treatment is provided.

Proposed Basin F12: 7.52 acres, undeveloped / 2.5 acre residential / pond (Q_5 = 2.8 cfs, Q_{100} = 16.5 cfs)

Basin F12 consists of undeveloped land and detention Pond F2. Runoff collected in this basin is detained and treated in the detention pond before outfalling off-site through a proposed outlet structure. Runoff ultimately outfalls offsite to the north through an existing public 48-inch RCP culvert under Hodgen Road.

Proposed Basin F13: 20.75 acres, 2.5 acre residential (Q_5 = 12.0 cfs, Q_{100} = 49.3 cfs)

Runoff generated in this basin flows over existing topography through native grass within the basin before flowing offsite to the west. The disturbed area within this is designated as separate pervious area (SPA) that does not contribute to the WQCV.

Proposed Basin F14: 25.29 acres, reservoir / 2.5 acre residential (Q_5 = 12.7 cfs, Q_{100} = 52.3 cfs)

Runoff generated in this basin flows over existing topography through native grass within the basin before flowing offsite to the west. The existing stock pond at the west end of the basin is removed in the developed condition, which restores the flow through the existing tertiary drainage channel by re-grading the area and removing the existing berm. The disturbed area within this is designated as separate pervious area (SPA) that does not contribute to the WQCV.

Proposed Basin F15: 2.53 acres, residential (2.5 acre lots) / pond (Q_5 = 1.6 cfs, Q_{100} = 6.5 cfs)

Runoff generated in this basin flows over existing topography through native grass within the basin before flowing offsite to the north. The disturbed area within this is designated as separate pervious area (SPA) that does not contribute to the WQCV.

Proposed Basin F16: 0.93 acres, roadway (Q_5 = 4.0 cfs, Q_{100} = 7.2 cfs)

Runoff generated in this basin sheet flows over the roadway and concentrates in the roadside ditches along Rubble Drive before flowing offsite to the north. The runoff is split by the road centerline and offsite outfall is the southern roadside ditch of Hodgen Road. The area in this basin is excluded from water quality treatment per El Paso County ECM I.7.1.C.1. This exclusion allows for to up to 20 percent of the applicable development site, not to exceed 1 acre, to be excluded from the runoff capture requirement due to the area not being practicable to capture to drain towards control measures.

Proposed Basin F17: 4.12 acres, residential (2.5 acre lots) (Q_5 = 2.5 cfs, Q_{100} = 10.4 cfs)

Runoff generated in this basin flows over existing topography through native grass within the basin before flowing offsite to the north. The disturbed area within this is designated as separate pervious area (SPA) that does not contribute to the WQCV.

Proposed Basin F18: 9.37 acres, residential (2.5 acre lots) (Q_5 = 5.6 cfs, Q_{100} = 23.1 cfs)

Runoff generated in this basin flows over existing topography through native grass within the basin before flowing offsite to the west. The disturbed area within this is designated as separate pervious area (SPA) that does not contribute to the WQCV.

Proposed Basin OS-1, OS-2, OS-3, OS-4, OS-5: remain consistent with the existing conditions

Offsite Design Point Comparison

Offsite Outfall	Ex. Area (ac.)	Design Points (Ex.)	Pr. Area (ac.)	Design Points (Pr.)	Ex. Q5 (cfs)	Pr. Q5 (cfs)	Ex. Q100 (cfs)	Pr. Q100 (cfs)	
C	41.7	C1-C4	45.6	Pond C Out, C4, C5	19.3	3.7	79.3	30.2	*
T	9.0	T1-T2	9.0	T1-T2	4.8	4.8	20.9	20.9	
R	1.1	R1	1.1	R1	3.4	3.4	6.6	6.6	
F1	270.0	F1-F5, OS1-OS5	263.7	Pond F1 Out, F16, F17	70.7	7.1	330.7	295.6	
F2	17.6	F9	26.4	Pond F2 Out, F15, F16	20.6	5.8	98.1	27.7	
CUMULATIVE OFFSITE FLOW COMPARISON					**118.8**	**24.8**	**535.6**	**381.0**	

*__Note__: Q values obtained from approved Flying Horse North Filing No. 4 FDR (SF2422) SWMM Modeling

b. Water Quality and Detention Facilities

There are two Full Spectrum Detention ponds that are proposed within this filing. Full Spectrum Detention (FSD) is a design concept introduced by the Mile High Flood District (MHFD, Urbonas and Wulliman 2005) that provides better control of the full range of runoff rates that pass through detention facilities than the conventional multi-stage concept. This concept also provides some mitigation of increased runoff volumes by releasing a portion of the increased runoff volume at a low rate over an extended period of time. Site detention ponds are designed as FSDs to provide the required volume stages for Water Quality

Capture Volume (WQCV), Excess Urban Runoff Volume (EURV), and the 100-year stage (flood control volume). In FSDs, the flood volume is equal to the entire volume and is inclusive of the EURV and the WQCV.

The MHFD-Detention workbook is utilized to design the outlet structures with orifice plates and restrictor plates. The outlet structures and plates are designed to achieve the target release rates of the various stages: WQCV at 40 hours, and EURV and 100-year release rates within the requisite 120 hours, with the goal of being in the range of 52 to 72 hours, as feasible for the runoff conditions. The developed condition outlet flow rates are not to exceed predeveloped conditions, and over-detention is provided within the two ponds to account for sub-basins that drain directly offsite without capture per the existing drainage patterns of the site.

The ponds include the required infrastructure such as concrete forebays, an emergency spillway with rip-rap weirs, concrete trickle channels, and a 2.5-foot depth micro-pool attached to the outlet structure. Ponds include 15'-20' width maintenance paths with vehicular access to the bottom of pond to access forebays and outlet structures for continued maintenance. The pathways have access from the public right-of-way and proper turning radii and longitudinal and cross slopes for a maintenance vehicle. The ponds include 1.0-foot of freeboard to the emergency spillway berm of the pond with the crest elevation at or above the 100-year water surface elevation. The spillways are sized with a trapezoidal weir for the 100-year inflow with rip-rap prescribed for the outflow velocity as energy dissipation.

The proposed ponds are described below.

Pond F1 (Design Point F9) provides WQCV and EURV for the stormwater runoff from the F basins that are tributary to it and includes over-detention to account for nearby sub-basins that drain directly offsite to ensure that the released stormwater to downstream properties and infrastructure is equal to or less than historical runoff. This is confirmed by comparing the routed peak flows of similar basins in the historic condition, to the routed peak flows inclusive of detention in the developed condition.

Pond F1 includes two concrete forebays sized for the required volume of the inflow, a 4-foot width concrete trickle channel with 6" vertical concrete curb, a 2.5-foot depth concrete micro pool, and an outlet structure that is includes a top trash rack, orifice plate, and restrictor plate on the outlet pipe.

Pond F2 (Design Point F12) provides WQCV and EURV for the stormwater runoff from the F basins that are tributary to it and includes over-detention to account for nearby sub-basins that drain directly offsite to ensure that the released stormwater to downstream properties and infrastructure is equal to or less than historical runoff. This is confirmed by comparing the routed peak flows of similar basins in the historic condition, to the routed peak flows inclusive of detention in the developed condition.

Pond F2 includes a concrete forebay sized for the required volume of the inflow, a 4-foot width concrete trickle channel with 6" vertical concrete curb, a 2.5-foot depth concrete micro pool, and an outlet structure that is includes a top trash rack, orifice plate, and restrictor plate on the outlet pipe.

Water Quality Treatment Summary Table							
Basin ID	Total Area (ac)	Total Proposed Disturbed Area (ac)	Area Trib to Pond F1 (ac)	Area Trib to Pond F2 (ac)	Area Trib to Pond C (ac)	Disturbed Area Excluded from WQ per ECM App I.7.1.C.1 (ac)	SPA Area
OS1	2.99						
OS2	4.65						
OS3	4.46						
OS4	7.34						
OS5	11.09						
C3	21.13	0.31			0.31		
C5	2.27						
F1	12.18						
F2	30.64						
F3	38.36	2.50	2.50				
F4	5.08	3.91	3.91				
F5	50.79	2.40	2.40				
F6	15.08	4.82	4.82				
F7	13.13	1.41	1.41				
F8	14.88	3.35	3.35				
F9	27.32	9.42	9.42				
F10.1	6.77	1.39	1.39				
F10.2	13.87	3.97	3.97				
F10.3	7.73	4.74	4.74				
F11	7.73	5.03		5.03			
F12	7.52	3.82		3.82			
F13	20.75	0.86					0.86
F14	25.29	0.52					0.52
F15	2.53	0.29					0.29
F16	0.93	0.93				0.93	
F17	4.12	0.05					0.05
F18	9.37	0.19					0.19
T1	5.08	0.00					
T2	3.92	0.00					
Total	377.00	49.91	37.91	8.85	0.31	0.93	1.91

Min Required Area to Receive WQ (ac)	Total Proposed Disturbed Area (ac)	Total Proposed Treated Area (ac)	Total Proposed Disturbed Area Excluded from WQ (ac)	Net Treatment (ac)
47.07	49.91	47.07	2.84	0.00

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.

The proposed development will consist of 47 2.5-acre single-family residential estate lots which are assumed at a percent imperviousness of 11% per the County ECM Table 3-1 Typical Values of Percent Impervious within Appendix L of the ECM which provides guidance for larger rural lot developments. Existing golf course areas are to remain undisturbed and utilize a land use category of “lawn” with a percent imperviousness of 2% per the County ECM Table 6-6 land use table. Composite coefficients, rainfall intensities, and runoff flow rates are calculated on a Rational Method spreadsheet and provided within the Appendix. As discussed previously, the Rational Method used in this report will 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. Design points within Filing No. 4 are designed per the findings of this report which utilizes the Rational Method and CUHP/SWMM modeling.

Reference to the PDR Amendment set of calculations and spreadsheets is included 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 Filing No. 7; however, small tertiary tributaries are within the site currently and function to convey flows to unnamed tributaries. These tertiary drainage ways are analyzed within this report to assess the water surface elevation within the swales during the 100-year storm event and determine buildability of lots adjacent to these sections. Roadside swales are to be constructed at a minimum to meet the typical roadway section (4:1 for 10' and 3:1 for 9' resulting in a total swale depth of 2.5'). The roadside swales are assessed along the roadways that capture sub-basins and result in cumulative flow.

All the proposed roadside swales will be installed with lining of either P300 or TMAX per scouring calculations. The existing channels, labeled as Section F-F and Section G-G on the Drainage Maps do not require armoring based on the proposed runoff velocities. See Appendix C for all swale and channel lining calculations.

b. Storm Sewer Infrastructure and Culvert Pipes

The Filing No. 7 development consists of rural development with 47 total 2.5-acre single family residential estate lots and rural roadway sections with roadside swales. The storm infrastructure within these areas consist of public culvert pipes for roadway crossings and consideration for future public culvert pipes for future driveways for each lot. Culvert calculations and graphics are provided within the Appendix of this report to demonstrate culvert capacities and show any roadway/driveway overtopping as a result of peak flows. The culverts are designed to have full capacity of the minor (5-year) storm event and a maximum of 4" of roadway or driveway pooling during the major (100-year) storm event.

V. Environmental Evaluations

a. Significant Existing or Potential Wetland and Riparian Areas Impacts

There are no significant impacts to potential wetland and riparian areas with this report.

b. Stormwater Quality Considerations and Proposed Practices

As part of the development, two full spectrum detention facilities will be installed to provide water quality treatment for the development. 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. Additionally, when possible, the existing natural drainage ways will be used to convey stormwater to more closely mimic the natural hydrologic and hydraulic cycle. Some of the drainage ways will be used to convey water to the ponds and others will receive water from the ponds and in both scenarios will provide additional water quality benefits.

On site practices for the estate homes includes direct discharge of roof and hardscape runoff to the surrounding landscaped areas. This would include discharge of the gutters onto landscape areas vs.

directly connecting to storm sewer and as discussed above as well using natural ditches and swales where it is logical and makes sense to convey stormwater in lieu of storm sewer piping.

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 permit 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 withing 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. At this time the project does not propose any direct development within the floodplain, however storm infrastructure will discharge into the existing FEMA channel.

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 filing includes the land use categories of 2.5-acre single-family residential and open space or pond area. Both land uses have relatively minor imperviousness and runoff coefficients. The developed areas for the homes as designated by pad areas on the plans are disbursed with open land areas of vegetation and trees between which provide runoff reduction into the pervious soil.

Step 2 – Stabilize Drainageways: The existing tertiary drainage ways are assessed for stormwater runoff capacity, velocity, and shear stress and channel lining is proposed per County criteria. Any altered drainage ways will be designed in a manner that provides water quality benefits through infiltration and the removal of pollutants via phytoremediation. Vegetation and/or matting will also be selected to stabilize the drainage ways by reducing the velocity of flows and decreasing any scour. These improvements help stabilize drainageways and minimize erosion and sediment runoff. Roadside ditches are stabilized swales by way of compaction per the roadway typical section and are also prescribed any required seeding, erosion control blanketing, and/or matting.

Step 3 – Provide WQCV: Runoff from this development is treated through capture and slow release of the WQCV via full spectrum detention ponds that are designed per current El Paso County DCM V2 and the MHFD. Proposed ponds F1 and F2 provide WQCV for their respective tributary basins. 1.91 acres of the site are excluded from WQCV treatment requirements as they are separate pervious areas (SPA) which

have a WQCV of 0 ft^3. Per El Paso County ECM I.7.1.C.1.A, 0.93 acres of disturbed area on site is excluded from water quality treatment and flows directly off site.

Step 4 – Consider the need for Industrial and Commercial BMP's: A site specific storm water quality and erosion control plan and narrative will be prepared with subsequent land use approvals prepared in conjunction with the report prior to any construction. Site specific temporary source control BMPs as well as permanent 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 use.

VI. Drawings

Please 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.

VII. Drainage and Bridge Fees

The East Cherry Creek Basin does not currently have a Drainage Basin Fee.

VIII. Permanent Control Measure Cost Estimates

FHN F7 Pond F1 Cost Estimate				
Item	**Unit**	**Qty.**	**Unit Estimate**	**Total Estimate**
Outlet Structure & Micropool	EA	1	$37,500.00	$37,500.00
Forebay	EA	2	$22,500.00	$45,000.00
Concrete Trickle Channel	LF	987	$105.00	$103,635.00
Concrete Run Down	EA	1	$32,500.00	$32,500.00
Overflow Rip Rap Spillway	CY	520	$44.00	$22,880.00
Forebay Rip Rap	CY	60	$47.00	$2,820.00
Overflow Spillway Type II Bedding	TN	50	$37.50	$1,875.00
Handrail	LF	45	$100.50	$4,522.50
Stabilization Bedding	TN	150	$37.50	$5,625.00
Concete Pump Truck	EA	6	$875.00	$5,250.00
Road Base	CY	969	$71.00	$68,799.00
30" RCP	LF	113	$132.00	$14,968.80
48" RCP	LF	62	$263.00	$16,174.50
			Total	**$361,549.80**

FHN F7 Pond F2 Cost Estimate				
Item	Unit	Qty.	Unit Estimate	Total Estimate
Outlet Structure & Micropool	EA	1	$37,500.00	$37,500.00
Forebay	EA	1	$30,000.00	$30,000.00
Concrete Trickle Channel	LF	527	$105.00	$55,335.00
Concrete Run Down	EA	1	$32,500.00	$32,500.00
Overflow Rip Rap Spillway	CY	210	$44.00	$9,240.00
Forebay Rip Rap	CY	25	$47.00	$1,175.00
Overflow Spillway Type II Bedding	TN	50	$37.50	$1,875.00
Handrail	LF	27	$100.50	$2,713.50
Stabilization Bedding	TN	150	$37.50	$5,625.00
Concete Pump Truck	EA	6	$875.00	$5,250.00
Road Base	CY	678	$71.00	$48,138.00
18" RCP	LF	52	$88.00	$4,602.40
			Total	**$233,953.90**

IX. Summary

Flying Horse North Filing No. 7 is a 266.9 acre filing within Flying Horse North that consists of 47 total single-family residential estate lots, two tracts for drainage and open spaces use, and right-of-way for Bogey Court, Backswing Trail, Scotch Court, Long Iron Trail, Rainmaker Way, and Rubble Drive.

Full Spectrum Detention facilities are proposed to provide water quality and detention to release the stormwater at or below historical rates. Pond F1 is located at the northern boundary of the filing, east of Rubble Drive. Pond F1 is located at the northern boundary of the filing, west of Rubble Drive. Water quality treatment is provided for all areas of development that do not fall under El Paso County ECM exclusions.

The Filing No. 7 final design is assessed for stormwater capacity of roadway sections, roadside swales and the existing tertiary drainage ways to ensure that development of the 2.5-acre single-family residential estate lots will not be negatively impacted by drainage conditions, including existing and proposed altered areas for the roadway and lot construction phases.

All County and MHFD drainage design standards are met. It is anticipated that there will be no negative impacts to downstream and surrounding developments and facilities due to the development of Filing No. 7.

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 (MHFD-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

Flying Horse North Master Development Drainage Plan, HR Green Development, LLC., September 2022

Flying Horse North Irrigation Reservoir Embankment Design Report, Classic Consulting Engineers and Surveyors, latest revision June 2018, County approved on September 25, 2018

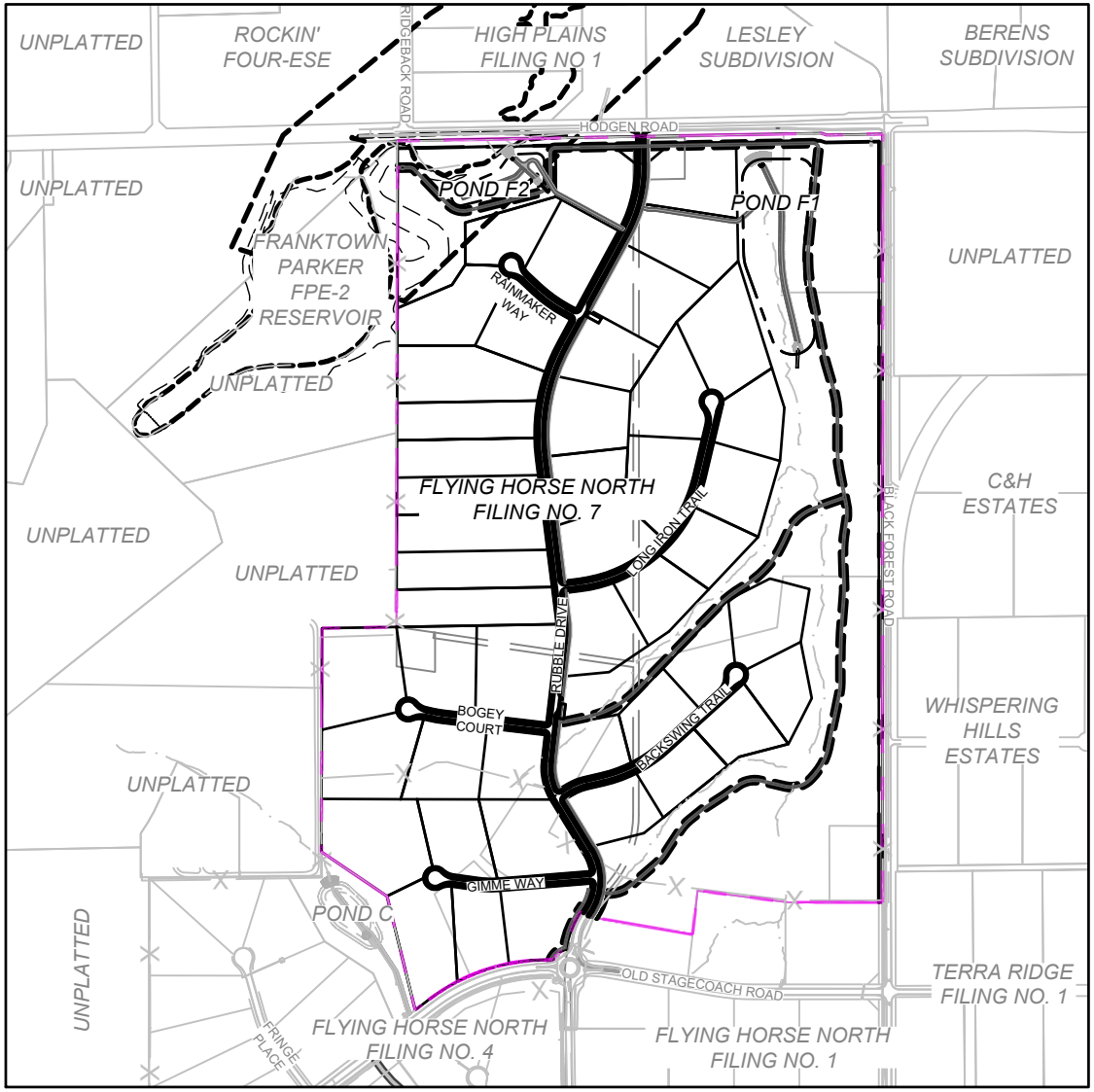
Black Squirrel Drainage Basin Planning Study (DBPS), URS Consultants, January 1989

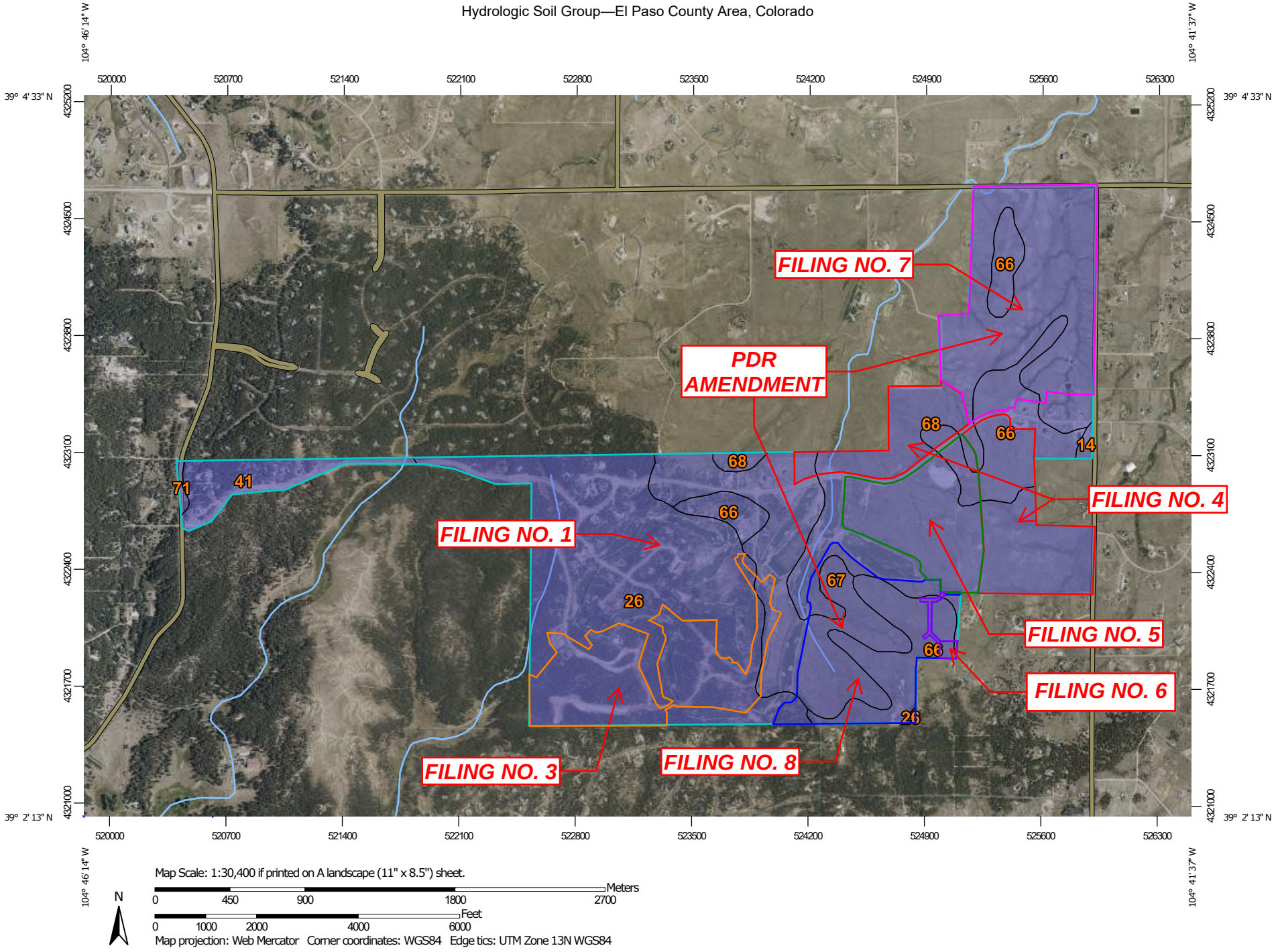
Flying Horse North Filing No. 4 Final Drainage Report, HR Green Development, LLC., September 2024.

Flying Horse North Major PUD Amendment Preliminary Drainage Report, HR Green Development, LLC., November 2025.

APPENDIX A – VICINITY MAP, SOIL MAP, FEMA MAP

FLYING HORSE NORTH FILING NO. 7
VICINITY MAP




104° 46' 14" W
104° 41' 37" W
39° 4' 33" N
39° 2' 13" N
520000
520700
521400
522100
522800
523500
524200
524900
525600
526300
4325200
4324500
4323800
4323100
4322400
4321700
4321000
FILING NO. 7
PDR AMENDMENT
FILING NO. 4
FILING NO. 1
FILING NO. 5
FILING NO. 6
FILING NO. 3
FILING NO. 8
66
68
14
71
41
67
26
Map Scale: 1:30,400 if printed on A landscape (11" x 8.5") sheet.
N
Meters
0 450 900 1800 2700
Feet
0 1000 2000 4000 6000
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

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

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

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

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

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

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 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—Aug 4, 2024

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
14	Brussett loam, 1 to 3 percent slopes	B	3.6	0.2%
26	Elbeth sandy loam, 8 to 15 percent slopes	B	521.0	32.8%
41	Kettle gravelly loamy sand, 8 to 40 percent slopes	B	53.1	3.3%
66	Peyton sandy loam, 1 to 5 percent slopes	B	224.0	14.1%
67	Peyton sandy loam, 5 to 9 percent slopes	B	216.2	13.6%
68	Peyton-Pring complex, 3 to 8 percent slopes	B	567.2	35.7%
71	Pring coarse sandy loam, 3 to 8 percent slopes	B	3.0	0.2%
Totals for Area of Interest			**1,588.3**	**100.0%**

NOTES TO USERS

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

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

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

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

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

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

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

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

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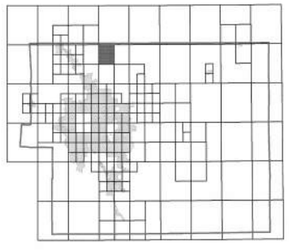
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El Paso County Vertical Datum Offset Table

Flooding Source	Vertical Datum Offset (ft)

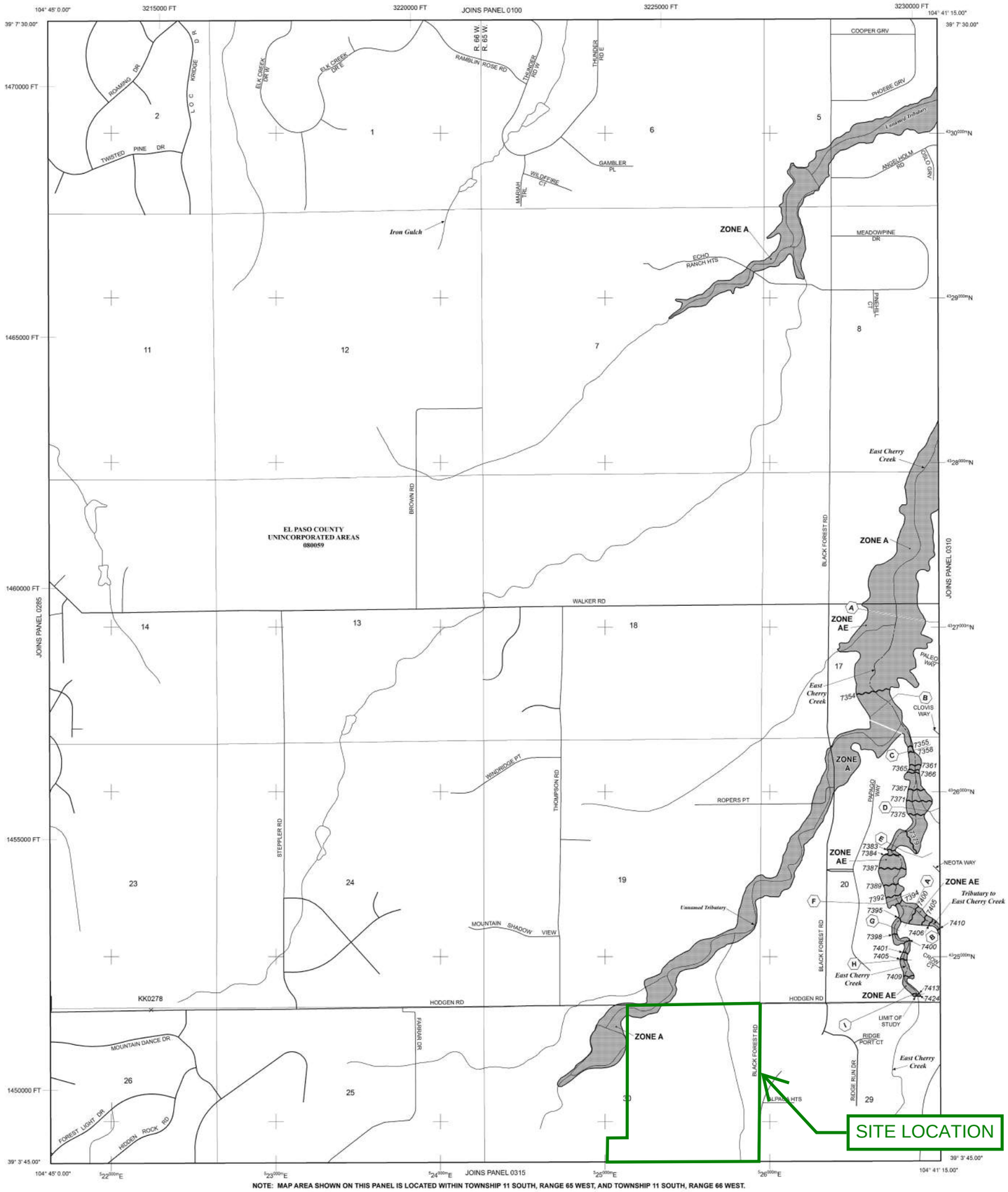
REFER TO SECTION 3.3 OF THE EL PASO COUNTY FLOOD INSURANCE STUDY FOR STREAM BY STREAM VERTICAL DATUM CONVERSION INFORMATION

Panel Location Map



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



NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 11 SOUTH, RANGE 65 WEST, AND TOWNSHIP 11 SOUTH, RANGE 66 WEST.

LEGEND

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

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

ZONE A No Base Flood Elevations determined.
ZONE AE Base Flood Elevations determined.
ZONE AH Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR Special Flood Hazard Area Formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99 Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

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

OTHER FLOOD AREAS

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

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

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

- Floodplain boundary
- Floodway boundary
- Zone D Boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

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

- A — A — Cross section line
- 23 — 23 — Transect line
- 97° 07' 30.00", 32° 22' 30.00" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
- 4275000mN — 1000-meter Universal Transverse Mercator grid ticks, zone 13
- 6000000 FT — 5000-foot grid ticks: Colorado State Plane coordinate system, central zone (FIPSZONE 0502), Lambert Conformal Conic Projection
- DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 — River Mile

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

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
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MAP SCALE 1" = 1000'
500 0 1000 2000 FEET
300 0 300 600 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0305G

FIRM

FLOOD INSURANCE RATE MAP

EL PASO COUNTY, COLORADO
AND INCORPORATED AREAS

PANEL 305 OF 1300

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
EL PASO COUNTY	080059	0305	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
08041C0305G

MAP REVISED
DECEMBER 7, 2018

Federal Emergency Management Agency

NOTES TO USERS

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

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

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

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

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

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

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

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

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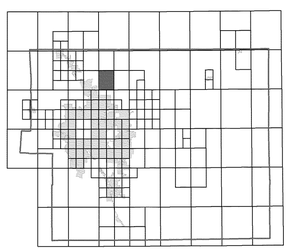
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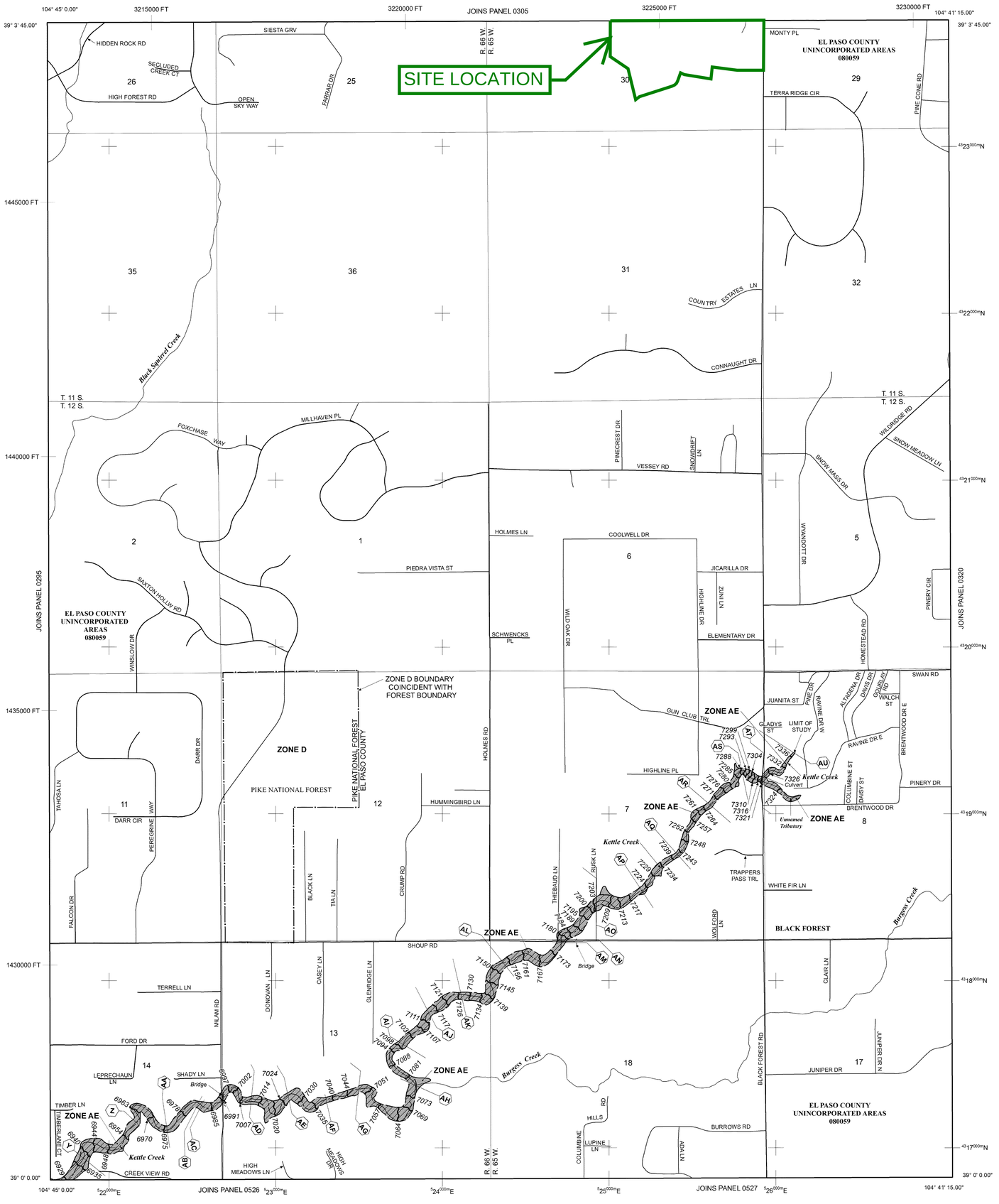
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NFIP

PANEL 0315G

NATIONAL FLOOD INSURANCE PROGRAM

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

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MAP NUMBER 08041C0315G

MAP REVISED DECEMBER 7, 2018

Federal Emergency Management Agency

Drainage Basins

El Paso County
Colorado

Legend

- Drainage Basins Source: Muller Engineering Company (1988)
- US Interstate Highways
- US Highways
- Colorado State Highways
- Major Roadways
- Local Streets & Roads

Creeks

- Perennial
- Intermittent
- Lakes & Reservoirs
- Summits
- Unincorporated Urban Areas
- Incorporated Cities
- Military
- Forest
- County Lines

N W E S

Miles

0 0.5 1 2 3 4 5

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Douglas County
Elbert County
Teller County
Lincoln County
Fremont County
Pueblo County

SITE LOCATION

Upper Monument Creek FOMO5800
Monument Rock FOMO5000
Dirty Woman Creek FOMO5200
Jackson Creek FOMO4400
Black Forest FOMO4200
Beaver Creek FOMO4600
Monument Branch FOMO3800
Black Squirrel Creek FOMO3600
West Cherry Creek CYCY0400
East Cherry Creek CYCY0200
West Kiowa Creek KIKI0200
East Kiowa Creek KIKI0400
Bijou Creek BIBI0200
Upper Big Sandy Creek BGBG1400
Lenard BGBG1200
Antelope Creek BGBG0800
Simla BGBG0400
Ramah BGBG0600
Calhan BGBG1000
Mustang Creek BGBG0200
Upper Black Squirrel CHBS2000
Upper Bracket Creek CHBR0600
North Fork HOHO0400
Pike National Forest
Air Force Academy FOMO3200
USAF Academy
Kettle Creek FOMO3000
Bennett Ranch CHWS1200
Geick Ranch CHMS0400
La Vega Ranch CHBR0400
Horse Creek HOHO0600
Pine Creek FOMO2800
South Pine Creek FOMO2600
Dry Creek FOMO2400
Cottonwood Creek FOMO2200
Falcon CHWS1400
Hook And Line Ranch CHBS1800
Baggett CHBR0200
Little Horse Creek HOHO0200
Steels Fork HOPO1000
Upper Fountain FOFO7600
Cheyenne Mountain Zoo
Cheyenne Park
Cascade
Douglas Creek FOMO1000
Templeton Gap FOMO1200
Sand Creek FOFO4000
Solbers Ranch CHWS0800
Haegler Ranch CHMS0200
Curtis Ranch CHWS1000
West Big Springs Creek CHBG0200
Upper Big Springs Creek CHBG0400
Rush HOPO0800
Candelaria FOFO5800
Williams Canyon FOFO7200
Manitou Reservoir FOFO7400
MANITOU SPRINGS
COLORADO SPRINGS
Shooks Run FOFO4400
Livestock Company CHWS0400
West Squirrel CHWS0600
Ellicott
Yoder
Rush
Ellicott CHBS1600
Lower Big Springs Creek CHBS1400
Telephone Exchange CHWS0200
Ellicott Consolidated CHBS1200
Upper Pond Creek HOPO0600
Lower Pond Creek HOPO0400
Ruxton Creek FOFO7000
Sutherland Creek FOFO6400
Upper Beaver Creek BEBE0400
Bear Creek FOFO4800
Peterson AFB
Peterson Field FOFO3400
Jimmy Camp Creek FOFO2000
Upper East Chico CHEC0400
Schriever AFB
Crows Roost CHBS1000
Drennan CHBS0400
Middle East Chico CHEC0200
Truckton
Southwest Area FOFO4600
Fishers Canyon FOFO3600
Windmill Gulch FOFO3000
Big Johnson FOFO2600
Fort Carson FOFO2200
Upper Williams Creek FOWI0600
Upper Chico Creek CHCH1600
Upper Dry Squirrel CHDS0200
Upper Williams Tributary FOWI0400
West Chico Tributary CHCH1200
Haynes Creek HAHA0600
St.lukes HOPO0200
Lower Black Squirrel CHBS0600
Squirrel Creek CHBS0200
Little Fountain Creek FOFO1800
Calhan Reservoir FOFO1400
Chico Creek CHCH1400
FOUNTAIN
Fort Carson
Lower Williams Creek FOFO1000
Lower Williams Tributary FOWI0200
Lower Dry Squirrel CHBS0400
East Kramer KRKR0600
Sand Canyon FOFO1600
Lower East Chico CHCH0800
Kramer Creek KRKR0400
Turkey Creek TUTU0200
East Haynes HAHA0400
Hammer Ranch CHCH0600
Finch Ranch CHCH0400
Windmill CHCH0200
West Haynes HAHA0200
West Kramer KRKR0200
Sand Creek FOFO0600
Williams Ranch FOFO0400
Midway Ranch FOFO0800
Red Creek BEBE0200
West Chico Creek CHCH0600
Young Hollow FOFO0200

APPENDIX B – HYDROLOGIC CALCULATIONS

FLYING HORSE NORTH FILING NO. 7
EXISTING CONDITIONS
EL PASO COUNTY, COLORADO

Calc'd by:	**CMD**
Checked by:	**RDL**
Date:	**11/11/2025**

SUMMARY RUNOFF TABLE

BASIN	AREA (ac)	% IMP.	C_5	C_{100}	Q_5 (cfs)	Q_{100} (cfs)
OS1	2.99	7.0	0.14	0.39	1.5	7.4
OS2	4.65	7.0	0.14	0.39	2.4	11.4
OS3	4.46	7.0	0.14	0.39	2.3	11.1
OS4	7.34	7.0	0.14	0.39	3.7	17.9
OS5	11.09	7.0	0.14	0.39	5.4	25.8
C2	22.36	6.1	0.11	0.38	8.9	49.3
C4	2.27	2.0	0.08	0.35	0.7	4.8
F1	11.08	4.5	0.10	0.37	3.9	23.9
F2	34.75	6.1	0.12	0.38	14.4	76.0
F3	37.49	5.0	0.11	0.37	12.1	68.7
F4	76.98	2.6	0.08	0.35	16.1	112.8
F5	79.17	2.0	0.08	0.35	16.6	121.7
F6	9.76	2.0	0.08	0.35	2.7	19.9
F7	24.74	2.0	0.08	0.35	6.4	47.1
F8	25.35	2.0	0.08	0.35	6.5	48.0
F9	17.60	2.0	0.08	0.35	4.8	35.5
T1	5.08	10.8	0.17	0.42	2.9	12.0
T2	3.92	8.6	0.15	0.40	2.1	9.4
ONSITE TOTAL	299.6	2.5%	0.08	0.33	82.4	543.9
OFFSITE TOTAL	81.4	8.2%	0.16	0.51	22.2	109.6
GRAND TOTAL	381.1	3.3%	0.09	0.34	113.5	702.7

CUMULATIVE DESIGN POINT SUMMARY TABLE

DESIGN POINT	CONTRIBUTING BASINS	ΣQ_5 (cfs)	ΣQ_{100} (cfs)	Tributary Area (ac.)	Weighted % Impervious
OS1	OS1	1.5	7.4	3.0	7.0
OS2	OS2	2.4	11.4	4.7	7.0
OS3	OS3	2.3	11.1	4.5	7.0
OS4	OS4	3.7	17.9	7.3	7.0
OS5	OS5	5.4	25.8	11.1	7.0
C2	C2	8.9	49.3	22.4	6.1
C4	C4	0.7	4.8	2.3	2.0
F1	F1	3.9	23.9	11.1	4.5
F2	F2	14.4	76.0	34.8	6.1
F3	F2 + F3	22.4	122.7	72.2	5.5
F4	F2 - F4 + OS1 - OS3	36.9	221.8	161.3	4.2
F5	F2 - F5 + OS1 - OS5	47.5	295.4	258.9	3.7
F6	F6	2.7	19.9	9.8	2.0
F7	F7	6.4	47.1	24.7	2.0
F8	F8	6.5	48.0	25.4	2.0
F9	F9	4.8	35.5	17.6	2.0
T1	T1	2.9	12.0	5.1	10.8
T2	T1 + T2	4.8	20.9	9.0	9.8

HRGreen	FLYING HORSE NORTH FILING NO. 7	Calc'd by:		CMD
	EXISTING CONDITIONS	Checked by:		RDL
	EL PASO COUNTY, COLORADO	Date:		11/11/2025

COMPOSITE 'C' FACTORS

BASIN	GOLF COURSE / UNDEVELOPED	ROADWAY	RESIDENTIAL (2.5 AC LOT)	RESIDENTIAL (5.0 AC LOT)	TOTAL	SOIL TYPE	GOLF COURSE / UNDEVELOPED			ROADWAY			RESIDENTIAL (2.5 AC LOT)			RESIDENTIAL (5.0 AC LOT)			COMPOSITE IMPERVIOUSNESS & C		
	ACRES						%I	C_5	C_{100}	%I	C_5	C_{100}	%I	C_5*	C_{100}*	%I	C_5*	C_{100}*	%I	C_5	C_{100}
OS1	0.00	0.00	0.00	2.99	2.99	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	7	0.14	0.39	7.0	0.14	0.39
OS2	0.00	0.00	0.00	4.65	4.65	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	7	0.14	0.39	7.0	0.14	0.39
OS3	0.00	0.00	0.00	4.46	4.46	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	7	0.14	0.39	7.0	0.14	0.39
OS4	0.00	0.00	0.00	7.34	7.34	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	7	0.14	0.39	7.0	0.14	0.39
OS5	0.00	0.00	0.00	11.09	11.09	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	7	0.14	0.39	7.0	0.14	0.39
C2	21.42	0.94	0.00	0.00	22.36	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	8	0.14	0.39	6.1	0.11	0.38
C4	2.27	0.00	0.00	0.00	2.27	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	7	0.14	0.39	2.0	0.08	0.35
F1	10.80	0.28	0.00	0.00	11.08	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	7	0.14	0.39	4.5	0.10	0.37
F2	18.99	0.00	15.76	0.00	34.75	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	7	0.14	0.39	6.1	0.12	0.38
F3	24.88	0.00	12.61	0.00	37.49	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	7	0.14	0.39	5.0	0.11	0.37
F4	76.54	0.44	0.00	0.00	76.98	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	7	0.14	0.39	2.6	0.08	0.35
F5	79.17	0.00	0.00	0.00	79.17	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	7	0.14	0.39	2.0	0.08	0.35
F6	9.76	0.00	0.00	0.00	9.76	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	7	0.14	0.39	2.0	0.08	0.35
F7	24.74	0.00	0.00	0.00	24.74	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	7	0.14	0.39	2.0	0.08	0.35
F8	25.35	0.00	0.00	0.00	25.35	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	7	0.14	0.39	2.0	0.08	0.35
F9	17.60	0.00	0.00	0.00	17.60	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	7	0.14	0.39	2.0	0.08	0.35
T1	0.11	0.00	4.97	0.00	5.08	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	7	0.14	0.39	10.8	0.17	0.42
T2	1.06	0.00	2.86	0.00	3.92	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	7	0.14	0.39	8.6	0.15	0.40
TOTAL ONSITE	**282.79**	**1.38**	**15.47**	**0.00**	**299.64**														**2.46%**	**0.08**	**0.33**
TOTAL OFFSITE	**29.90**	**0.28**	**20.73**	**30.53**	**81.44**														**8.21%**	**0.16**	**0.51**
GRAND TOTAL	**312.69**	**1.66**	**36.20**	**30.53**	**381.08**														**3.32%**	**0.09**	**0.34**

HRGreen	FLYING HORSE NORTH FILING NO. 7	Calc'd by:	CMD
	EXISTING CONDITIONS	Checked by:	RDL
	EL PASO COUNTY, COLORADO	Date:	11/11/2025

TIME OF CONCENTRATION

BASIN DATA			OVERLAND TIME (T_i)			TRAVEL TIME (T_t)					TOTAL	tc=(L/180)+10	Design tc
DESIGNATION	C_5	AREA (ac)	LENGTH (ft)	SLOPE %	t_i (min)	C_V	LENGTH (ft)	SLOPE %	V (ft/s)	t_t (min)	t_c (min)	tc max	tc design (min)
OS1	0.14	2.99	250	1.6	23.9	10	280	3.5	1.9	2.5	26.4	12.9	12.9
OS2	0.14	4.65	220	2.6	19.0	10	325	5.8	2.4	2.2	21.3	13.0	13.0
OS3	0.14	4.46	300	4.3	18.8	10	200	9.0	3.0	1.1	19.9	12.8	12.8
OS4	0.14	7.34	300	5.5	17.3	10	295	5.9	2.4	2.0	19.3	13.3	13.3
OS5	0.14	11.09	300	8.8	14.8	10	575	3.4	1.8	5.2	20.0	14.9	14.9
C2	0.11	22.36	300	5.2	18.1	10	650	5.0	2.2	4.8	22.9	15.3	15.3
C4	0.08	2.27	300	4.5	19.6	10	494	6.7	2.6	3.2	22.8	14.4	14.4
F1	0.10	11.08	300	3.3	21.3	10	600	2.0	1.4	7.1	28.4	15.0	15.0
F2	0.12	34.75	300	3.0	21.6	10	780	3.0	1.7	7.5	29.1	16.0	16.0
F3	0.11	37.49	300	7.0	16.4	10	1900	3.3	1.8	17.4	33.9	22.2	22.2
F4	0.08	76.98	300	12.0	14.1	10	3344	3.3	1.8	30.6	44.6	30.2	30.2
F5	0.08	79.17	300	3.5	21.3	10	2830	1.9	1.4	34.2	55.6	27.4	27.4
F6	0.08	9.76	300	3.5	21.3	10	700	4.0	2.0	5.8	27.2	15.6	15.6
F7	0.08	24.74	300	2.0	25.7	10	1160	5.3	2.3	8.4	34.1	18.1	18.1
F8	0.08	25.35	300	9.2	15.5	10	1190	1.7	1.3	15.2	30.7	18.3	18.3
F9	0.08	17.60	300	2.0	25.7	10	760	3.0	1.7	7.3	33.0	15.9	15.9
T1	0.17	5.08	300	2.7	21.2	10	855	2.8	1.7	8.5	29.8	16.4	16.4
T2	0.15	3.92	300	3.2	20.6	10	476	2.8	1.7	4.7	25.3	14.3	14.3
F3 DP	0.11	83.32	300	5.0	18.3	10	2604	3.5	1.9	23.3	41.6	26.1	26.1
F4 DP	0.10	179.74	300	5.0	18.5	10	4264	3.0	1.7	41.0	59.5	35.4	35.4
F5 DP	0.11	270.00	300	5.0	18.5	10	6009	2.7	1.6	61.3	79.7	45.1	45.1

HRGreen	**FLYING HORSE NORTH FILING NO. 7**	**Calc'd by:**	**CMD**
	EXISTING CONDITIONS	**Checked by:**	**RDL**
	DESIGN STORM: 5-YEAR	**Date:**	**11/11/2025**

		DIRECT RUNOFF						TOTAL RUNOFF				REMARKS
DESIGN POINT	BASIN ID	AREA (ac)	C_5	t_c (min)	C_5*A (ac)	I (in./ hr.)	Q (cfs)	t_c (min)	C_5*A (ac)	I (in./ hr.)	Q (cfs)	
OS1	OS1	2.99	0.14	12.9	0.41	3.74	**1.5**					OFFSITE BASIN FLOW
OS2	OS2	4.65	0.14	13.0	0.64	3.73	**2.4**					OFFSITE BASIN FLOW
OS3	OS3	4.46	0.14	12.8	0.61	3.76	**2.3**					OFFSITE BASIN FLOW
OS4	OS4	7.34	0.14	13.3	1.01	3.70	**3.7**					OFFSITE BASIN FLOW
OS5	OS5	11.09	0.14	14.9	1.52	3.53	**5.4**					OFFSITE BASIN FLOW
C2	C2	22.36	0.11	15.3	2.56	3.49	**8.9**					FLOW FROM C2 TO POND C
C4	C4	2.27	0.08	14.4	0.18	3.58	**0.7**					OFFSITE BASIN FLOW
F1	F1	11.08	0.10	15.0	1.12	3.52	**3.9**					BASIN FLOW TO DP F1
F2	F2	34.75	0.12	16.0	4.20	3.42	**14.4**					BASIN FLOW TO DP F2
F3	F3	37.49	0.11	22.2	4.14	2.93	**12.1**					BASIN FLOW TO DP F3
								26.1	8.34	2.69	**22.4**	COMBINED BASIN FLOW FROM BASINS F2 - F3
F4	F4	76.98	0.08	30.2	6.52	2.47	**16.1**					BASIN FLOW TO DP F4
								35.4	16.52	2.23	**36.9**	COMBINED BASIN FLOW FROM BASINS F2 - F4 + OS1 - OS3
F5	F5	79.17	0.08	27.4	6.33	2.62	**16.6**					BASIN FLOW TO DP F5
								45.1	25.39	1.87	**47.5**	COMBINED BASIN FLOW FROM BASINS F2 - F5 + OS1 - OS5
F6	F6	9.76	0.08	15.6	0.78	3.47	**2.7**					BASIN FLOW TO DP F6
F7	F7	24.74	0.08	18.1	1.98	3.24	**6.4**					BASIN FLOW TO DP F7
F8	F8	25.35	0.08	18.3	2.03	3.22	**6.5**					BASIN FLOW TO DP F8

HRGreen	**FLYING HORSE NORTH FILING NO. 7**		**Calc'd by:**	**CMD**	
	EXISTING CONDITIONS		**Checked by:**	**RDL**	
	DESIGN STORM: 5-YEAR		**Date:**	**11/11/2025**	

		DIRECT RUNOFF						**TOTAL RUNOFF**				**REMARKS**
DESIGN POINT	**BASIN ID**	**AREA (ac)**	**C_5**	**t_c (min)**	**C_5*A (ac)**	**I (in./ hr.)**	**Q (cfs)**	**t_c (min)**	**C_5*A (ac)**	**I (in./ hr.)**	**Q (cfs)**	
F9	F9	17.60	0.08	15.9	1.41	3.43	**4.8**					BASIN FLOW TO DP F9
T1	T1	5.08	0.17	16.4	0.85	3.39	**2.9**					BASIN FLOW TO DP T1
T2	T2	3.92	0.15	14.3	0.57	3.59	**2.1**					BASIN FLOW TO DP T2 (OFFSITE FLOW)
								16.4	1.43	3.39	**4.8**	COMBINED BASIN FLOW FROM BASINS T1 AND T2 (OFFSITE FLOW)

HRGreen

FLYING HORSE NORTH FILING NO. 7 | **Calc'd by:** | **CMD**

EXISTING CONDITIONS | **Checked by:** | **RDL**

DESIGN STORM: 100-YEAR | **Date:** | **11/11/2025**

		DIRECT RUNOFF						TOTAL RUNOFF				REMARKS
DESIGN PONT	BASIN ID	AREA (ac)	C_{100}	t_c (min)	C_{100}*A (ac)	I (in./ hr.)	Q (cfs)	t_c (min)	C_{100}*A (ac)	I (in./ hr.)	Q (cfs)	
OS1	OS1	2.99	0.39	12.9	1.17	6.28	**7.4**					OFFSITE BASIN FLOW
OS2	OS2	4.65	0.39	13.0	1.83	6.27	**11.4**					OFFSITE BASIN FLOW
OS3	OS3	4.46	0.39	12.8	1.75	6.31	**11.1**					OFFSITE BASIN FLOW
OS4	OS4	7.34	0.39	13.3	2.88	6.21	**17.9**					OFFSITE BASIN FLOW
OS5	OS5	11.09	0.39	14.9	4.36	5.93	**25.8**					OFFSITE BASIN FLOW
C2	C2	22.36	0.38	15.3	8.40	5.86	**49.3**					FLOW FROM C2 TO POND C
C4	C4	2.27	0.35	14.4	0.79	6.01	**4.8**					OFFSITE BASIN FLOW
F1	F1	11.08	0.37	15.0	4.05	5.91	**23.9**					BASIN FLOW TO DP F1
F2	F2	34.75	0.38	16.0	13.22	5.75	**76.0**					BASIN FLOW TO DP F2
F3	F3	37.49	0.37	22.2	13.97	4.92	**68.7**					BASIN FLOW TO DP F3
								26.1	27.19	4.51	**122.7**	COMBINED BASIN FLOW FROM BASINS F2 - F3
F4	F4	76.98	0.35	30.2	27.21	4.14	**112.8**					BASIN FLOW TO DP F4
								35.4	59.15	3.75	**221.8**	COMBINED BASIN FLOW FROM BASINS F2 - F4 + OS1 - OS3
F5	F5	79.17	0.35	27.4	27.71	4.39	**121.7**					BASIN FLOW TO DP F5
								45.1	94.10	3.14	**295.4**	COMBINED BASIN FLOW FROM BASINS F2 - F5 + OS1 - OS5
F6	F6	9.76	0.35	15.6	3.42	5.82	**19.9**					BASIN FLOW TO DP F6
F7	F7	24.74	0.35	18.1	8.66	5.44	**47.1**					BASIN FLOW TO DP F7
F8	F8	25.35	0.35	18.3	8.87	5.41	**48.0**					BASIN FLOW TO DP F8

HRGreen	**FLYING HORSE NORTH FILING NO. 7**							**Calc'd by:**				**CMD**	
	EXISTING CONDITIONS							**Checked by:**				**RDL**	
	DESIGN STORM: 100-YEAR							**Date:**				**11/11/2025**	
		DIRECT RUNOFF						**TOTAL RUNOFF**				**REMARKS**	
DESIGN PONT	**BASIN ID**	**AREA (ac)**	**C_{100}**	**t_c (min)**	**C_{100}*A (ac)**	**I (in./ hr.)**	**Q (cfs)**	**t_c (min)**	**C_{100}*A (ac)**	**I (in./ hr.)**	**Q (cfs)**		
F9	F9	17.60	0.35	15.9	6.16	5.77	**35.5**					BASIN FLOW TO DP F9	
T1	T1	5.08	0.42	16.4	2.11	5.68	**12.0**					BASIN FLOW TO DP T1	
T2	T2	3.92	0.40	14.3	1.56	6.03	**9.4**					BASIN FLOW TO DP T2 (OFFSITE FLOW)	
								16.4	3.68	5.68	**20.9**	COMBINED BASIN FLOW FROM BASINS T1 AND T2 (OFFSITE FLOW)	

FLYING HORSE NORTH FILING NO. 7
PROPOSED CONDITIONS
EL PASO COUNTY, COLORADO

Calc'd by:	**CMD**
Checked by:	**RDL**
Date:	**8/27/2026**

SUMMARY RUNOFF TABLE

BASIN	AREA (ac)	% IMP.	C_5	C_{100}	Q_5 (cfs)	Q_{100} (cfs)
OS1	2.99	7.0	0.14	0.39	1.5	7.4
OS2	4.65	7.0	0.14	0.39	2.4	11.4
OS3	4.46	7.0	0.14	0.39	2.3	11.1
OS4	7.34	7.0	0.14	0.39	3.7	17.9
OS5	11.09	7.0	0.14	0.39	5.4	25.8
C3	21.13	9.3	0.15	0.40	11.3	50.1
F1	12.18	11.0	0.17	0.42	7.3	30.0
F2	30.64	9.7	0.16	0.41	16.5	71.7
F3	38.36	10.2	0.16	0.41	20.2	88.3
F4	5.08	11.0	0.17	0.42	2.6	10.8
F5	50.79	6.4	0.12	0.38	18.9	97.4
F6	15.08	11.0	0.17	0.42	7.2	29.5
F7	13.13	6.5	0.12	0.38	5.1	26.5
F8	14.88	11.0	0.17	0.42	7.1	29.2
F9	27.32	4.2	0.10	0.37	8.4	50.4
F10.1	6.77	11.0	0.17	0.42	4.2	17.1
F10.2	13.87	11.0	0.17	0.42	8.5	35.1
F10.3	7.73	11.0	0.17	0.42	3.8	15.7
F11	7.73	11.0	0.17	0.42	4.9	20.2
F12	7.52	4.3	0.10	0.37	2.8	16.5
F13	20.75	11.0	0.17	0.42	12.0	49.3
F14	25.29	11.0	0.17	0.42	12.7	52.3
F15	2.53	11.0	0.17	0.42	1.6	6.5
F16	0.93	100.0	0.90	0.96	4.0	7.2
F17	4.12	11.0	0.17	0.42	2.5	10.4
F18	9.37	11.0	0.17	0.42	5.6	23.1
T1	5.08	10.8	0.17	0.42	2.9	12.0
T2	3.92	11.0	0.17	0.42	2.4	9.9
ONSITE TOTAL	298.6	9.2%	0.15	0.40	162.2	717.2
OFFSITE TOTAL	78.4	12.2%	0.20	0.54	25.5	115.7
GRAND TOTAL	377.0	9.2%	0.15	0.40	187.8	832.9

CUMULATIVE DESIGN POINT SUMMARY TABLE

DESIGN POINT	CONTRIBUTING BASINS	ΣQ_5 (cfs)	ΣQ_{100} (cfs)	Tributary Area (ac.)	Weighted % Impervious
OS1	OS1	1.5	7.4	3.0	7.0
OS2	OS2	2.4	11.4	4.7	7.0
OS3	OS3	2.3	11.1	4.5	7.0
OS4	OS4	3.7	17.9	7.3	7.0
OS5	OS5	5.4	25.8	11.1	7.0
C3	C3	11.3	50.1	21.1	9.3
F1	F1	7.3	30.0	12.2	11.0
F2	F2	16.5	71.7	30.6	9.7
F3	F2 + F3	29.0	126.5	69.0	9.9
F4	F4	2.6	10.8	5.1	11.0
F5	F2 - F5 + F10S + OS1 - OS3	46.1	212.9	143.7	8.5
F6	F6	7.2	29.5	15.1	11.0
F7	F2 - F7 + F10S + OS1 - OS4	55.0	253.4	179.3	8.5
F8	F8	7.1	29.2	14.9	11.0
F9	F9	8.4	50.4	27.3	4.2
F10.1	F1 + F10.1	8.7	36.0	19.0	11.0
F10.2	F10.2	8.5	35.1	13.9	11.0
F10.3	F10.3	3.8	15.7	7.7	11.0
F11	F11	4.9	20.2	7.7	11.0
F12	F12	2.8	16.5	7.5	4.3
F13	F13	12.0	49.3	20.8	11.0
F14	F14	12.7	52.3	25.3	11.0
F15	F15	1.6	6.5	2.5	11.0
F16	F16	4.0	7.2	0.9	100.0
F17	F17	2.5	10.4	4.1	11.0
F18	F18	5.6	23.1	9.4	11.0
T1	T1	2.9	12.0	5.1	10.8
T2	T1, T2	5.2	21.3	9.0	10.9

POND SUMMARY

POND ID	TRIBUTARY AREA (ac)	EFFECTIVE % IMPERVIOUS	C5	C100	PREDEV. PEAK INFLOW (UD-DET.) (cfs)	PEAK OUTFLOW (UD-DET.) (cfs)
POND F1	258.6	7.30%	0.13	0.36	248.5	117.2
POND F2	23.0	14.63%	0.24	0.62	23.3	16.0

HRGreen	FLYING HORSE NORTH FILING NO. 7	Calc'd by:		CMD
	PROPOSED CONDITIONS	Checked by:		RDL
	EL PASO COUNTY, COLORADO	Date:		3/19/2026

COMPOSITE 'C' FACTORS

BASIN	GOLF COURSE / UNDEVELOPED	ROADWAY	RESIDENTIAL (2.5 AC LOT)	RESIDENTIAL (5.0 AC LOT)	TOTAL	SOIL TYPE	GOLF COURSE / UNDEVELOPED			ROADWAY			RESIDENTIAL (2.5 AC LOT)			RESIDENTIAL (5.0 AC LOT)			COMPOSITE IMPERVIOUSNESS & C FACTOR		
	ACRES						%I	C_5	C_{100}	%I	C_5	C_{100}	%I	C_5*	C_{100}*	%I	C_5*	C_{100}*	%I	C_5	C_{100}
OS1	0.00	0.00	0.00	2.99	2.99	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	7	0.14	0.39	7.0	0.14	0.39
OS2	0.00	0.00	0.00	4.65	4.65	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	7	0.14	0.39	7.0	0.14	0.39
OS3	0.00	0.00	0.00	4.46	4.46	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	7	0.14	0.39	7.0	0.14	0.39
OS4	0.00	0.00	0.00	7.34	7.34	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	7	0.14	0.39	7.0	0.14	0.39
OS5	0.00	0.00	0.00	11.09	11.09	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	7	0.14	0.39	7.0	0.14	0.39
C3	4.39	0.05	16.69	0.00	21.13	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	7	0.14	0.39	9.3	0.15	0.40
C5	0.00	0.00	2.27	0.00	2.27	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	7	0.14	0.39	11.0	0.17	0.42
F1	0.00	0.00	12.18	0.00	12.18	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	7	0.14	0.39	11.0	0.17	0.42
F2	4.51	0.00	26.13	0.00	30.64	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	7	0.14	0.39	9.7	0.16	0.41
F3	17.34	1.39	19.63	0.00	38.36	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	7	0.14	0.39	10.2	0.16	0.41
F4	0.00	0.00	5.08	0.00	5.08	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	7	0.14	0.39	11.0	0.17	0.42
F5	25.72	0.00	25.07	0.00	50.79	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	7	0.14	0.39	6.4	0.12	0.38
F6	0.00	0.00	15.08	0.00	15.08	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	7	0.14	0.39	11.0	0.17	0.42
F7	6.59	0.00	6.54	0.00	13.13	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	7	0.14	0.39	6.5	0.12	0.38
F8	0.00	0.00	14.88	0.00	14.88	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	7	0.14	0.39	11.0	0.17	0.42
F9	20.60	0.00	6.72	0.00	27.32	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	7	0.14	0.39	4.2	0.10	0.37
F10.1	0.00	0.00	6.77	0.00	6.77	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	8	0.14	0.39	11.0	0.17	0.42
F10.2	0.00	0.00	13.87	0.00	13.87	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	7	0.14	0.39	11.0	0.17	0.42
F10.3	0.00	0.00	7.73	0.00	7.73	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	7	0.14	0.39	11.0	0.17	0.42
F11	0.00	0.00	7.73	0.00	7.73	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	8	0.14	0.39	11.0	0.17	0.42
F12	5.62	0.00	1.90	0.00	7.52	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	7	0.14	0.39	4.3	0.10	0.37
F13	0.00	0.00	20.75	0.00	20.75	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	7	0.14	0.39	11.0	0.17	0.42
F14	0.00	0.00	25.29	0.00	25.29	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	7	0.14	0.39	11.0	0.17	0.42
F15	0.00	0.00	2.53	0.00	2.53	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	7	0.14	0.39	11.0	0.17	0.42
F16	0.00	0.93	0.00	0.00	0.93	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	7	0.14	0.39	100.0	0.90	0.96
F17	0.00	0.00	4.12	0.00	4.12	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	8	0.14	0.39	11.0	0.17	0.42
F18	0.00	0.00	9.37	0.00	9.37	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	9	0.14	0.39	11.0	0.17	0.42
T1	0.11	0.00	4.97	0.00	5.08	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	7	0.14	0.39	10.8	0.17	0.42
T2	0.00	0.00	3.92	0.00	3.92	B	2	0.08	0.35	100	0.90	0.96	11	0.17	0.42	7	0.14	0.39	11.0	0.17	0.42
TOTAL ONSITE	**80.26**	**2.37**	**215.93**	**0.00**	**298.57**														**9.20%**	**0.15**	**0.40**
TOTAL OFFSITE	**4.62**	**0.00**	**43.28**	**30.53**	**78.43**														**12.18%**	**0.20**	**0.54**
GRAND TOTAL	**84.88**	**2.37**	**259.21**	**30.53**	**377.00**														**9.21%**	**0.15**	**0.40**

HRGreen	FLYING HORSE NORTH FILING NO. 7																		Calc'd by:		CMD
	PROPOSED CONDITIONS																		Checked by:		RDL
	EL PASO COUNTY, COLORADO																		Date:		3/19/2026
COMPOSITE 'C' FACTORS																					
BASIN	GOLF COURSE / UNDEVELOPED	ROADWAY	RESIDENTIAL (2.5 AC LOT)	RESIDENTIAL (5.0 AC LOT)	TOTAL	SOIL TYPE	GOLF COURSE / UNDEVELOPED			ROADWAY			RESIDENTIAL (2.5 AC LOT)			RESIDENTIAL (5.0 AC LOT)			COMPOSITE IMPERVIOUSNESS & C FACTOR		
	ACRES						%I	C_5	C_{100}	%I	C_5	C_{100}	%I	C_5*	C_{100}*	%I	C_5*	C_{100}*	%I	C_5	C_{100}
POND SUMMARY																					
POND F1	74.76	1.39	151.95	30.53	258.63	B													7.30%	0.13	0.36
POND F2	5.62	0.00	17.36	0.00	22.98	B													14.63%	0.24	0.62

HRGreen	**FLYING HORSE NORTH FILING NO. 7**	**Calc'd by:**	**CMD**
	PROPOSED CONDITIONS	**Checked by:**	**RDL**
	EL PASO COUNTY, COLORADO	**Date:**	**3/19/2026**

TIME OF CONCENTRATION

BASIN DATA			OVERLAND TIME (T_i)			TRAVEL TIME (T_t)					TOTAL	*tc=(L/180)+10*	Design tc
DESIGNATION	C_5	AREA (ac)	LENGTH (ft)	SLOPE %	t_i (min)	C_V	LENGTH (ft)	SLOPE %	V (ft/s)	t_t (min)	t_c (min)	*tc max*	*tc design (min)*
OS1	0.14	2.99	250	1.6	23.9	10	280	3.5	1.9	2.5	26.4	12.9	12.9
OS2	0.14	4.65	220	2.6	19.0	10	325	5.8	2.4	2.2	21.3	13.0	13.0
OS3	0.14	4.46	300	4.3	18.8	10	200	9.0	3.0	1.1	19.9	12.8	12.8
OS4	0.14	7.34	300	5.5	17.3	10	295	5.9	2.4	2.0	19.3	13.3	13.3
OS5	0.14	11.09	300	8.8	14.8	10	575	3.4	1.8	5.2	20.0	14.9	14.9
C3	0.15	21.13	300	5.2	17.4	10	650	5.0	2.2	4.8	22.2	15.3	15.3
C5	0.17	2.27	300	4.5	17.9	10	494	6.7	2.6	3.2	21.1	14.4	14.4
F1	0.17	12.18	300	3.3	19.8	10	600	2.0	1.4	7.1	26.9	15.0	15.0
F2	0.16	30.64	300	3.0	20.8	10	780	3.0	1.7	7.5	28.3	16.0	16.0
F3	0.16	38.36	300	4.7	17.9	10	882	3.3	1.8	8.1	26.0	16.6	16.6
F4	0.17	5.08	300	3.5	19.4	10	1635	1.9	1.4	19.8	39.2	20.8	20.8
F5	0.12	50.79	300	8.6	15.1	10	1765	1.5	1.2	24.0	39.1	21.5	21.5
F6	0.17	15.08	300	2.0	23.4	10	2290	5.3	2.3	16.6	40.0	24.4	24.4
F7	0.12	13.13	300	9.2	14.8	10	1384	1.7	1.3	17.7	32.5	19.4	19.4
F8	0.17	14.88	300	2.0	23.4	10	2260	3.0	1.7	21.7	45.2	24.2	24.2
F9	0.10	27.32	300	5.5	18.0	10	1718	3.1	1.8	16.3	34.2	21.2	21.2
F10.1	0.17	25.16	300	3.5	19.4	10	458	2.9	1.7	4.5	23.9	14.2	14.2
F10.2	0.36	1.10	300	7.0	12.4	10	438	3.7	1.9	3.8	16.2	14.1	14.1
F10.3	0.21	15.94	300	3.7	18.2	10	2000	2.5	1.6	21.0	39.2	22.8	22.8
F11	0.17	7.73	300	2.0	23.4	10	250	2.0	1.4	2.9	26.4	13.1	13.1
F12	0.10	7.52	300	3.8	20.3	10	510	8.4	2.9	2.9	23.2	14.5	14.5
F13	0.17	20.75	300	1.0	29.5	10	835	5.3	2.3	6.0	35.6	16.3	16.3
F14	0.17	25.29	300	0.5	37.2	10	1834	7.2	2.7	11.4	48.6	21.9	21.9
F15	0.17	2.53	300	3.0	20.5	10	365	10.0	3.2	1.9	22.4	13.7	13.7
F16	0.90	0.93	60	2.0	2.3	10	497	4.0	2.0	4.1	6.4	13.1	6.4
F17	0.17	4.12	300	1.2	27.8	10	462	2.0	1.4	5.4	33.2	14.2	14.2
F18	0.17	9.37	300	1.2	27.8	10	600	4.0	2.0	5.0	32.8	15.0	15.0
T1	0.17	5.08	300	2.7	21.2	10	855	2.8	1.7	8.5	29.7	16.4	16.4
T2	0.17	3.92	300	3.2	20.1	10	476	2.8	1.7	4.7	24.8	14.3	14.3
F3 DP	0.16	69.00	300	4.0	18.9	10	2616	4.0	2.0	21.9	40.7	26.2	26.2
F5 DP	0.14	119.79	300	5.5	17.2	10	4337	1.9	1.4	52.6	69.8	35.8	35.8
F7 DP	0.14	132.92	300	4.0	19.2	10	4795	2.0	1.4	57.1	76.3	38.3	38.3
F10S DP	0.17	37.34	300	5.0	17.3	10	2530	3.1	1.8	24.0	41.3	25.7	25.7

HRGreen	**FLYING HORSE NORTH FILING NO. 7**	**Calc'd by:**	**CMD**
	PROPOSED CONDITIONS	**Checked by:**	**RDL**
	DESIGN STORM: 5-YEAR	**Date:**	**3/19/2026**

		DIRECT RUNOFF						TOTAL RUNOFF				REMARKS
DESIGN POINT	BASIN ID	AREA (ac)	C_5	t_c (min)	C_5*A (ac)	I (in./ hr.)	Q (cfs)	t_c (min)	C_5*A (ac)	I (in./ hr.)	Q (cfs)	
OS1	OS1	2.99	0.14	12.9	0.41	3.74	**1.5**					OFFSITE BASIN FLOW
OS2	OS2	4.65	0.14	13.0	0.64	3.73	**2.4**					OFFSITE BASIN FLOW
OS3	OS3	4.46	0.14	12.8	0.61	3.76	**2.3**					OFFSITE BASIN FLOW
OS4	OS4	7.34	0.14	13.3	1.01	3.70	**3.7**					OFFSITE BASIN FLOW
OS5	OS5	11.09	0.14	14.9	1.52	3.53	**5.4**					OFFSITE BASIN FLOW
C3	C3	21.13	0.15	15.3	3.24	3.49	**11.3**					FLOW FROM C3 TO POND C
C5	C5	2.27	0.17	14.4	0.39	3.58	**1.4**					OFFSITE BASIN FLOW
F1	F1	12.18	0.17	15.0	2.07	3.52	**7.3**					BASIN FLOW TO DP F1
F2	F2	30.64	0.16	16.0	4.81	3.42	**16.5**					BASIN FLOW TO DP F2
F3	F3	38.36	0.16	16.6	5.98	3.37	**20.2**					BASIN FLOW TO DP F3
								26.2	10.79	2.68	**29.0**	COMBINED BASIN FLOW FROM BASINS F2 - F3
F4	F4	5.08	0.17	20.8	0.86	3.03	**2.6**					BASIN FLOW TO DP F4
F5	F5	50.79	0.12	21.5	6.32	2.98	**18.9**					BASIN FLOW TO DP F5
								35.8	20.79	2.22	**46.1**	COMBINED BASIN FLOW FROM BASINS F2 - F5 + F10S + OS1 - OS3
F6	F6	15.08	0.17	24.4	2.57	2.79	**7.2**					BASIN FLOW TO DP F6
F7	F7	13.13	0.12	19.4	1.64	3.14	**5.1**					BASIN FLOW TO DP F7
								38.3	26.01	2.11	**55.0**	COMBINED BASIN FLOW FROM BASINS F2 - F7 + F10S + OS1 - OS4
F8	F8	14.88	0.17	24.2	2.53	2.80	**7.1**					BASIN FLOW TO DP F8

HRGreen	**FLYING HORSE NORTH FILING NO. 7**	**Calc'd by:**	**CMD**
	PROPOSED CONDITIONS	**Checked by:**	**RDL**
	DESIGN STORM: 5-YEAR	**Date:**	**3/19/2026**

		DIRECT RUNOFF						TOTAL RUNOFF				REMARKS
DESIGN POINT	BASIN ID	AREA (ac)	C_5	t_c (min)	C_5*A (ac)	I (in./ hr.)	Q (cfs)	t_c (min)	C_5*A (ac)	I (in./ hr.)	Q (cfs)	
F9	F9	27.32	0.10	21.2	2.79	3.00	**8.4**					BASIN FLOW TO DP F9
F10.1	F10.1	6.77	0.17	14.2	1.15	3.60	**4.2**					BASIN FLOW TO DP F10.1
								25.7	3.23	2.71	**8.7**	COMBINED BASIN FLOW FROM BASINS F1 AND F10.1
F10.2	F10.2	13.87	0.17	14.1	2.36	3.61	**8.5**					BASIN FLOW TO DP F10.2
F10.3	F10.3	7.73	0.17	22.8	1.31	2.89	**3.8**					BASIN FLOW TO DP F10.3
F11	F11	7.73	0.17	13.1	1.32	3.73	**4.9**					BASIN FLOW TO DP F11
								22.8	2.63	2.89	**7.6**	COMBINED F10.3 AND F11 INTO POND F2
F12	F12	7.52	0.10	14.5	0.77	3.57	**2.8**					BASIN FLOW TO DP F12
F13	F13	20.75	0.17	16.3	3.53	3.40	**12.0**					BASIN FLOW TO DP F13 (OFFSITE FLOW)
F14	F14	25.29	0.17	21.9	4.30	2.96	**12.7**					BASIN FLOW TO DP F14 (OFFSITE FLOW)
F15	F15	2.53	0.17	13.7	0.43	3.66	**1.6**					BASIN FLOW TO DP F15 (OFFSITE FLOW)
F16	F16	0.93	0.90	6.4	0.84	4.80	**4.0**					BASIN FLOW TO DP F16 (OFFSITE FLOW)
F17	F17	4.12	0.17	14.2	0.70	3.60	**2.5**					BASIN FLOW TO DP F17 (OFFSITE FLOW)
F18	F18	9.37	0.17	15.0	1.59	3.52	**5.6**					BASIN FLOW TO DP F18 (OFFSITE FLOW)
T1	T1	5.08	0.17	16.4	0.85	3.39	**2.9**					BASIN FLOW TO DP T1
T2	T2	3.92	0.17	14.3	0.67	3.59	**2.4**					BASIN FLOW TO DP T2 (OFFSITE FLOW)
								16.4	1.52	3.39	**5.2**	COMBINED BASIN FLOW FROM BASINS T1 AND T2 (OFFSITE FLOW)

HRGreen

FLYING HORSE NORTH FILING NO. 7 | **Calc'd by:** | **CMD**

PROPOSED CONDITIONS | **Checked by:** | **RDL**

DESIGN STORM: 100-YEAR | **Date:** | **3/19/2026**

		DIRECT RUNOFF						TOTAL RUNOFF				REMARKS
DESIGN PONT	BASIN ID	AREA (ac)	C_{100}	t_c (min)	C_{100}*A (ac)	I (in./ hr.)	Q (cfs)	t_c (min)	C_{100}*A (ac)	I (in./ hr.)	Q (cfs)	
OS1	OS1	2.99	0.39	12.9	1.17	6.28	**7.4**					OFFSITE BASIN FLOW
OS2	OS2	4.65	0.39	13.0	1.83	6.27	**11.4**					OFFSITE BASIN FLOW
OS3	OS3	4.46	0.39	12.8	1.75	6.31	**11.1**					OFFSITE BASIN FLOW
OS4	OS4	7.34	0.39	13.3	2.88	6.21	**17.9**					OFFSITE BASIN FLOW
OS5	OS5	11.09	0.39	14.9	4.36	5.93	**25.8**					OFFSITE BASIN FLOW
C3	C3	21.13	0.40	15.3	8.55	5.86	**50.1**					FLOW FROM C3 TO POND C
C5	C5	2.27	0.42	14.4	0.95	6.01	**5.7**					OFFSITE BASIN FLOW
F1	F1	12.18	0.42	15.0	5.08	5.91	**30.0**					BASIN FLOW TO DP F1
F2	F2	30.64	0.41	16.0	12.48	5.75	**71.7**					BASIN FLOW TO DP F2
F3	F3	38.36	0.41	16.6	15.59	5.66	**88.3**					BASIN FLOW TO DP F3
								26.2	28.07	4.51	**126.5**	COMBINED BASIN FLOW FROM BASINS F2 - F3
F4	F4	5.08	0.42	20.8	2.12	5.09	**10.8**					BASIN FLOW TO DP F4
F5	F5	50.79	0.38	21.5	19.46	5.01	**97.4**					BASIN FLOW TO DP F5
								35.8	57.22	3.72	**212.9**	COMBINED BASIN FLOW FROM BASINS F2 - F5 + F10S + OS1 - OS3
F6	F6	15.08	0.42	24.4	6.29	4.69	**29.5**					BASIN FLOW TO DP F6
F7	F7	13.13	0.38	19.4	5.03	5.27	**26.5**					BASIN FLOW TO DP F7
								38.3	71.43	3.55	**253.4**	COMBINED BASIN FLOW FROM BASINS F2 - F7 + F10S + OS1 - OS4
F8	F8	14.88	0.42	24.2	6.21	4.70	**29.2**					BASIN FLOW TO DP F8

HRGreen	**FLYING HORSE NORTH FILING NO. 7**	**Calc'd by:**	**CMD**
	PROPOSED CONDITIONS	**Checked by:**	**RDL**
	DESIGN STORM: 100-YEAR	**Date:**	**3/19/2026**

		DIRECT RUNOFF						TOTAL RUNOFF				REMARKS
DESIGN PONT	BASIN ID	AREA (ac)	C_{100}	t_c (min)	C_{100}*A (ac)	I (in./ hr.)	Q (cfs)	t_c (min)	C_{100}*A (ac)	I (in./ hr.)	Q (cfs)	
F9	F9	27.32	0.37	21.2	10.01	5.04	**50.4**					BASIN FLOW TO DP F9
F10.1	F10.1	6.77	0.42	14.2	2.82	6.05	**17.1**					BASIN FLOW TO DP F10.1
								25.7	7.90	4.55	**36.0**	COMBINED BASIN FLOW FROM BASINS F1 AND F10.1
F10.2	F10.2	13.87	0.42	14.1	5.79	6.07	**35.1**					BASIN FLOW TO DP F10.2
F10.3	F10.3	7.73	0.42	22.8	3.22	4.86	**15.7**					BASIN FLOW TO DP F10.3
F11	F11	7.73	0.42	13.1	3.22	6.26	**20.2**					BASIN FLOW TO DP F11
								22.8	6.45	4.86	**31.3**	COMBINED F10.3 AND F11 INTO POND F2
F12	F12	7.52	0.37	14.5	2.76	6.00	**16.5**					BASIN FLOW TO DP F12
F13	F13	20.75	0.42	16.3	8.65	5.70	**49.3**					BASIN FLOW TO DP F13 (OFFSITE FLOW)
F14	F14	25.29	0.42	21.9	10.55	4.96	**52.3**					BASIN FLOW TO DP F14 (OFFSITE FLOW)
F15	F15	2.53	0.42	13.7	1.06	6.14	**6.5**					BASIN FLOW TO DP F15 (OFFSITE FLOW)
F16	F16	0.93	0.96	6.4	0.89	8.06	**7.2**					BASIN FLOW TO DP F16 (OFFSITE FLOW)
F17	F17	4.12	0.42	14.2	1.72	6.04	**10.4**					BASIN FLOW TO DP F17 (OFFSITE FLOW)
F18	F18	9.37	0.42	15.0	3.91	5.91	**23.1**					BASIN FLOW TO DP F18 (OFFSITE FLOW)
T1	T1	5.08	0.42	16.4	2.11	5.68	**12.0**					BASIN FLOW TO DP T1
T2	T2	3.92	0.42	14.3	1.64	6.03	**9.9**					BASIN FLOW TO DP T2 (OFFSITE FLOW)
								16.4	3.75	5.68	**21.3**	COMBINED BASIN FLOW FROM BASINS T1 AND T2 (OFFSITE FLOW)

APPENDIX C – HYDRAULIC CALCULATIONS

Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, Jan 6 2026

CULVERT 3 - 5 YR

Invert Elev Dn (ft)	=	7500.00
Pipe Length (ft)	=	107.51
Slope (%)	=	3.72
Invert Elev Up (ft)	=	7504.00
Rise (in)	=	54.0
Shape	=	Circular
Span (in)	=	54.0
No. Barrels	=	1
n-Value	=	0.013
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

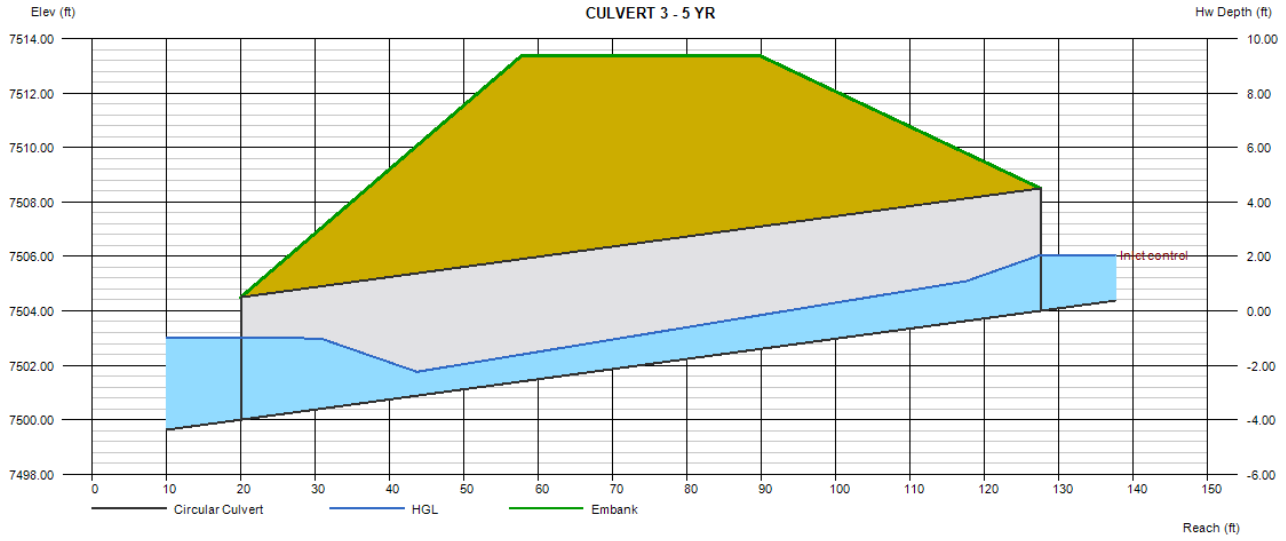
Top Elevation (ft)	=	7513.38
Top Width (ft)	=	32.00
Crest Width (ft)	=	0.00

Calculations

Qmin (cfs)	=	29.00
Qmax (cfs)	=	29.00
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	29.00
Qpipe (cfs)	=	29.00
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	2.56
Veloc Up (ft/s)	=	6.03
HGL Dn (ft)	=	7503.02
HGL Up (ft)	=	7505.54
Hw Elev (ft)	=	7506.05
Hw/D (ft)	=	0.46
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, Jan 6 2026

CULVERT 3 - 100 YR

Invert Elev Dn (ft)	=	7500.00
Pipe Length (ft)	=	107.51
Slope (%)	=	3.72
Invert Elev Up (ft)	=	7504.00
Rise (in)	=	54.0
Shape	=	Circular
Span (in)	=	54.0
No. Barrels	=	1
n-Value	=	0.013
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

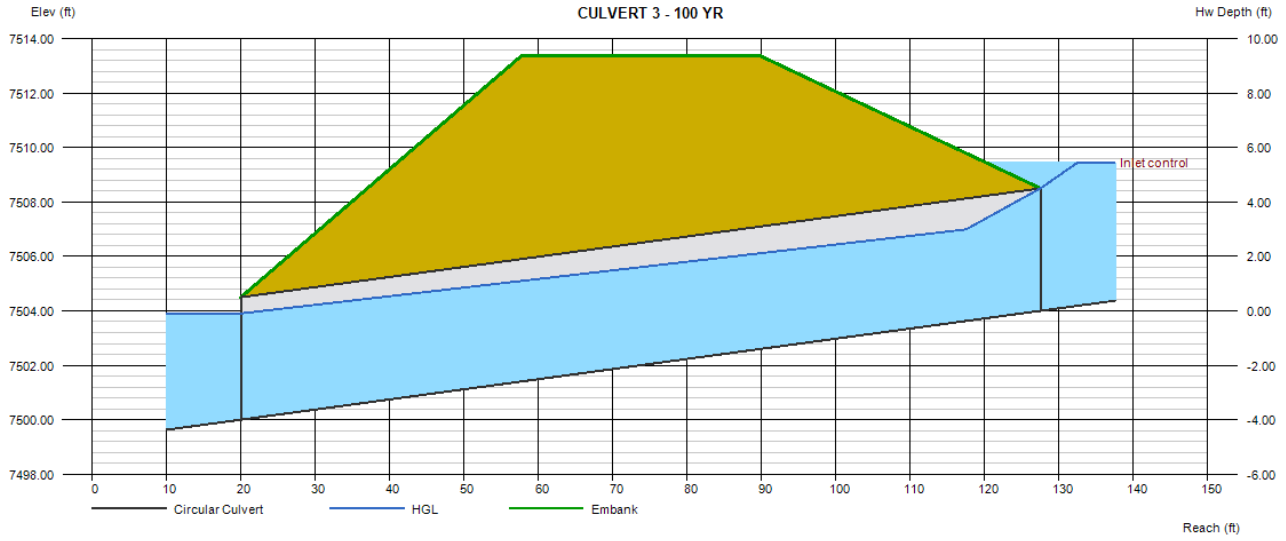
Top Elevation (ft)	=	7513.38
Top Width (ft)	=	32.00
Crest Width (ft)	=	0.00

Calculations

Qmin (cfs)	=	126.50
Qmax (cfs)	=	126.50
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	126.50
Qpipe (cfs)	=	126.50
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	8.63
Veloc Up (ft/s)	=	10.09
HGL Dn (ft)	=	7503.90
HGL Up (ft)	=	7507.31
Hw Elev (ft)	=	7509.45
Hw/D (ft)	=	1.21
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Monday, Jan 5 2026

CULVERT 4.1 - 5 YR

Invert Elev Dn (ft)	=	7556.43
Pipe Length (ft)	=	27.56
Slope (%)	=	1.38
Invert Elev Up (ft)	=	7556.81
Rise (in)	=	18.0
Shape	=	Circular
Span (in)	=	18.0
No. Barrels	=	1
n-Value	=	0.013
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

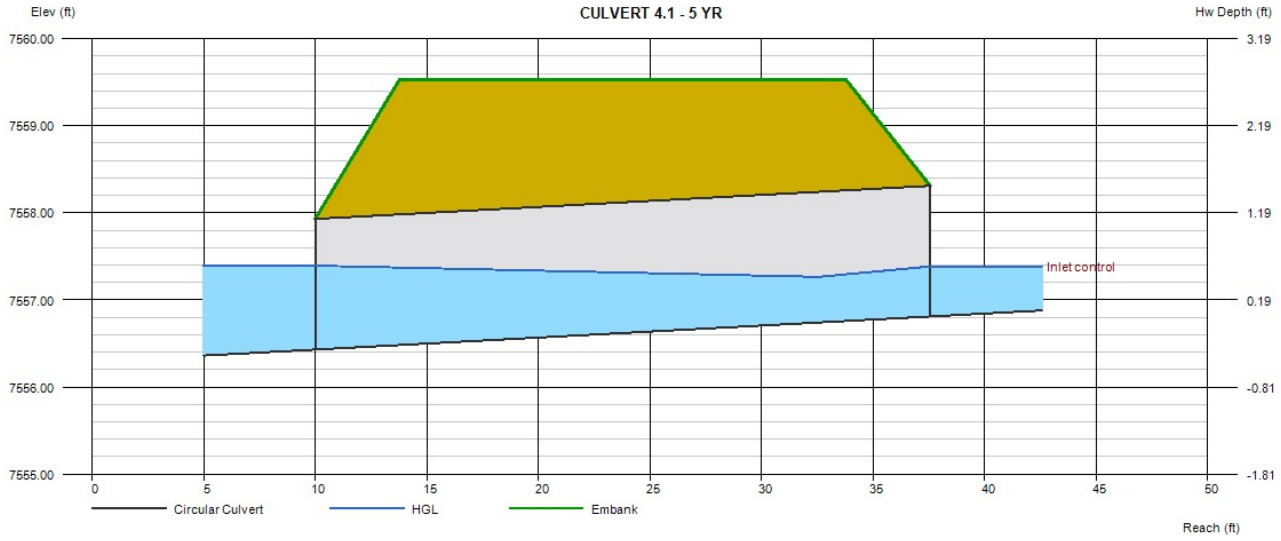
Top Elevation (ft)	=	7559.53
Top Width (ft)	=	20.00
Crest Width (ft)	=	0.00

Calculations

Qmin (cfs)	=	1.30
Qmax (cfs)	=	1.30
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	1.30
Qpipe (cfs)	=	1.30
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	1.08
Veloc Up (ft/s)	=	3.14
HGL Dn (ft)	=	7557.39
HGL Up (ft)	=	7557.24
Hw Elev (ft)	=	7557.39
Hw/D (ft)	=	0.38
Flow Regime	=	Inlet Control



NOTE: USED HALF OF DESIGN Q VALUE FOR BASIN F4 DUE TO SMALL AREA OF BASIN AFFECTING CULVERT

Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Monday, Jan 5 2026

CULVERT 4.1 - 100 YR

Invert Elev Dn (ft)	=	7556.43
Pipe Length (ft)	=	27.56
Slope (%)	=	1.38
Invert Elev Up (ft)	=	7556.81
Rise (in)	=	18.0
Shape	=	Circular
Span (in)	=	18.0
No. Barrels	=	1
n-Value	=	0.013
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

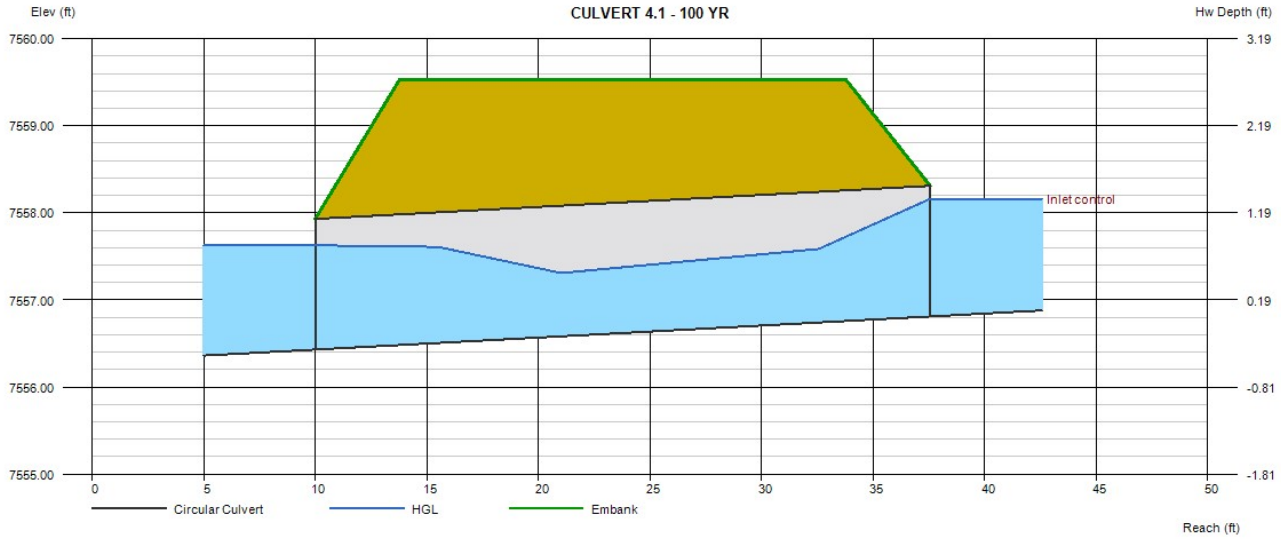
Top Elevation (ft)	=	7559.53
Top Width (ft)	=	20.00
Crest Width (ft)	=	0.00

Calculations

Qmin (cfs)	=	5.40
Qmax (cfs)	=	5.40
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	5.40
Qpipe (cfs)	=	5.40
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	3.57
Veloc Up (ft/s)	=	4.91
HGL Dn (ft)	=	7557.63
HGL Up (ft)	=	7557.71
Hw Elev (ft)	=	7558.16
Hw/D (ft)	=	0.90
Flow Regime	=	Inlet Control



NOTE: USED HALF OF DESIGN Q VALUE FOR BASIN F4 DUE TO SMALL AREA OF BASIN AFFECTING CULVERT

Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Monday, Jan 5 2026

CULVERT 4.2 - 5 YR

Invert Elev Dn (ft)	=	7544.13
Pipe Length (ft)	=	50.04
Slope (%)	=	4.34
Invert Elev Up (ft)	=	7546.30
Rise (in)	=	18.0
Shape	=	Circular
Span (in)	=	18.0
No. Barrels	=	1
n-Value	=	0.013
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

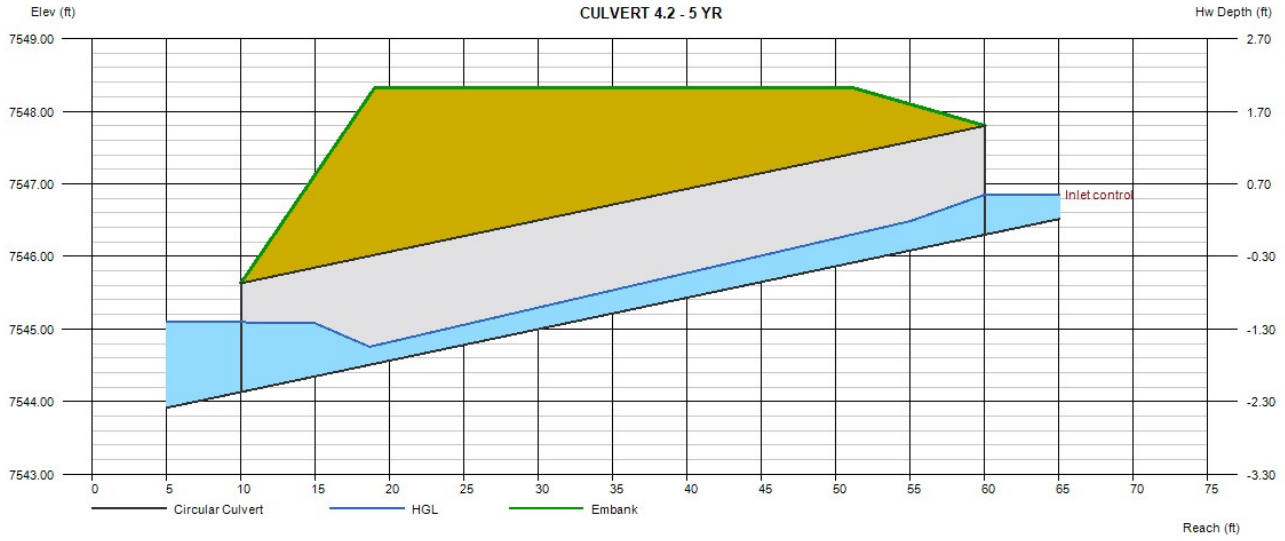
Top Elevation (ft)	=	7548.33
Top Width (ft)	=	32.00
Crest Width (ft)	=	200.00

Calculations

Qmin (cfs)	=	1.30
Qmax (cfs)	=	1.30
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	1.30
Qpipe (cfs)	=	1.30
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	1.08
Veloc Up (ft/s)	=	3.14
HGL Dn (ft)	=	7545.09
HGL Up (ft)	=	7546.73
Hw Elev (ft)	=	7546.85
Hw/D (ft)	=	0.37
Flow Regime	=	Inlet Control



NOTE: USED HALF OF DESIGN Q VALUE FOR BASIN F4 DUE TO SMALL AREA OF BASIN AFFECTING CULVERT

Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Monday, Jan 5 2026

CULVERT 4.2 - 100 YR

Invert Elev Dn (ft)	=	7544.13
Pipe Length (ft)	=	50.04
Slope (%)	=	4.34
Invert Elev Up (ft)	=	7546.30
Rise (in)	=	18.0
Shape	=	Circular
Span (in)	=	18.0
No. Barrels	=	1
n-Value	=	0.013
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

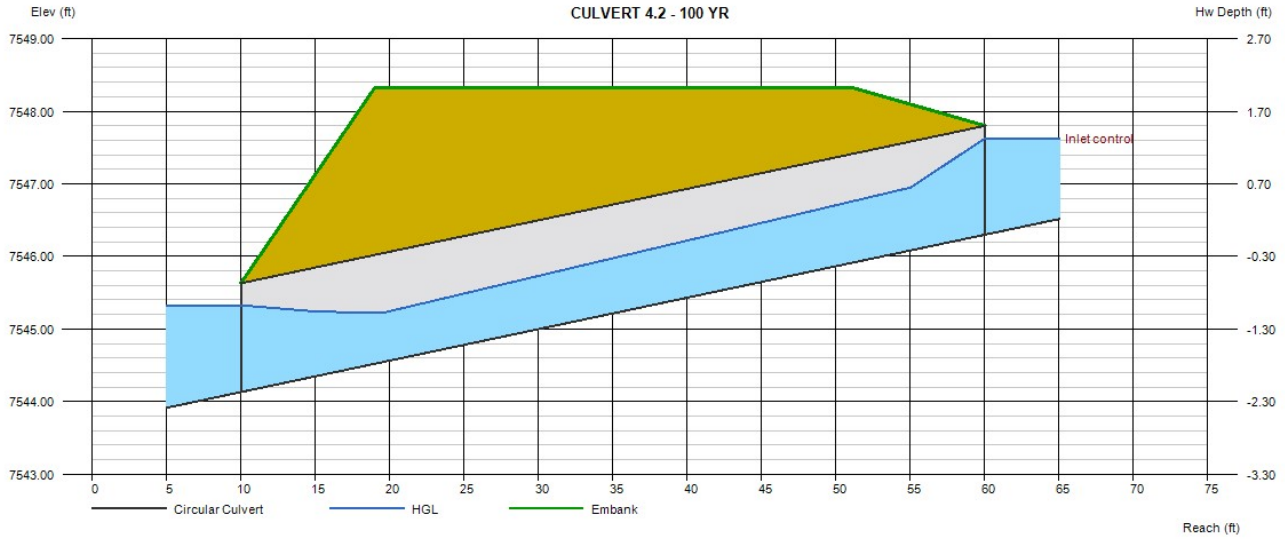
Top Elevation (ft)	=	7548.33
Top Width (ft)	=	32.00
Crest Width (ft)	=	200.00

Calculations

Qmin (cfs)	=	5.40
Qmax (cfs)	=	5.40
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	5.40
Qpipe (cfs)	=	5.40
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	3.57
Veloc Up (ft/s)	=	4.91
HGL Dn (ft)	=	7545.33
HGL Up (ft)	=	7547.19
Hw Elev (ft)	=	7547.63
Hw/D (ft)	=	0.89
Flow Regime	=	Inlet Control



NOTE: USED HALF OF DESIGN Q VALUE FOR BASIN F4 DUE TO SMALL AREA OF BASIN AFFECTING CULVERT

Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, Mar 19 2026

CULVERT 5 - 5 YR

Invert Elev Dn (ft)	=	7472.00
Pipe Length (ft)	=	50.00
Slope (%)	=	0.78
Invert Elev Up (ft)	=	7472.39
Rise (in)	=	48.0
Shape	=	Circular
Span (in)	=	48.0
No. Barrels	=	2
n-Value	=	0.013
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

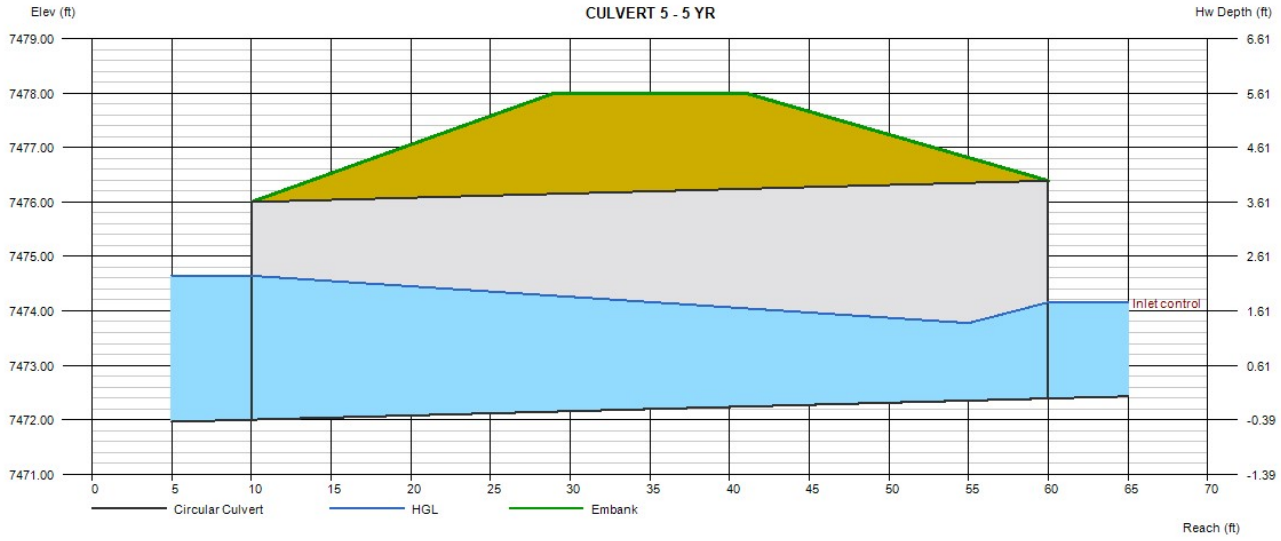
Top Elevation (ft)	=	7478.00
Top Width (ft)	=	12.00
Crest Width (ft)	=	50.00

Calculations

Qmin (cfs)	=	38.45
Qmax (cfs)	=	38.45
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	38.45
Qpipe (cfs)	=	38.45
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	2.18
Veloc Up (ft/s)	=	5.50
HGL Dn (ft)	=	7474.64
HGL Up (ft)	=	7473.68
Hw Elev (ft)	=	7474.16
Hw/D (ft)	=	0.44
Flow Regime	=	Inlet Control



NOTE: DESIGN Q FOR CULVERT 5
CALCULATED AS FOLLOWS:

Q(TOTAL)= Q(COMBINED F3) + 0.5 * Q(BASIN F5)
Q5 = 29 + 0.5 * 18.9 = 38.45 cfs
Q100 = 126.5 + 0.5 * 97.4 = 175.2 cfs

Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, Mar 19 2026

CULVERT 5 - 100 YR

Invert Elev Dn (ft)	=	7472.00
Pipe Length (ft)	=	50.00
Slope (%)	=	0.78
Invert Elev Up (ft)	=	7472.39
Rise (in)	=	48.0
Shape	=	Circular
Span (in)	=	48.0
No. Barrels	=	2
n-Value	=	0.013
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

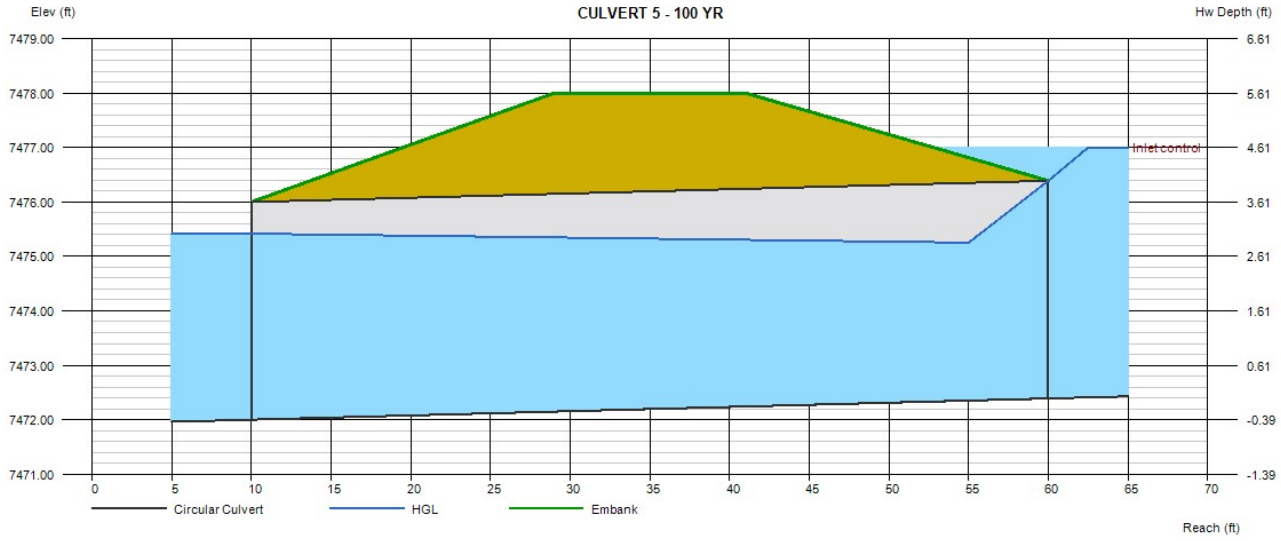
Top Elevation (ft)	=	7478.00
Top Width (ft)	=	12.00
Crest Width (ft)	=	50.00

Calculations

Qmin (cfs)	=	175.20
Qmax (cfs)	=	175.20
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	175.20
Qpipe (cfs)	=	175.20
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	7.66
Veloc Up (ft/s)	=	9.17
HGL Dn (ft)	=	7475.42
HGL Up (ft)	=	7475.23
Hw Elev (ft)	=	7477.00
Hw/D (ft)	=	1.15
Flow Regime	=	Inlet Control



NOTE: DESIGN Q FOR CULVERT 5
CALCULATED AS FOLLOWS:

Q(TOTAL)= Q(COMBINED F3) + 0.5 * Q(BASIN F5)
Q5 = 29 + 0.5 * 18.9 = 38.45 cfs
Q100 = 126.5 + 0.5 * 97.4 = 175.2 cfs

Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Monday, Jan 5 2026

CULVERT 6 - 5 YR

Invert Elev Dn (ft)	=	7532.98
Pipe Length (ft)	=	33.59
Slope (%)	=	4.82
Invert Elev Up (ft)	=	7534.60
Rise (in)	=	18.0
Shape	=	Circular
Span (in)	=	18.0
No. Barrels	=	1
n-Value	=	0.013
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

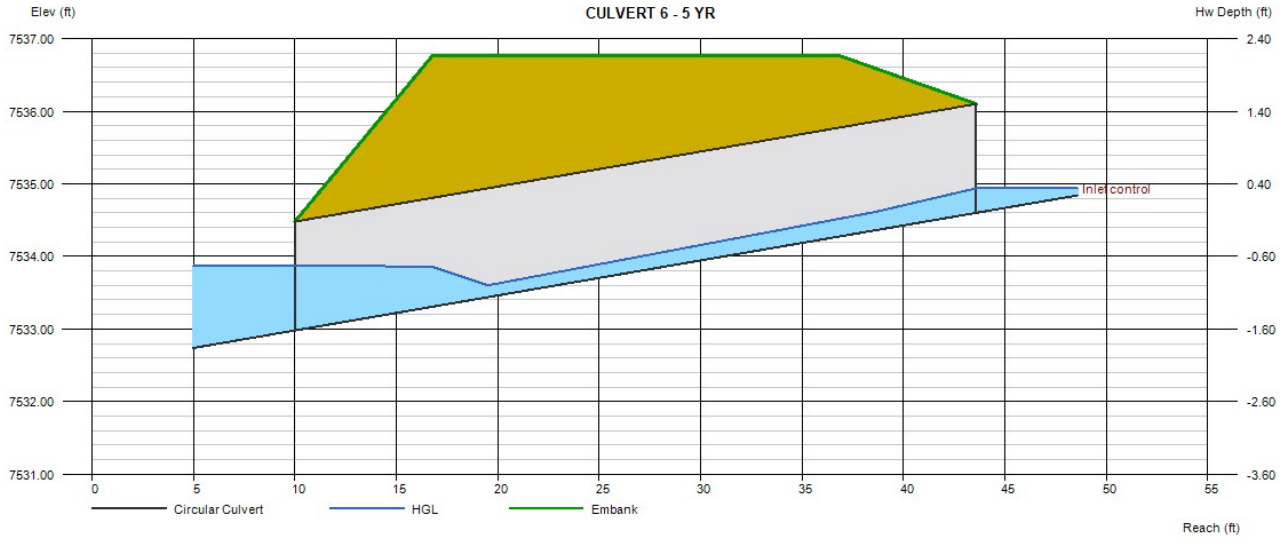
Top Elevation (ft)	=	7536.77
Top Width (ft)	=	20.00
Crest Width (ft)	=	0.00

Calculations

Qmin (cfs)	=	0.56
Qmax (cfs)	=	0.56
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	0.56
Qpipe (cfs)	=	0.56
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	0.51
Veloc Up (ft/s)	=	2.49
HGL Dn (ft)	=	7533.87
HGL Up (ft)	=	7534.88
Hw Elev (ft)	=	7534.94
Hw/D (ft)	=	0.23
Flow Regime	=	Inlet Control



NOTE: USED A FRACTION OF DESIGN Q FOR BASIN F6 BASED ON ACREAGE DUE TO SMALL AREA AFFECTING THIS CULVERT:

1.18 ACRES / 15.08 ACRES = .0783
.0783*7.2 (5 YR) = 0.56 CFS
.0783*29.5 (100 YR) = 2.31 CFS

Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Monday, Jan 5 2026

CULVERT 6 - 100 YR

Invert Elev Dn (ft)	=	7532.98
Pipe Length (ft)	=	33.59
Slope (%)	=	4.82
Invert Elev Up (ft)	=	7534.60
Rise (in)	=	18.0
Shape	=	Circular
Span (in)	=	18.0
No. Barrels	=	1
n-Value	=	0.013
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

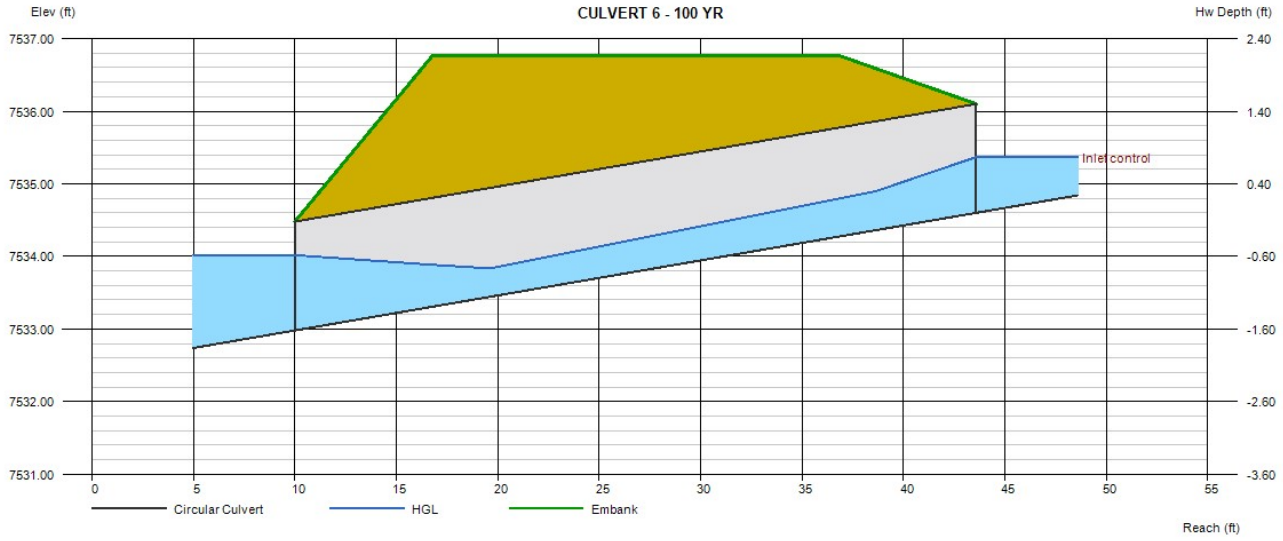
Top Elevation (ft)	=	7536.77
Top Width (ft)	=	20.00
Crest Width (ft)	=	0.00

Calculations

Qmin (cfs)	=	2.31
Qmax (cfs)	=	2.31
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	2.31
Qpipe (cfs)	=	2.31
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	1.77
Veloc Up (ft/s)	=	3.71
HGL Dn (ft)	=	7534.02
HGL Up (ft)	=	7535.17
Hw Elev (ft)	=	7535.37
Hw/D (ft)	=	0.51
Flow Regime	=	Inlet Control



NOTE: USED A FRACTION OF DESIGN Q FOR BASIN F6 BASED ON ACREAGE DUE TO SMALL AREA AFFECTING THIS CULVERT:

1.18 ACRES / 15.08 ACRES = .0783
.0783*7.2 (5 YR) = 0.56 CFS
.0783*29.5 (100 YR) = 2.31 CFS

Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Friday, Aug 21 2026

CULVERT 8.1 - 5 YR

Invert Elev Dn (ft)	=	7462.07
Pipe Length (ft)	=	42.26
Slope (%)	=	1.42
Invert Elev Up (ft)	=	7462.67
Rise (in)	=	30.0
Shape	=	Circular
Span (in)	=	30.0
No. Barrels	=	1
n-Value	=	0.013
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

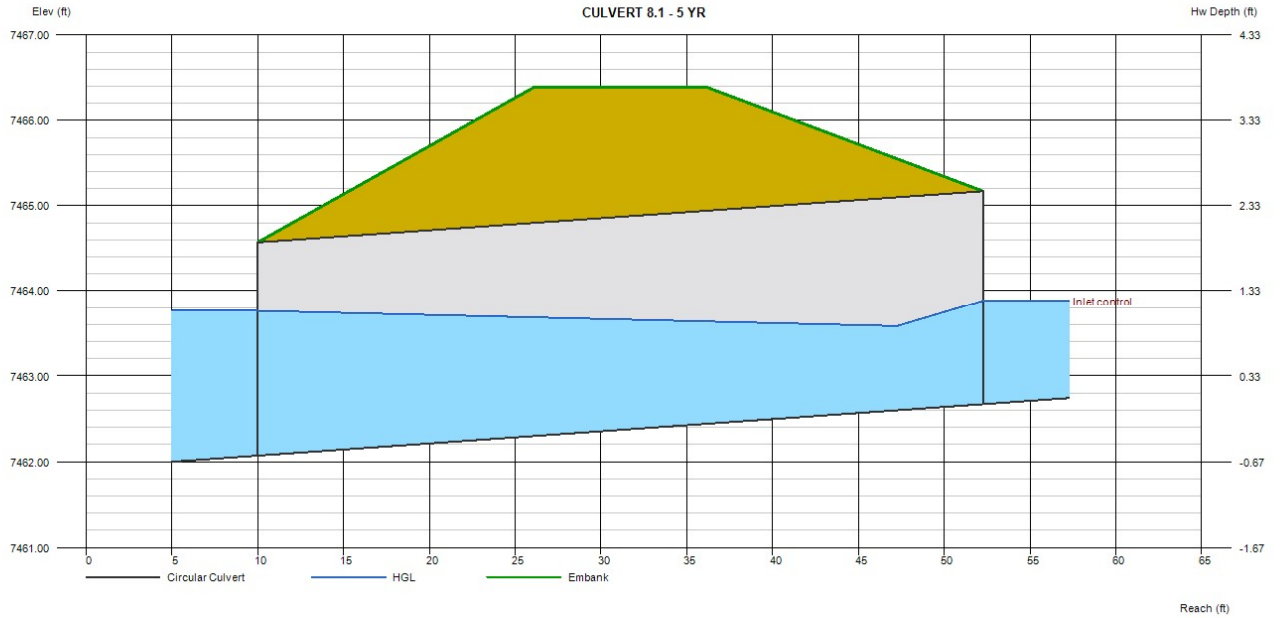
Top Elevation (ft)	=	7466.39
Top Width (ft)	=	10.00
Crest Width (ft)	=	200.00

Calculations

Qmin (cfs)	=	7.10
Qmax (cfs)	=	7.10
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	7.10
Qpipe (cfs)	=	7.10
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	2.01
Veloc Up (ft/s)	=	4.54
HGL Dn (ft)	=	7463.76
HGL Up (ft)	=	7463.56
Hw Elev (ft)	=	7463.88
Hw/D (ft)	=	0.48
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Friday, Aug 21 2026

CULVERT 8.1 - 100 YR

Invert Elev Dn (ft)	=	7462.07
Pipe Length (ft)	=	42.26
Slope (%)	=	1.42
Invert Elev Up (ft)	=	7462.67
Rise (in)	=	30.0
Shape	=	Circular
Span (in)	=	30.0
No. Barrels	=	1
n-Value	=	0.013
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

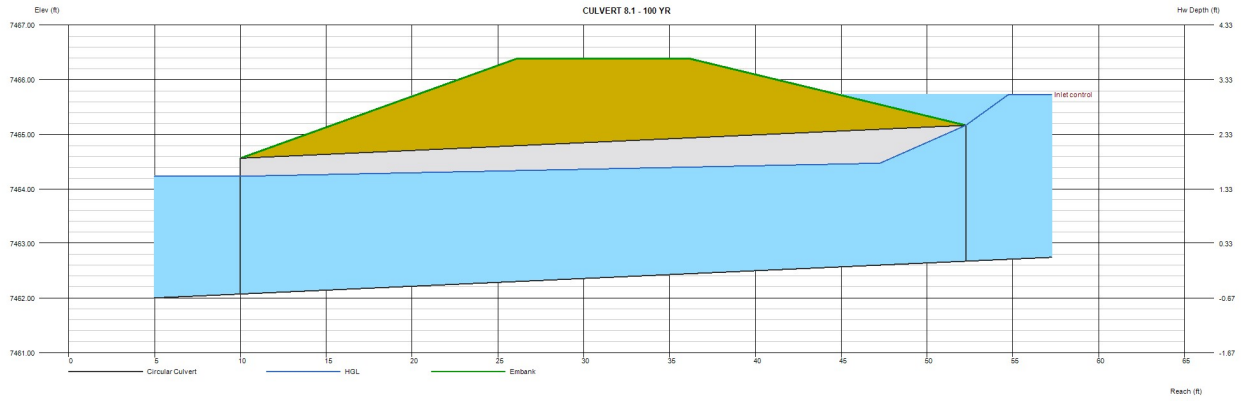
Top Elevation (ft)	=	7466.39
Top Width (ft)	=	10.00
Crest Width (ft)	=	200.00

Calculations

Qmin (cfs)	=	29.20
Qmax (cfs)	=	29.20
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	29.20
Qpipe (cfs)	=	29.20
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	6.45
Veloc Up (ft/s)	=	7.54
HGL Dn (ft)	=	7464.24
HGL Up (ft)	=	7464.51
Hw Elev (ft)	=	7465.74
Hw/D (ft)	=	1.23
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Friday, Aug 21 2026

CULVERT 8.2 - 5 YR

Invert Elev Dn (ft)	=	7439.15
Pipe Length (ft)	=	113.54
Slope (%)	=	5.59
Invert Elev Up (ft)	=	7445.50
Rise (in)	=	30.0
Shape	=	Circular
Span (in)	=	30.0
No. Barrels	=	1
n-Value	=	0.013
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

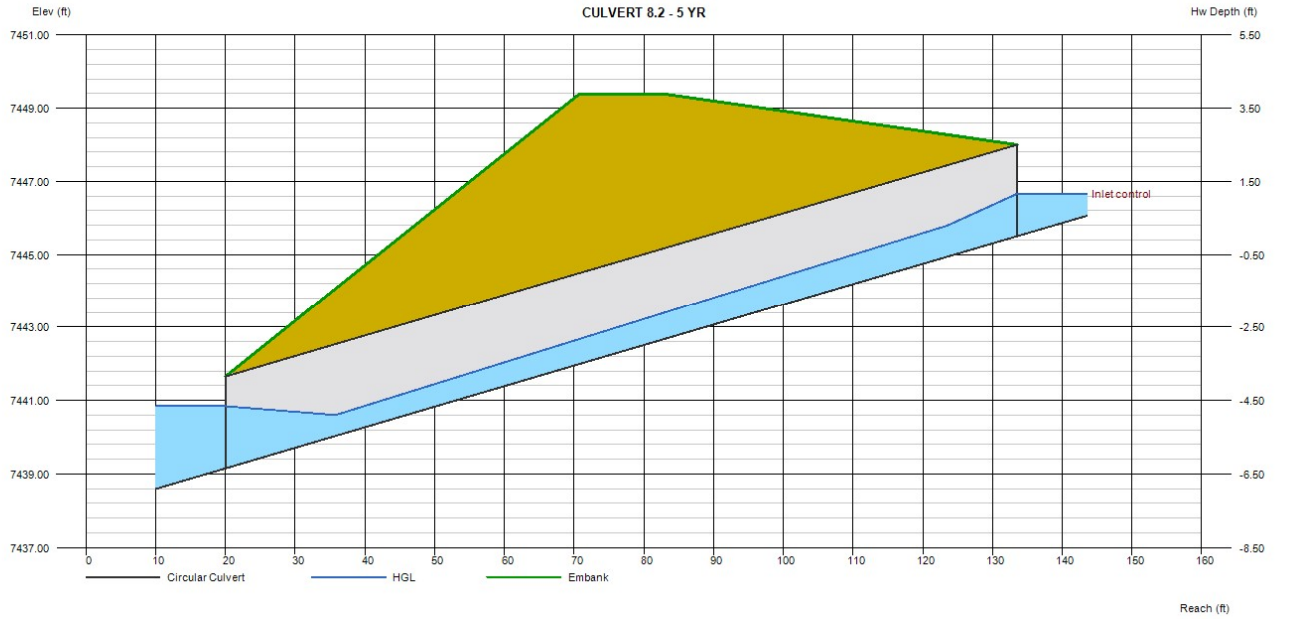
Top Elevation (ft)	=	7449.39
Top Width (ft)	=	12.00
Crest Width (ft)	=	200.00

Calculations

Qmin (cfs)	=	7.10
Qmax (cfs)	=	7.10
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	7.10
Qpipe (cfs)	=	7.10
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	2.01
Veloc Up (ft/s)	=	4.58
HGL Dn (ft)	=	7440.84
HGL Up (ft)	=	7446.38
Hw Elev (ft)	=	7446.66
Hw/D (ft)	=	0.46
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Friday, Aug 21 2026

CULVERT 8.2 - 100 YR

Invert Elev Dn (ft)	=	7439.15
Pipe Length (ft)	=	113.54
Slope (%)	=	5.59
Invert Elev Up (ft)	=	7445.50
Rise (in)	=	30.0
Shape	=	Circular
Span (in)	=	30.0
No. Barrels	=	1
n-Value	=	0.013
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

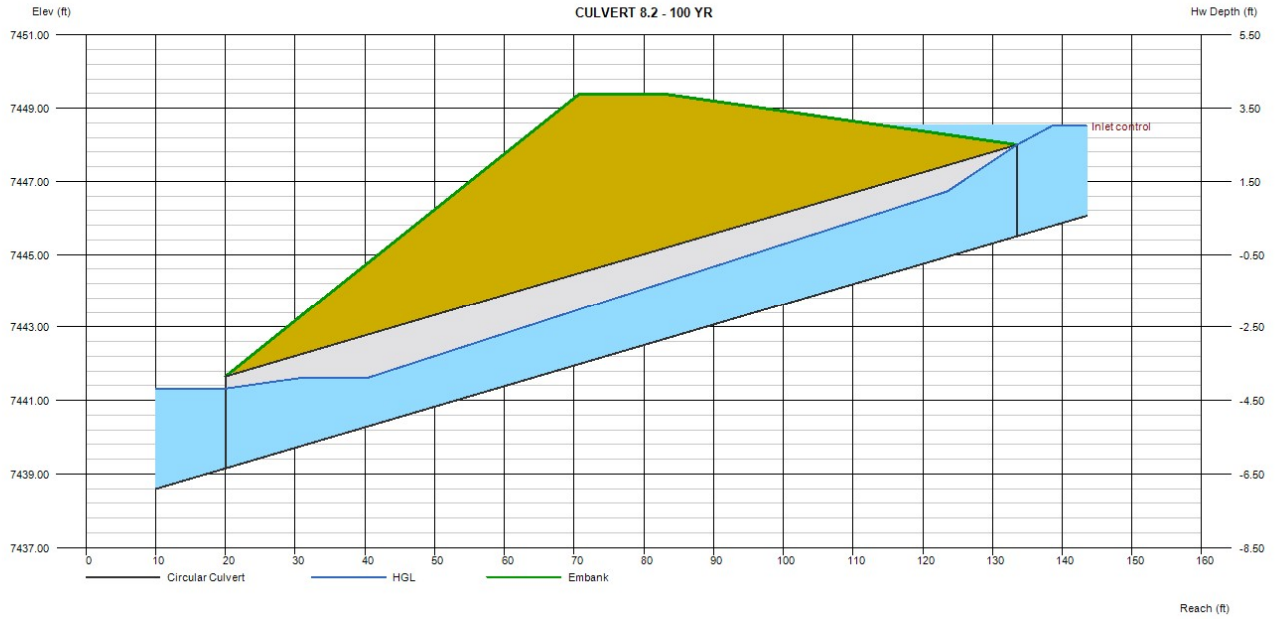
Top Elevation (ft)	=	7449.39
Top Width (ft)	=	12.00
Crest Width (ft)	=	200.00

Calculations

Qmin (cfs)	=	29.20
Qmax (cfs)	=	29.20
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	29.20
Qpipe (cfs)	=	29.20
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	6.45
Veloc Up (ft/s)	=	7.54
HGL Dn (ft)	=	7441.32
HGL Up (ft)	=	7447.34
Hw Elev (ft)	=	7448.51
Hw/D (ft)	=	1.21
Flow Regime	=	Inlet Control



Culvert Report

CULVERT 10.1.1 - 5 YR

Invert Elev Dn (ft)	=	7556.19
Pipe Length (ft)	=	34.14
Slope (%)	=	1.44
Invert Elev Up (ft)	=	7556.68
Rise (in)	=	24.0
Shape	=	Elliptical
Span (in)	=	38.0
No. Barrels	=	1
n-Value	=	0.013
Culvert Type	=	Horizontal Ellipse Concrete
Culvert Entrance	=	Square edge w/headwall (H)
Coeff. K,M,c,Y,k	=	0.01, 2, 0.0398, 0.67, 0.5

Embankment

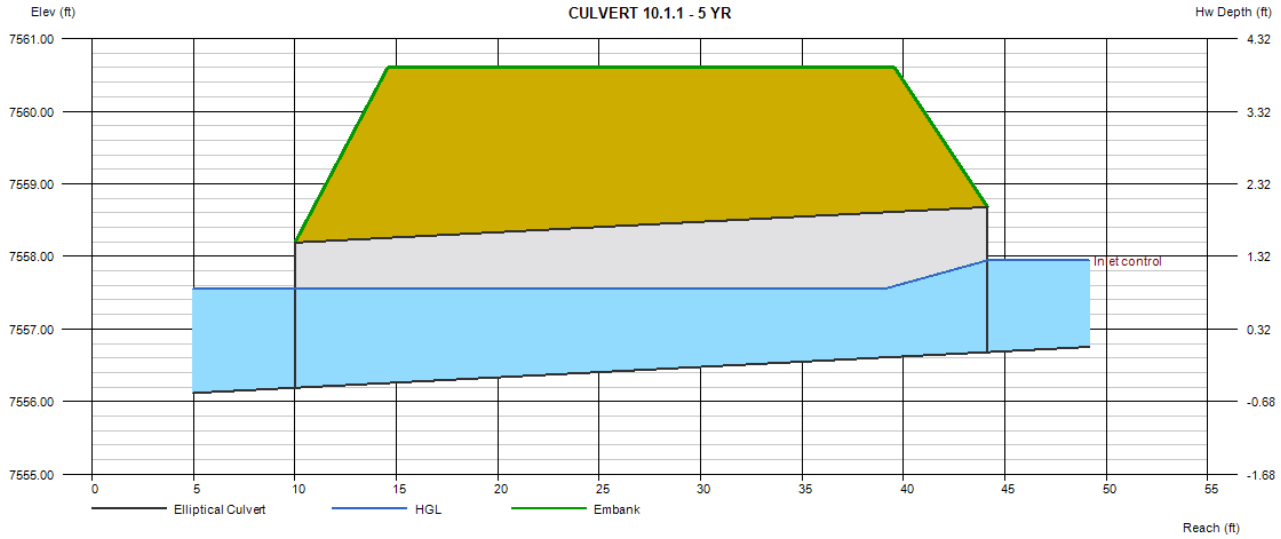
Top Elevation (ft)	=	7560.60
Top Width (ft)	=	25.00
Crest Width (ft)	=	0.00

Calculations

Qmin (cfs)	=	8.70
Qmax (cfs)	=	8.70
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	8.70
Qpipe (cfs)	=	8.70
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	2.33
Veloc Up (ft/s)	=	4.21
HGL Dn (ft)	=	7557.55
HGL Up (ft)	=	7557.56
Hw Elev (ft)	=	7557.95
Hw/D (ft)	=	0.63
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, Jan 6 2026

CULVERT 10.1.1 - 100 YR

Invert Elev Dn (ft)	=	7556.19
Pipe Length (ft)	=	34.14
Slope (%)	=	1.44
Invert Elev Up (ft)	=	7556.68
Rise (in)	=	24.0
Shape	=	Elliptical
Span (in)	=	38.0
No. Barrels	=	1
n-Value	=	0.013
Culvert Type	=	Horizontal Ellipse Concrete
Culvert Entrance	=	Square edge w/headwall (H)
Coeff. K,M,c,Y,k	=	0.01, 2, 0.0398, 0.67, 0.5

Embankment

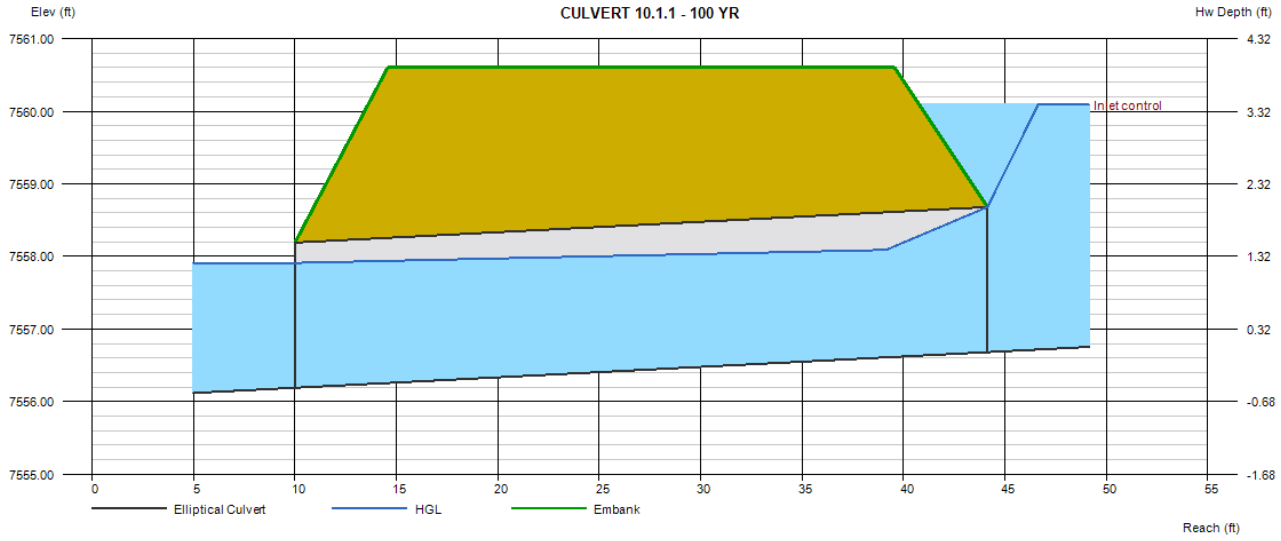
Top Elevation (ft)	=	7560.60
Top Width (ft)	=	25.00
Crest Width (ft)	=	20.00

Calculations

Qmin (cfs)	=	36.00
Qmax (cfs)	=	36.00
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	36.00
Qpipe (cfs)	=	36.00
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	7.74
Veloc Up (ft/s)	=	9.10
HGL Dn (ft)	=	7557.91
HGL Up (ft)	=	7558.12
Hw Elev (ft)	=	7560.09
Hw/D (ft)	=	1.71
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Monday, May 4 2026

CULVERT 10.1.2 - 5 YR

Invert Elev Dn (ft)	=	7548.24
Pipe Length (ft)	=	126.96
Slope (%)	=	5.38
Invert Elev Up (ft)	=	7555.07
Rise (in)	=	30.0
Shape	=	Circular
Span (in)	=	30.0
No. Barrels	=	2
n-Value	=	0.013
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

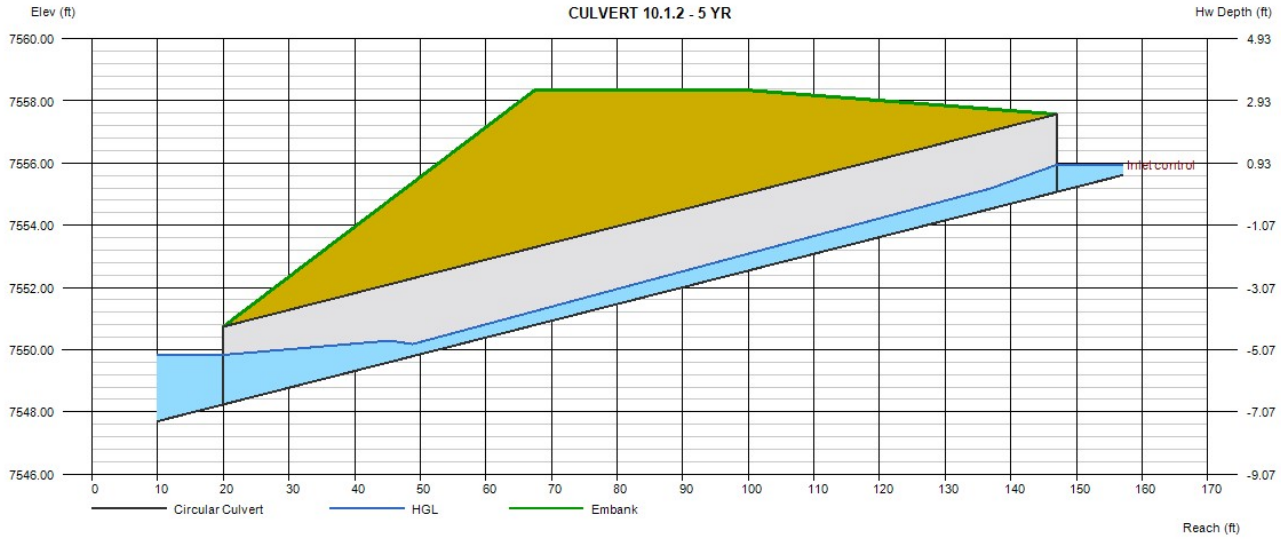
Top Elevation (ft)	=	7558.35
Top Width (ft)	=	32.00
Crest Width (ft)	=	200.00

Calculations

Qmin (cfs)	=	8.70
Qmax (cfs)	=	8.70
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	8.70
Qpipe (cfs)	=	8.70
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	1.32
Veloc Up (ft/s)	=	3.98
HGL Dn (ft)	=	7549.83
HGL Up (ft)	=	7555.76
Hw Elev (ft)	=	7555.94
Hw/D (ft)	=	0.35
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, Jan 6 2026

CULVERT 10.1.2 - 100 YR

Invert Elev Dn (ft)	=	7548.24
Pipe Length (ft)	=	126.96
Slope (%)	=	5.38
Invert Elev Up (ft)	=	7555.07
Rise (in)	=	30.0
Shape	=	Circular
Span (in)	=	30.0
No. Barrels	=	2
n-Value	=	0.013
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

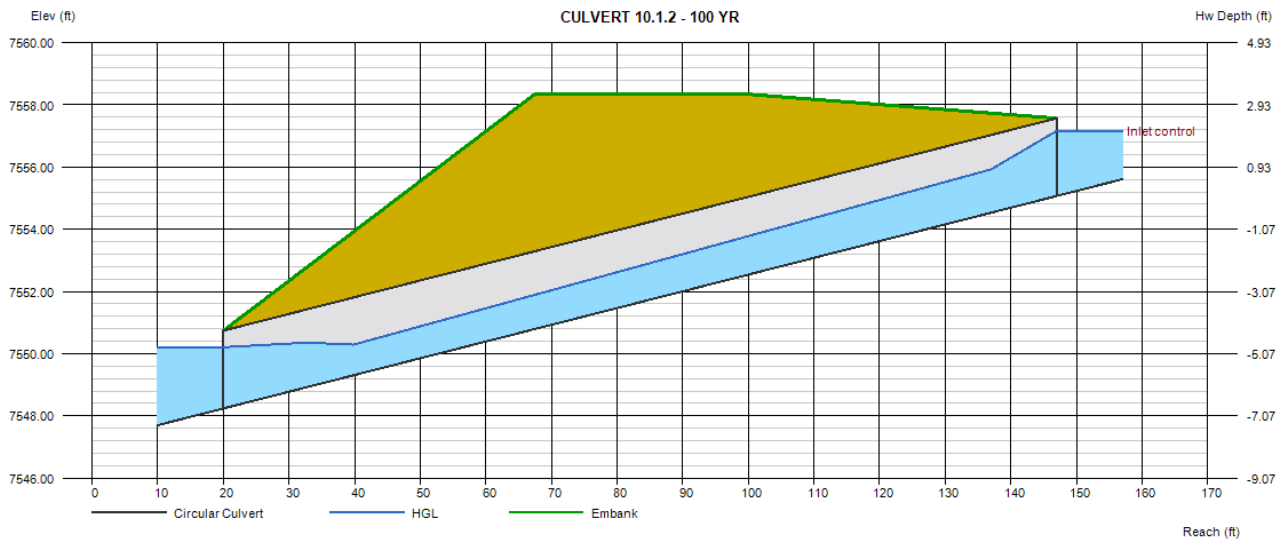
Top Elevation (ft)	=	7558.35
Top Width (ft)	=	32.00
Crest Width (ft)	=	200.00

Calculations

Qmin (cfs)	=	36.00
Qmax (cfs)	=	36.00
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	36.00
Qpipe (cfs)	=	36.00
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	4.34
Veloc Up (ft/s)	=	6.17
HGL Dn (ft)	=	7550.21
HGL Up (ft)	=	7556.51
Hw Elev (ft)	=	7557.16
Hw/D (ft)	=	0.84
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Monday, Jan 5 2026

CULVERT 10.2 - 5 YR

Invert Elev Dn (ft)	=	7535.94
Pipe Length (ft)	=	133.95
Slope (%)	=	3.72
Invert Elev Up (ft)	=	7540.92
Rise (in)	=	30.0
Shape	=	Circular
Span (in)	=	30.0
No. Barrels	=	1
n-Value	=	0.013
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

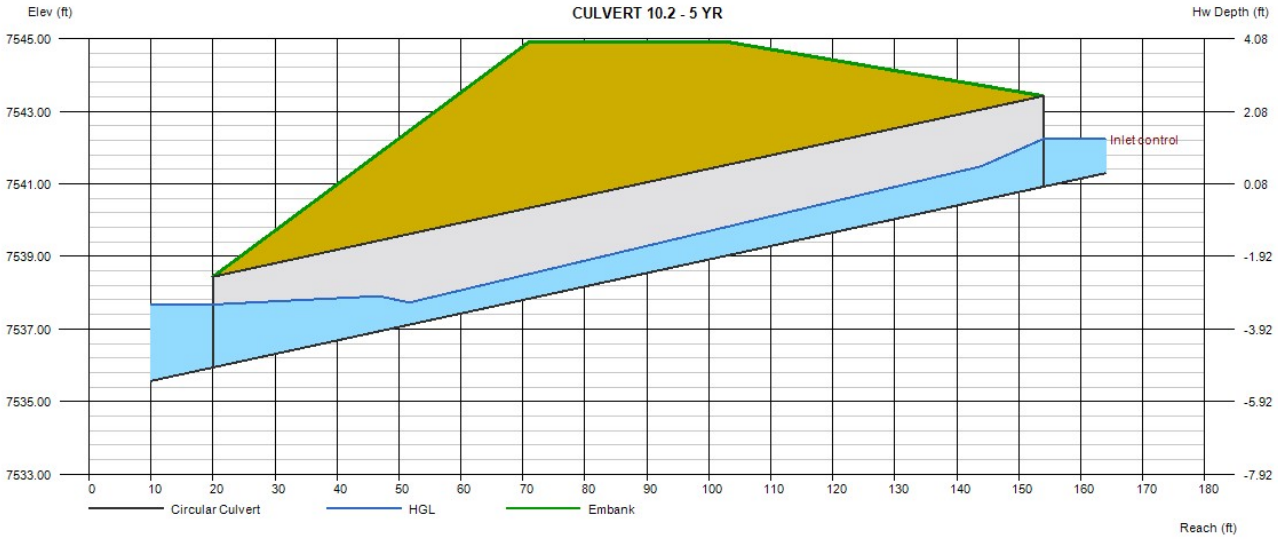
Top Elevation (ft)	=	7544.91
Top Width (ft)	=	32.00
Crest Width (ft)	=	200.00

Calculations

Qmin (cfs)	=	8.50
Qmax (cfs)	=	8.50
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	8.50
Qpipe (cfs)	=	8.50
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	2.34
Veloc Up (ft/s)	=	4.83
HGL Dn (ft)	=	7537.68
HGL Up (ft)	=	7541.89
Hw Elev (ft)	=	7542.24
Hw/D (ft)	=	0.53
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Monday, Jan 5 2026

CULVERT 10.2 - 100 YR

Invert Elev Dn (ft)	=	7535.94
Pipe Length (ft)	=	133.95
Slope (%)	=	3.72
Invert Elev Up (ft)	=	7540.92
Rise (in)	=	30.0
Shape	=	Circular
Span (in)	=	30.0
No. Barrels	=	1
n-Value	=	0.013
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

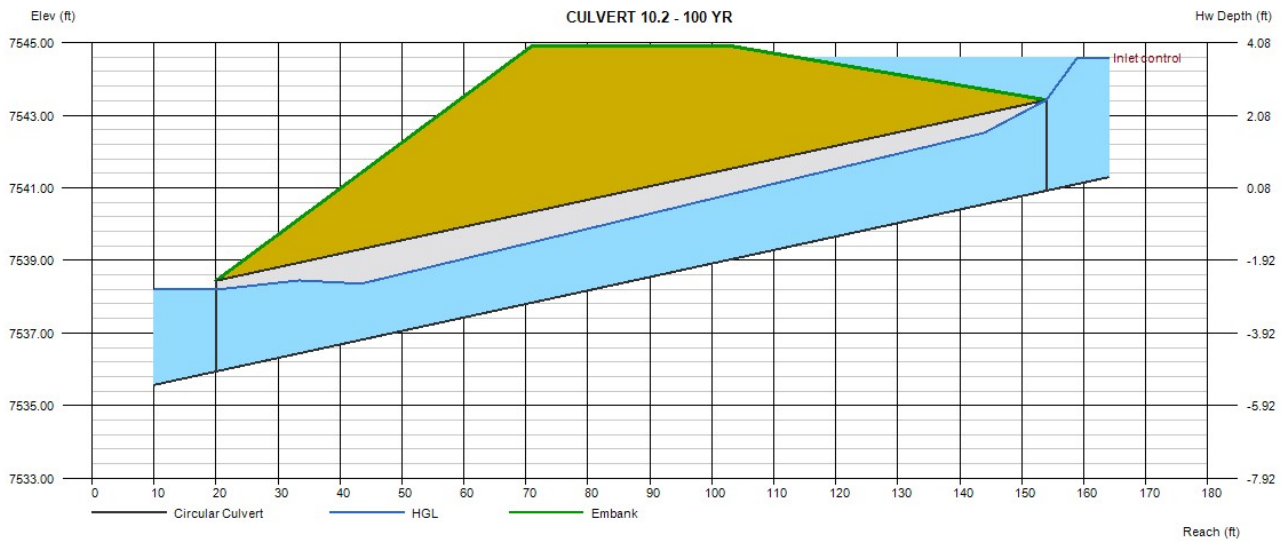
Top Elevation (ft)	=	7544.91
Top Width (ft)	=	32.00
Crest Width (ft)	=	200.00

Calculations

Qmin (cfs)	=	35.10
Qmax (cfs)	=	35.10
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	35.10
Qpipe (cfs)	=	35.10
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	7.53
Veloc Up (ft/s)	=	8.30
HGL Dn (ft)	=	7538.20
HGL Up (ft)	=	7542.93
Hw Elev (ft)	=	7544.58
Hw/D (ft)	=	1.47
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, Nov 13 2025

POND F1 OUTLET PIPE - 5 YR

Invert Elev Dn (ft)	=	7434.53
Pipe Length (ft)	=	71.90
Slope (%)	=	1.70
Invert Elev Up (ft)	=	7435.75
Rise (in)	=	48.0
Shape	=	Circular
Span (in)	=	48.0
No. Barrels	=	1
n-Value	=	0.013
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

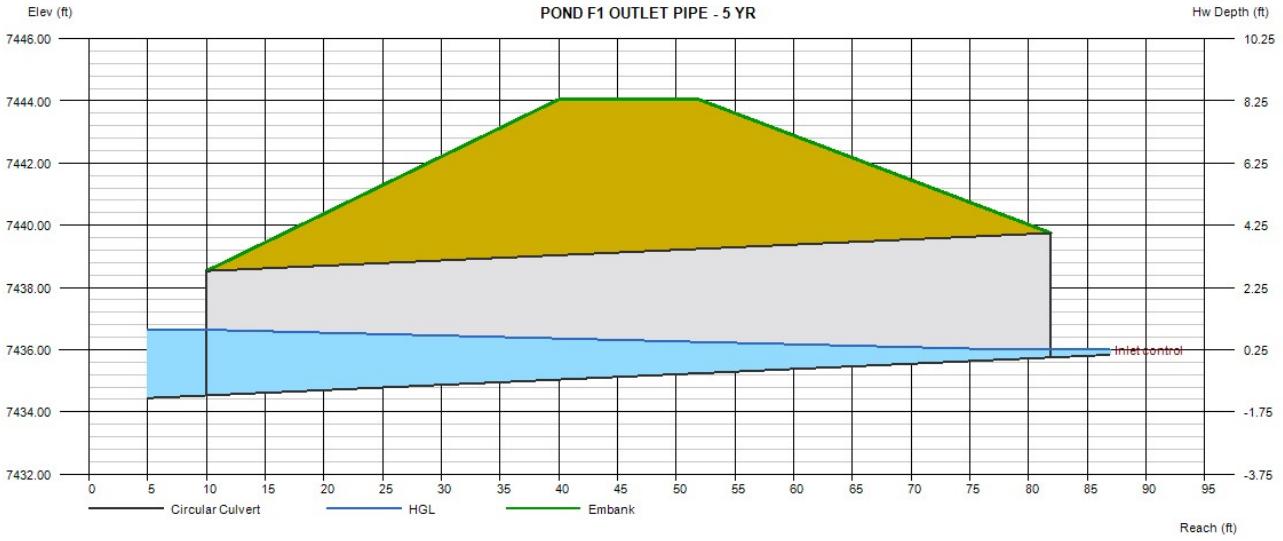
Top Elevation (ft)	=	7444.04
Top Width (ft)	=	12.00
Crest Width (ft)	=	0.00

Calculations

Qmin (cfs)	=	0.60
Qmax (cfs)	=	0.60
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	0.60
Qpipe (cfs)	=	0.60
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	0.09
Veloc Up (ft/s)	=	2.20
HGL Dn (ft)	=	7436.64
HGL Up (ft)	=	7435.97
Hw Elev (ft)	=	7436.01
Hw/D (ft)	=	0.07
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, Nov 13 2025

POND F1 OUTLET PIPE - 100 YR

Invert Elev Dn (ft)	=	7434.53
Pipe Length (ft)	=	71.90
Slope (%)	=	1.70
Invert Elev Up (ft)	=	7435.75
Rise (in)	=	48.0
Shape	=	Circular
Span (in)	=	48.0
No. Barrels	=	1
n-Value	=	0.013
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

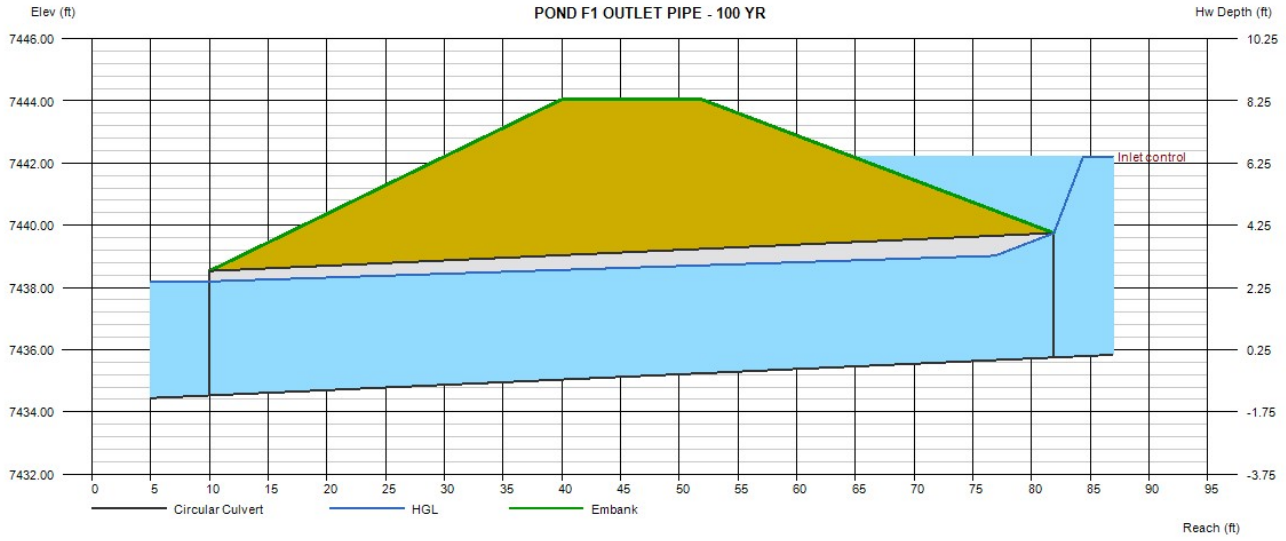
Top Elevation (ft)	=	7444.04
Top Width (ft)	=	12.00
Crest Width (ft)	=	0.00

Calculations

Qmin (cfs)	=	123.00
Qmax (cfs)	=	123.00
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	123.00
Qpipe (cfs)	=	123.00
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	10.20
Veloc Up (ft/s)	=	11.00
HGL Dn (ft)	=	7438.20
HGL Up (ft)	=	7439.08
Hw Elev (ft)	=	7442.21
Hw/D (ft)	=	1.61
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, Nov 13 2025

POND F2 OUTLET - 5 YR

Invert Elev Dn (ft)	=	7426.48
Pipe Length (ft)	=	52.32
Slope (%)	=	0.99
Invert Elev Up (ft)	=	7427.00
Rise (in)	=	18.0
Shape	=	Circular
Span (in)	=	18.0
No. Barrels	=	1
n-Value	=	0.013
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

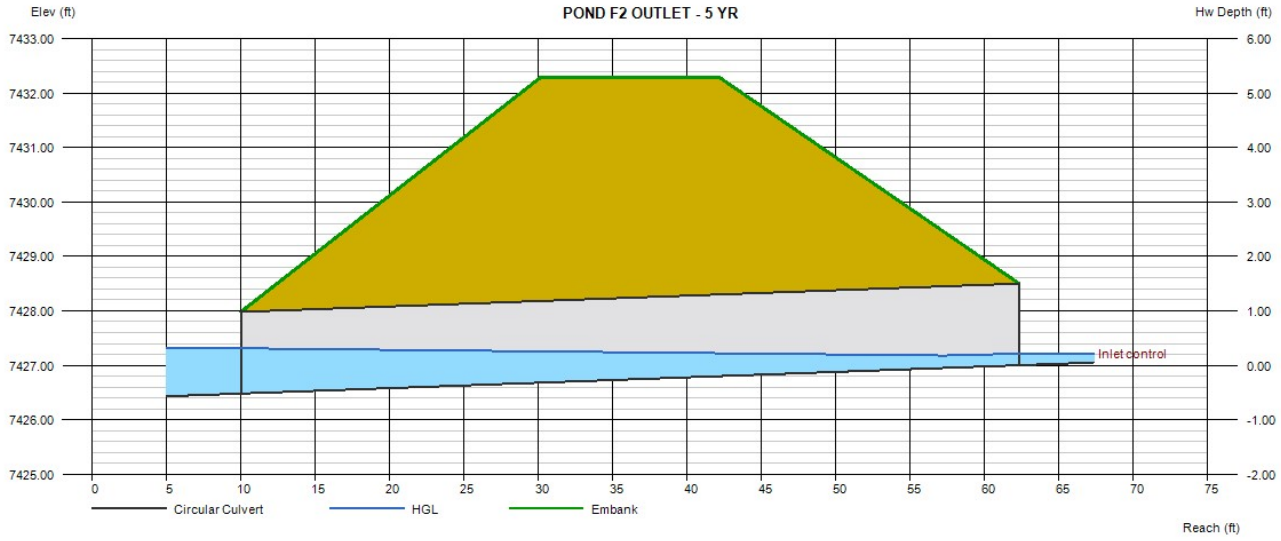
Top Elevation (ft)	=	7432.29
Top Width (ft)	=	12.00
Crest Width (ft)	=	0.00

Calculations

Qmin (cfs)	=	0.20
Qmax (cfs)	=	0.20
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	0.20
Qpipe (cfs)	=	0.20
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	0.20
Veloc Up (ft/s)	=	1.90
HGL Dn (ft)	=	7427.31
HGL Up (ft)	=	7427.17
Hw Elev (ft)	=	7427.21
Hw/D (ft)	=	0.14
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, Nov 13 2025

POND F2 OUTLET - 100 YR

Invert Elev Dn (ft)	=	7426.48
Pipe Length (ft)	=	52.32
Slope (%)	=	0.99
Invert Elev Up (ft)	=	7427.00
Rise (in)	=	18.0
Shape	=	Circular
Span (in)	=	18.0
No. Barrels	=	1
n-Value	=	0.013
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

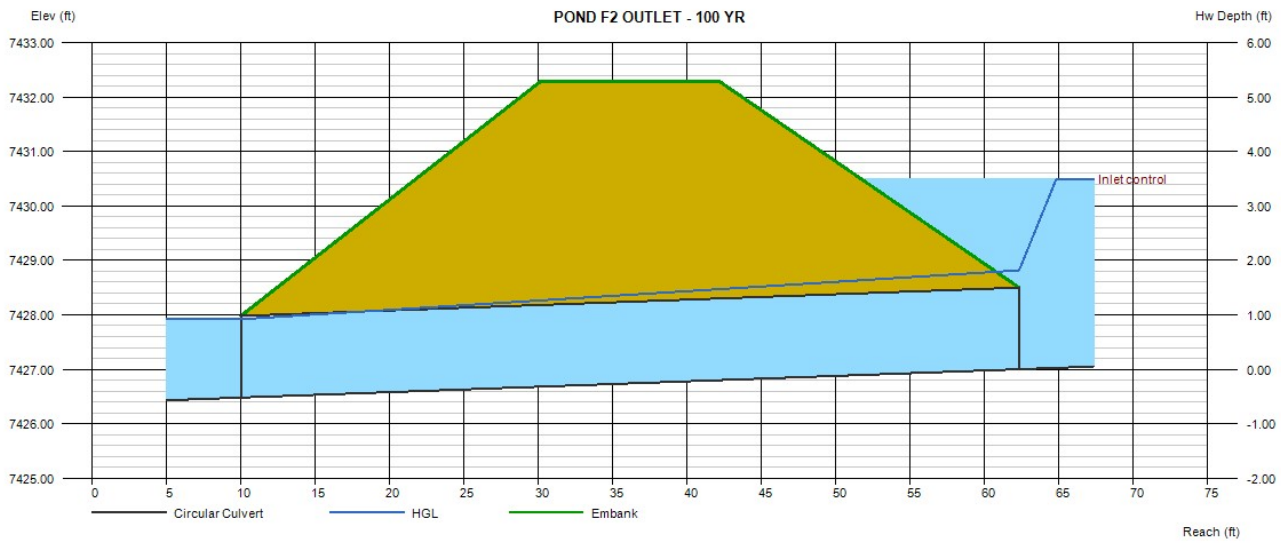
Top Elevation (ft)	=	7432.29
Top Width (ft)	=	12.00
Crest Width (ft)	=	0.00

Calculations

Qmin (cfs)	=	14.00
Qmax (cfs)	=	14.00
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	14.00
Qpipe (cfs)	=	14.00
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	8.03
Veloc Up (ft/s)	=	7.92
HGL Dn (ft)	=	7427.92
HGL Up (ft)	=	7428.82
Hw Elev (ft)	=	7430.50
Hw/D (ft)	=	2.33
Flow Regime	=	Inlet Control



Worksheet for Swale Section A-A

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.030
Channel Slope	7.10 %
Left Side Slope	4.00 H:V
Right Side Slope	4.00 H:V
Discharge	20.20 cfs

Results	
Normal Depth	0.8 ft
Flow Area	2.8 ft²
Wetted Perimeter	6.9 ft
Hydraulic Radius	0.4 ft
Top Width	6.69 ft
Critical Depth	1.1 ft
Critical Slope	1.67 %
Velocity	7.23 ft/s
Velocity Head	0.81 ft
Specific Energy	1.65 ft
Froude Number	1.972
Flow Type	Supercritical

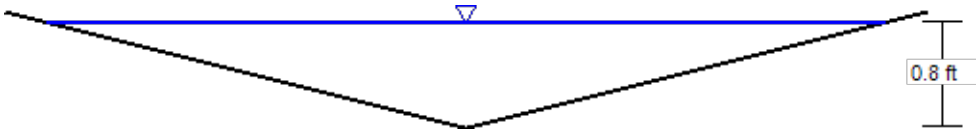
GVF Input Data	
Downstream Depth	0.0 ft
Length	0.0 ft
Number Of Steps	0

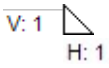
GVF Output Data	
Upstream Depth	0.0 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.8 ft
Critical Depth	1.1 ft
Channel Slope	7.10 %
Critical Slope	1.67 %

Cross Section for Swale Section A-A

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.030
Channel Slope	7.10 %
Normal Depth	0.8 ft
Left Side Slope	4.00 H:V
Right Side Slope	4.00 H:V
Discharge	20.20 cfs





Worksheet for Swale Section B-B

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.030
Channel Slope	7.70 %
Left Side Slope	4.00 H:V
Right Side Slope	4.00 H:V
Discharge	31.30 cfs

Results	
Normal Depth	1.0 ft
Flow Area	3.8 ft²
Wetted Perimeter	8.0 ft
Hydraulic Radius	0.5 ft
Top Width	7.76 ft
Critical Depth	1.3 ft
Critical Slope	1.57 %
Velocity	8.32 ft/s
Velocity Head	1.07 ft
Specific Energy	2.04 ft
Froude Number	2.105
Flow Type	Supercritical

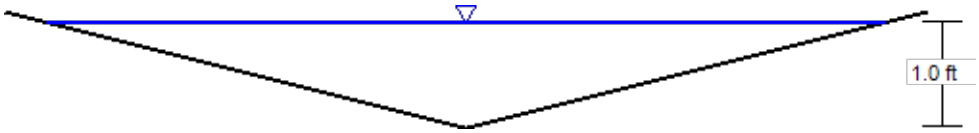
GVF Input Data	
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Length	0.0 ft
Number Of Steps	0

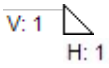
GVF Output Data	
Upstream Depth	0.0 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	1.0 ft
Critical Depth	1.3 ft
Channel Slope	7.70 %
Critical Slope	1.57 %

Cross Section for Swale Section B-B

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.030
Channel Slope	7.70 %
Normal Depth	1.0 ft
Left Side Slope	4.00 H:V
Right Side Slope	4.00 H:V
Discharge	31.30 cfs





Worksheet for Swale Section C-C

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.030
Channel Slope	2.00 %
Left Side Slope	4.00 H:V
Right Side Slope	4.00 H:V
Bottom Width	12.00 ft
Discharge	29.20 cfs

Results	
Normal Depth	0.5 ft
Flow Area	7.2 ft²
Wetted Perimeter	16.2 ft
Hydraulic Radius	0.4 ft
Top Width	16.09 ft
Critical Depth	0.5 ft
Critical Slope	1.71 %
Velocity	4.07 ft/s
Velocity Head	0.26 ft
Specific Energy	0.77 ft
Froude Number	1.073
Flow Type	Supercritical

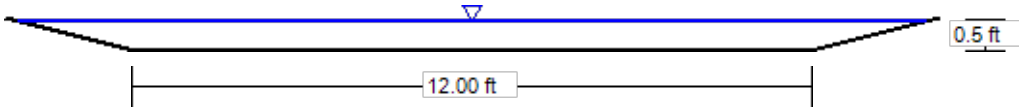
GVF Input Data	
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Length	0.0 ft
Number Of Steps	0

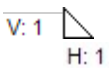
GVF Output Data	
Upstream Depth	0.0 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.5 ft
Critical Depth	0.5 ft
Channel Slope	2.00 %
Critical Slope	1.71 %

Cross Section for Swale Section C-C

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.030
Channel Slope	2.00 %
Normal Depth	0.5 ft
Left Side Slope	4.00 H:V
Right Side Slope	4.00 H:V
Bottom Width	12.00 ft
Discharge	29.20 cfs





Worksheet for Swale Section D-D

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.030
Channel Slope	5.50 %
Left Side Slope	3.00 H:V
Right Side Slope	3.00 H:V
Discharge	39.50 cfs

Results	
Normal Depth	1.3 ft
Flow Area	4.8 ft²
Wetted Perimeter	8.0 ft
Hydraulic Radius	0.6 ft
Top Width	7.58 ft
Critical Depth	1.6 ft
Critical Slope	1.51 %
Velocity	8.25 ft/s
Velocity Head	1.06 ft
Specific Energy	2.32 ft
Froude Number	1.831
Flow Type	Supercritical

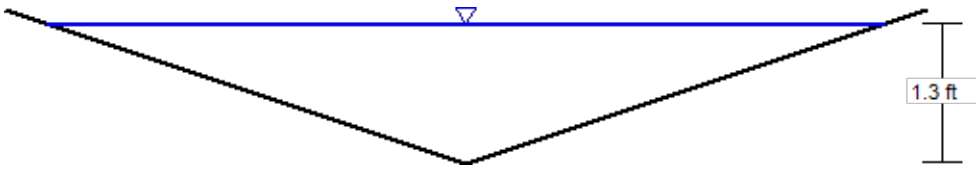
GVF Input Data	
Downstream Depth	0.0 ft
Length	0.0 ft
Number Of Steps	0

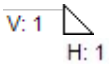
GVF Output Data	
Upstream Depth	0.0 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	1.3 ft
Critical Depth	1.6 ft
Channel Slope	5.50 %
Critical Slope	1.51 %

Cross Section for Swale Section D-D

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.030
Channel Slope	5.50 %
Normal Depth	1.3 ft
Left Side Slope	3.00 H:V
Right Side Slope	3.00 H:V
Discharge	39.50 cfs





Worksheet for Swale Section E-E

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.030
Channel Slope	8.10 %
Left Side Slope	4.00 H:V
Right Side Slope	4.00 H:V
Discharge	10.80 cfs

Results	
Normal Depth	0.6 ft
Flow Area	1.7 ft²
Wetted Perimeter	5.3 ft
Hydraulic Radius	0.3 ft
Top Width	5.16 ft
Critical Depth	0.9 ft
Critical Slope	1.81 %
Velocity	6.49 ft/s
Velocity Head	0.65 ft
Specific Energy	1.30 ft
Froude Number	2.015
Flow Type	Supercritical

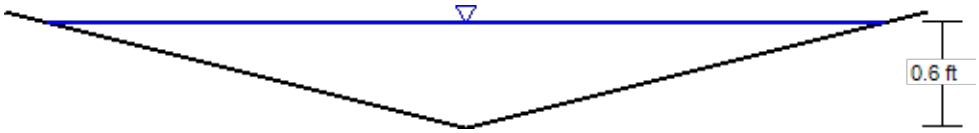
GVF Input Data	
Downstream Depth	0.0 ft
Length	0.0 ft
Number Of Steps	0

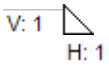
GVF Output Data	
Upstream Depth	0.0 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.6 ft
Critical Depth	0.9 ft
Channel Slope	8.10 %
Critical Slope	1.81 %

Cross Section for Swale Section E-E

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.030
Channel Slope	8.10 %
Normal Depth	0.6 ft
Left Side Slope	4.00 H:V
Right Side Slope	4.00 H:V
Discharge	10.80 cfs





Worksheet for Swale Section F-F

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	1.20 %
Discharge	253.40 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+45	7,465.23
0+61	7,464.00
0+67	7,462.22
0+79	7,462.00
0+88	7,461.23
0+94	7,460.00
1+05	7,460.00
1+18	7,461.59
1+34	7,463.08
1+45	7,464.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+45, 7,465.23)	(1+45, 7,464.00)	0.030

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	1.9 ft
Roughness Coefficient	0.030
Elevation	7,461.86 ft
Elevation Range	7,460.0 to 7,465.2 ft
Flow Area	43.8 ft²
Wetted Perimeter	39.8 ft
Hydraulic Radius	1.1 ft
Top Width	39.58 ft
Normal Depth	1.9 ft
Critical Depth	1.8 ft
Critical Slope	1.28 %

Worksheet for Swale Section F-F

Results	
Velocity	5.78 ft/s
Velocity Head	0.52 ft
Specific Energy	2.38 ft
Froude Number	0.969
Flow Type	Subcritical

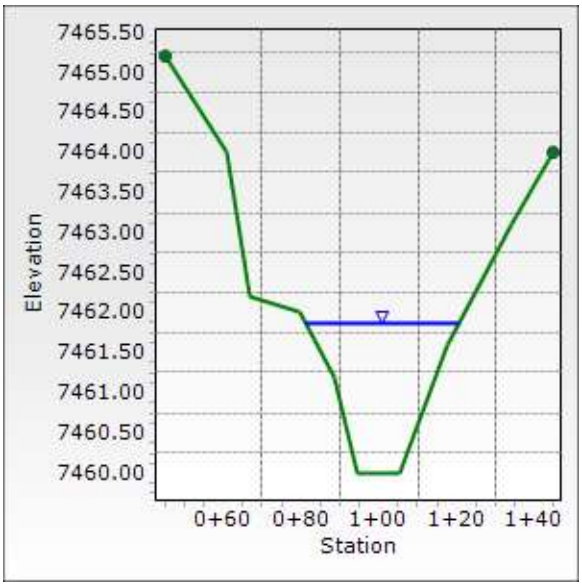
GVF Input Data	
Downstream Depth	0.0 ft
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	1.9 ft
Critical Depth	1.8 ft
Channel Slope	1.20 %
Critical Slope	1.28 %

Cross Section for Swale Section F-F

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	1.20 %
Normal Depth	1.9 ft
Discharge	253.40 cfs



Worksheet for Swale Section G-G

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	1.30 %
Discharge	212.90 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+23	7,499.32
0+33	7,497.89
0+46	7,496.00
0+59	7,494.15
0+78	7,493.00
0+94	7,492.16
1+03	7,492.00
1+20	7,493.28
1+37	7,494.51
1+57	7,495.81
1+69	7,497.06
1+83	7,498.44

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+23, 7,499.32)	(1+83, 7,498.44)	0.030

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	1.5 ft
Roughness Coefficient	0.030
Elevation	7,493.47 ft
Elevation Range	7,492.0 to 7,499.3 ft
Flow Area	43.1 ft²
Wetted Perimeter	52.7 ft
Hydraulic Radius	0.8 ft
Top Width	52.61 ft
Normal Depth	1.5 ft

Worksheet for Swale Section G-G

Results	
Critical Depth	1.4 ft
Critical Slope	1.41 %
Velocity	4.94 ft/s
Velocity Head	0.38 ft
Specific Energy	1.85 ft
Froude Number	0.962
Flow Type	Subcritical

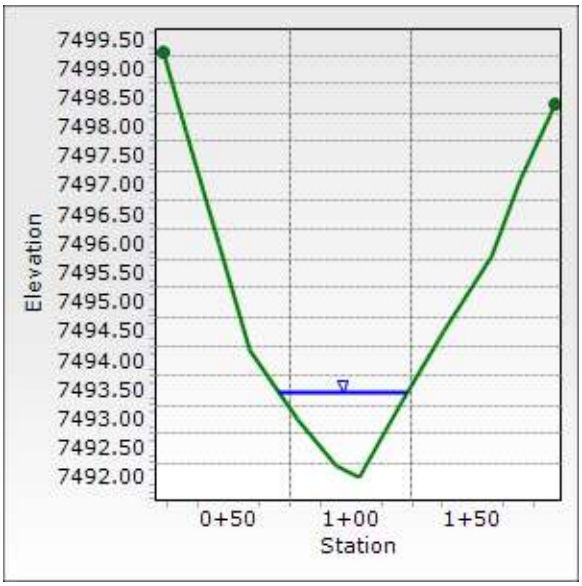
GVF Input Data	
Downstream Depth	0.0 ft
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	1.5 ft
Critical Depth	1.4 ft
Channel Slope	1.30 %
Critical Slope	1.41 %

Cross Section for Swale Section G-G

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	1.30 %
Normal Depth	1.5 ft
Discharge	212.90 cfs



Worksheet for Street Section F1 - Basin F11

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.030
Channel Slope	5.33 %
Left Side Slope	3.00 H:V
Right Side Slope	4.00 H:V
Discharge	20.20 cfs

Results	
Normal Depth	0.9 ft
Flow Area	3.0 ft²
Wetted Perimeter	6.8 ft
Hydraulic Radius	0.4 ft
Top Width	6.51 ft
Critical Depth	1.2 ft
Critical Slope	1.66 %
Velocity	6.68 ft/s
Velocity Head	0.69 ft
Specific Energy	1.62 ft
Froude Number	1.728
Flow Type	Supercritical

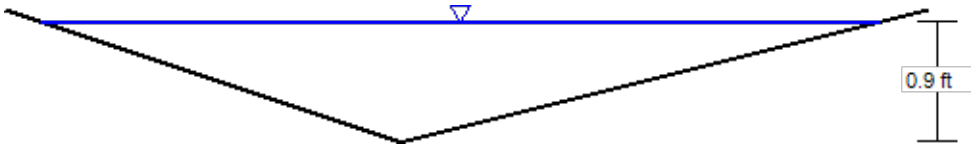
GVF Input Data	
Downstream Depth	0.0 ft
Length	0.0 ft
Number Of Steps	0

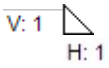
GVF Output Data	
Upstream Depth	0.0 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.9 ft
Critical Depth	1.2 ft
Channel Slope	5.33 %
Critical Slope	1.66 %

Cross Section for Street Section F1 - Basin F11

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.030
Channel Slope	5.33 %
Normal Depth	0.9 ft
Left Side Slope	3.00 H:V
Right Side Slope	4.00 H:V
Discharge	20.20 cfs





Worksheet for Street Section F1 - Basin F8

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.030
Channel Slope	5.33 %
Left Side Slope	4.00 H:V
Right Side Slope	3.00 H:V
Discharge	29.20 cfs

Results	
Normal Depth	1.1 ft
Flow Area	4.0 ft²
Wetted Perimeter	7.8 ft
Hydraulic Radius	0.5 ft
Top Width	7.47 ft
Critical Depth	1.3 ft
Critical Slope	1.58 %
Velocity	7.33 ft/s
Velocity Head	0.83 ft
Specific Energy	1.90 ft
Froude Number	1.768
Flow Type	Supercritical

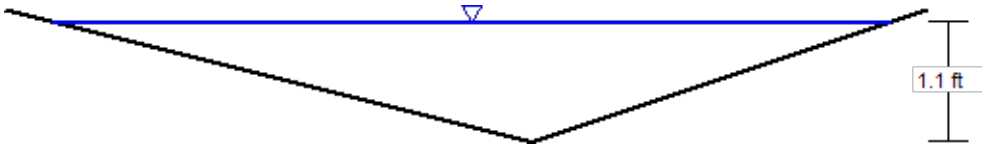
GVF Input Data	
Downstream Depth	0.0 ft
Length	0.0 ft
Number Of Steps	0

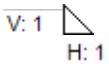
GVF Output Data	
Upstream Depth	0.0 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	1.1 ft
Critical Depth	1.3 ft
Channel Slope	5.33 %
Critical Slope	1.58 %

Cross Section for Street Section F1 - Basin F8

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Roughness Coefficient	0.030	
Channel Slope	5.33	%
Normal Depth	1.1	ft
Left Side Slope	4.00	H:V
Right Side Slope	3.00	H:V
Discharge	29.20	cfs





Worksheet for Street Section F2 - Basin F10.2

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.030
Channel Slope	2.00 %
Left Side Slope	3.00 H:V
Right Side Slope	4.00 H:V
Discharge	35.10 cfs

Results	
Normal Depth	1.4 ft
Flow Area	6.6 ft²
Wetted Perimeter	10.0 ft
Hydraulic Radius	0.7 ft
Top Width	9.62 ft
Critical Depth	1.4 ft
Critical Slope	1.54 %
Velocity	5.31 ft/s
Velocity Head	0.44 ft
Specific Energy	1.81 ft
Froude Number	1.130
Flow Type	Supercritical

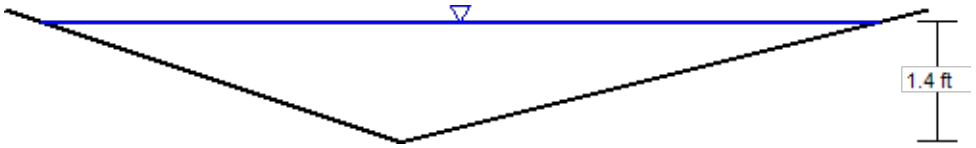
GVF Input Data	
Downstream Depth	0.0 ft
Length	0.0 ft
Number Of Steps	0

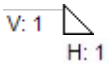
GVF Output Data	
Upstream Depth	0.0 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	1.4 ft
Critical Depth	1.4 ft
Channel Slope	2.00 %
Critical Slope	1.54 %

Cross Section for Street Section F2 - Basin F10.2

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.030
Channel Slope	2.00 %
Normal Depth	1.4 ft
Left Side Slope	3.00 H:V
Right Side Slope	4.00 H:V
Discharge	35.10 cfs





Worksheet for Street Section F2 - Basin F6

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.030
Channel Slope	2.00 %
Left Side Slope	4.00 H:V
Right Side Slope	3.00 H:V
Discharge	29.50 cfs

Results	
Normal Depth	1.3 ft
Flow Area	5.8 ft²
Wetted Perimeter	9.4 ft
Hydraulic Radius	0.6 ft
Top Width	9.01 ft
Critical Depth	1.3 ft
Critical Slope	1.58 %
Velocity	5.09 ft/s
Velocity Head	0.40 ft
Specific Energy	1.69 ft
Froude Number	1.117
Flow Type	Supercritical

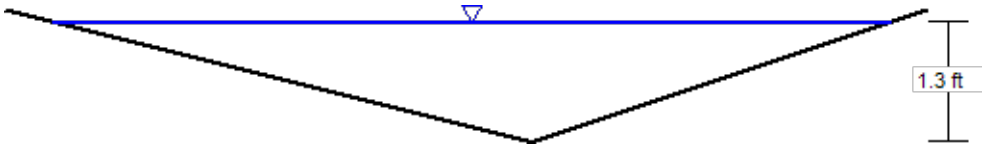
GVF Input Data	
Downstream Depth	0.0 ft
Length	0.0 ft
Number Of Steps	0

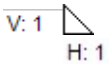
GVF Output Data	
Upstream Depth	0.0 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	1.3 ft
Critical Depth	1.3 ft
Channel Slope	2.00 %
Critical Slope	1.58 %

Cross Section for Street Section F2 - Basin F6

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Roughness Coefficient	0.030	
Channel Slope	2.00	%
Normal Depth	1.3	ft
Left Side Slope	4.00	H:V
Right Side Slope	3.00	H:V
Discharge	29.50	cfs





FROUDE NUMBER CALCULATIONS			CALCULATED BY:	CMD	DATE:	1/5/2026
PROJECT: 211030 FILING NO. 7			CHECKED BY:	RDL		
Froude Number Calculations: 100-YR						
Section	Velocity	Gravitational Constant	Hydraulic depth	Xsectional Area	top Width	Froude #
-	ft/s	ft/s^2	ft	ft^2	ft	N/A
A-A	7.23	32.17	0.42	2.80	6.69	1.97
B-B	8.32	32.17	0.49	3.8	7.76	2.10
C-C	4.07	32.17	0.45	7.2	16.09	1.07
D-D	8.25	32.17	0.63	4.8	7.58	1.83
E-E	6.49	32.17	0.33	1.7	5.16	1.99
F-F	5.78	32.17	1.11	43.8	39.58	0.97
G-G	4.94	32.17	0.82	43.1	52.61	0.96
SECTION F1 - WEST	6.68	32.17	0.46	3	6.51	1.73
SECTION F1 - EAST	7.33	32.17	0.54	4.0	7.47	1.77
SECTION F2 - WEST	5.31	32.17	0.69	6.6	9.62	1.13
SECTION F2 - EAST	5.09	32.17	0.64	5.8	9.01	1.12

SHEAR STRESS & CHANNEL LININGS		CALCULATED BY:	CMD	DATE:	1/5/2026
PROJECT: 211030 FILING NO. 7		CHECKED BY:	RDL		

Shear Stress Calculations: 100-YR				
Section	unit weight of water	Depth of flow	Slope	Shear Stress
-	lb/ft^3	ft	ft/ft	lb/ft^2
A-A	62.43	0.80	0.071	3.55
B-B	62.43	1.00	0.077	4.81
C-C	62.43	0.50	0.020	0.62
D-D	62.43	1.30	0.055	4.46
E-E	62.43	0.60	0.081	3.03
F-F	62.43	1.90	0.012	1.42
G-G	62.43	1.50	0.013	1.22
SECTION F1 - WEST	62.43	0.90	0.053	2.98
SECTION F1 - EAST	62.43	1.10	0.053	3.64
SECTION F2 - WEST	62.43	1.40	0.020	1.75
SECTION F2 - EAST	62.43	1.30	0.020	1.62

Channel Lining Determination					
Calculated Values			P300 Max Values		
Section	Shear Stress	Velocity	Shear Stress	Velocity	Lining Required
A-A	3.55	7.23	3	9	TMAX
B-B	4.81	8.32	3	9	TMAX
C-C	0.62	4.07	3	9	P300
D-D	4.46	8.25	3	9	TMAX
E-E	3.03	6.49	3	9	TMAX
F-F	1.42	5.78	3	9	NONE
G-G	1.22	4.94	3	9	NONE
SECTION F1 - WEST	2.98	6.68	3	9	P300
SECTION F1 - EAST	3.64	7.33	3	9	TMAX
SECTION F2 - WEST	1.75	5.31	3	9	P300
SECTION F2 - EAST	1.62	5.09	3	9	P300

Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Monday, Jan 5 2026

Concrete Rundown F7 5Yr

Trapezoidal

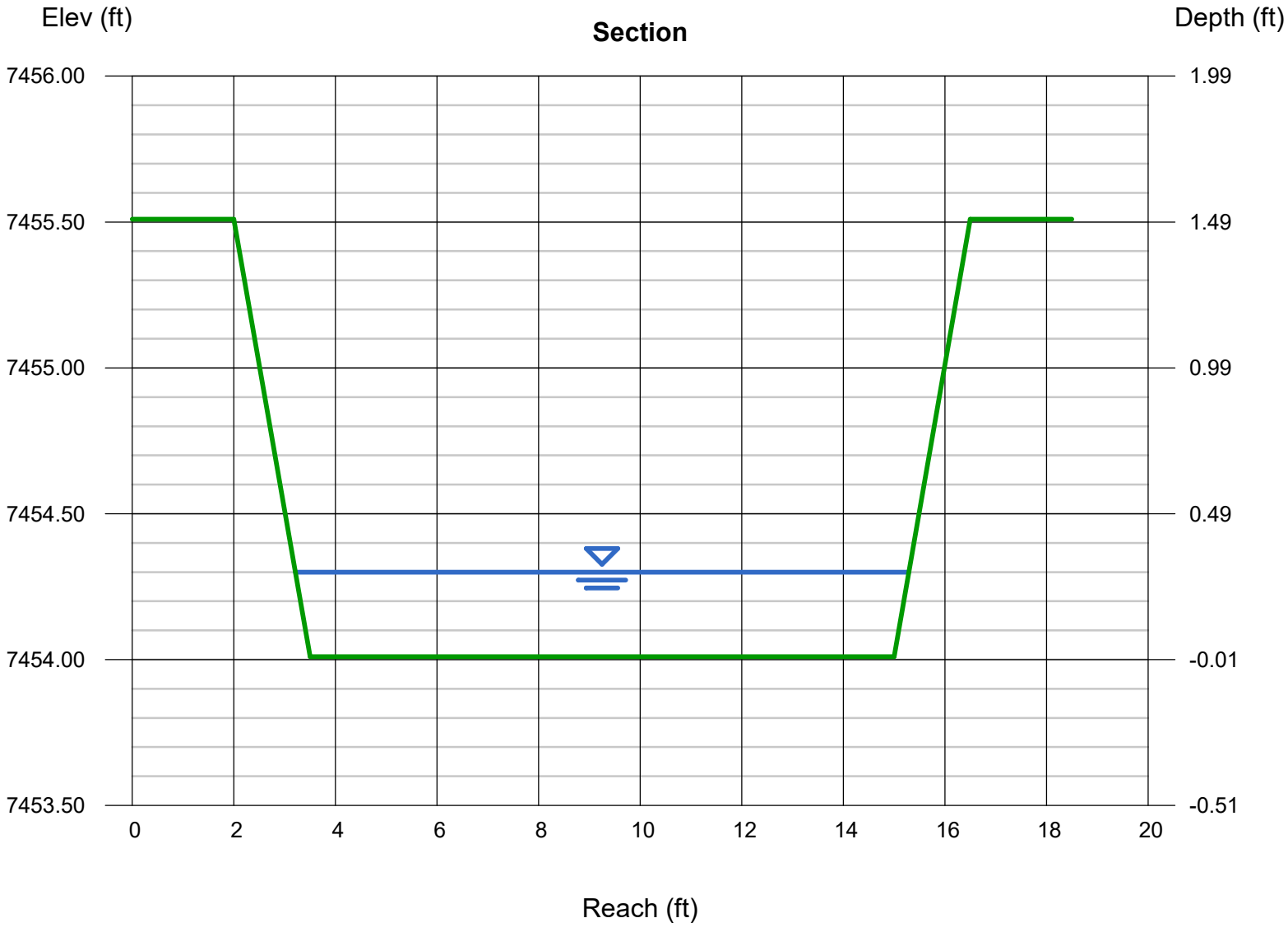
Bottom Width (ft)	= 11.50
Side Slopes (z:1)	= 1.00, 1.00
Total Depth (ft)	= 1.50
Invert Elev (ft)	= 7454.01
Slope (%)	= 11.62
N-Value	= 0.013

Calculations

Compute by:	Known Q
Known Q (cfs)	= 55.00

Highlighted

Depth (ft)	= 0.29
Q (cfs)	= 55.00
Area (sqft)	= 3.42
Velocity (ft/s)	= 16.09
Wetted Perim (ft)	= 12.32
Crit Depth, Yc (ft)	= 0.87
Top Width (ft)	= 12.08
EGL (ft)	= 4.31



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Monday, Jan 5 2026

Concrete Rundown F7 100Yr

Trapezoidal

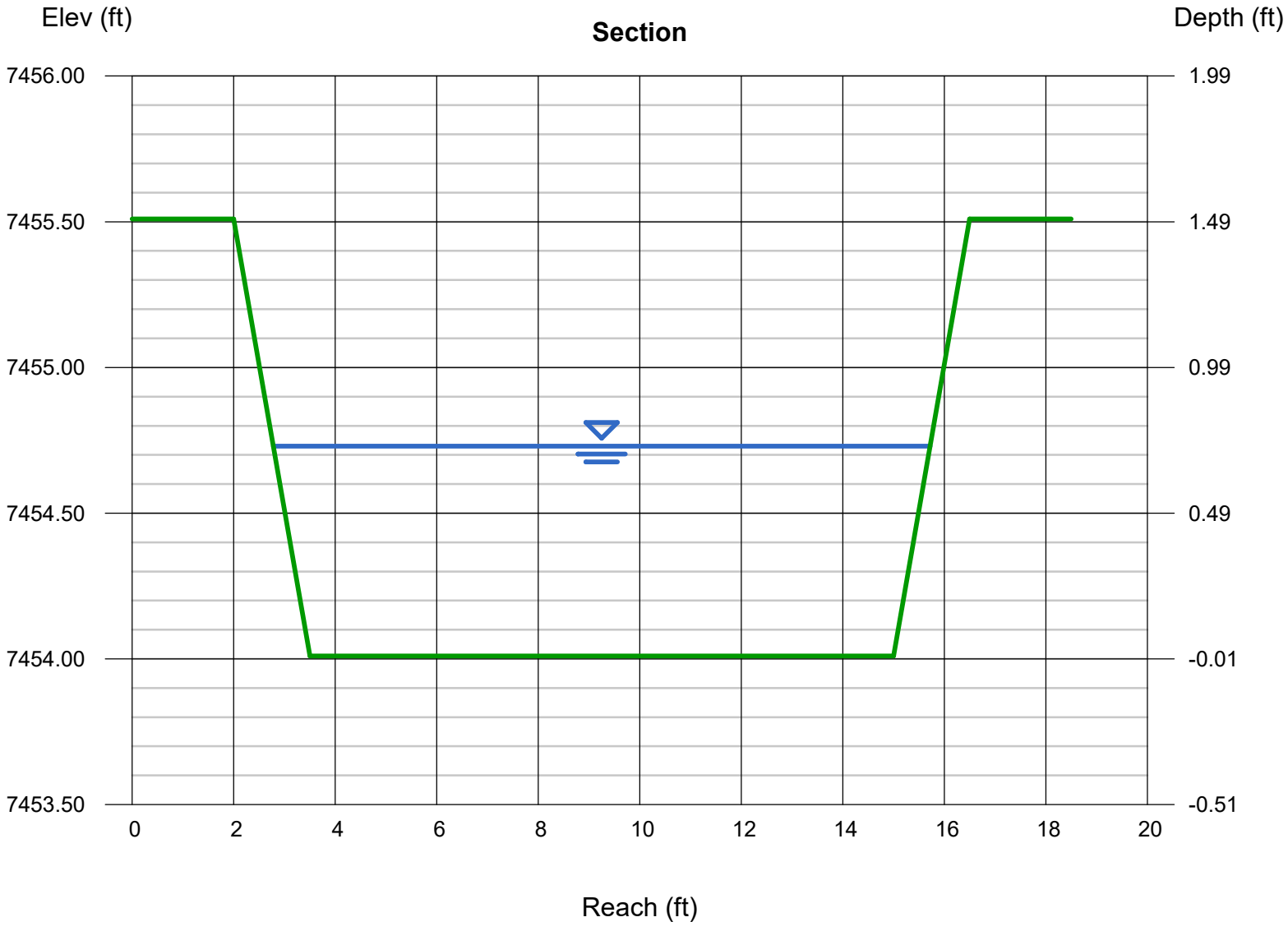
Bottom Width (ft)	= 11.50
Side Slopes (z:1)	= 1.00, 1.00
Total Depth (ft)	= 1.50
Invert Elev (ft)	= 7454.01
Slope (%)	= 11.62
N-Value	= 0.013

Calculations

Compute by:	Known Q
Known Q (cfs)	= 253.40

Highlighted

Depth (ft)	= 0.72
Q (cfs)	= 253.40
Area (sqft)	= 8.80
Velocity (ft/s)	= 28.80
Wetted Perim (ft)	= 13.54
Crit Depth, Yc (ft)	= 1.50
Top Width (ft)	= 12.94
EGL (ft)	= 13.62



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Monday, Jan 5 2026

Concrete Rundown F11 5Yr

Triangular

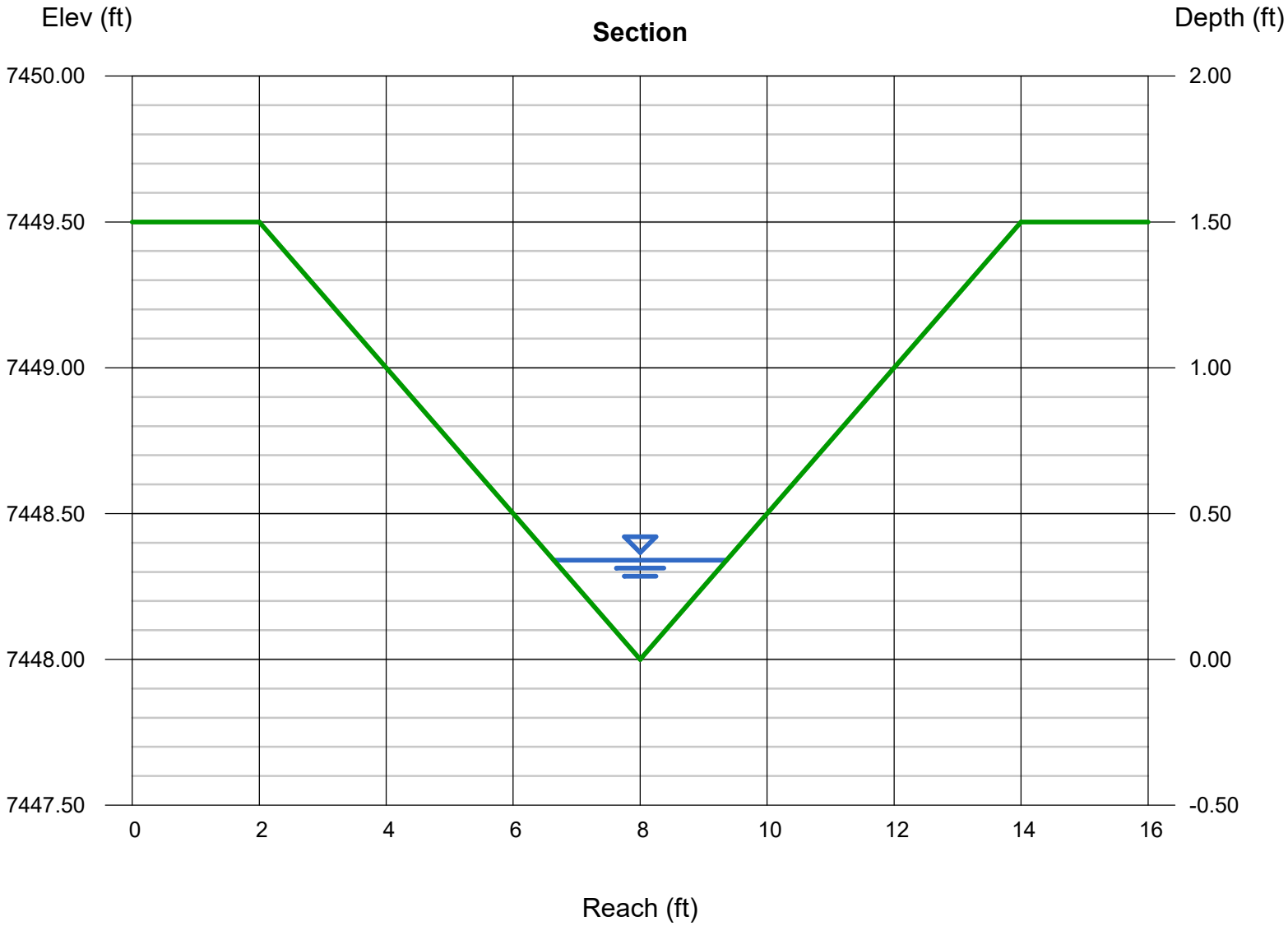
Side Slopes (z:1)	= 4.00, 4.00
Total Depth (ft)	= 1.50
Invert Elev (ft)	= 7448.00
Slope (%)	= 25.00
N-Value	= 0.013

Calculations

Compute by:	Known Q
Known Q (cfs)	= 7.60

Highlighted

Depth (ft)	= 0.34
Q (cfs)	= 7.600
Area (sqft)	= 0.46
Velocity (ft/s)	= 16.44
Wetted Perim (ft)	= 2.80
Crit Depth, Yc (ft)	= 0.75
Top Width (ft)	= 2.72
EGL (ft)	= 4.54



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Monday, Jan 5 2026

Concrete Rundown F11 100Yr

Triangular

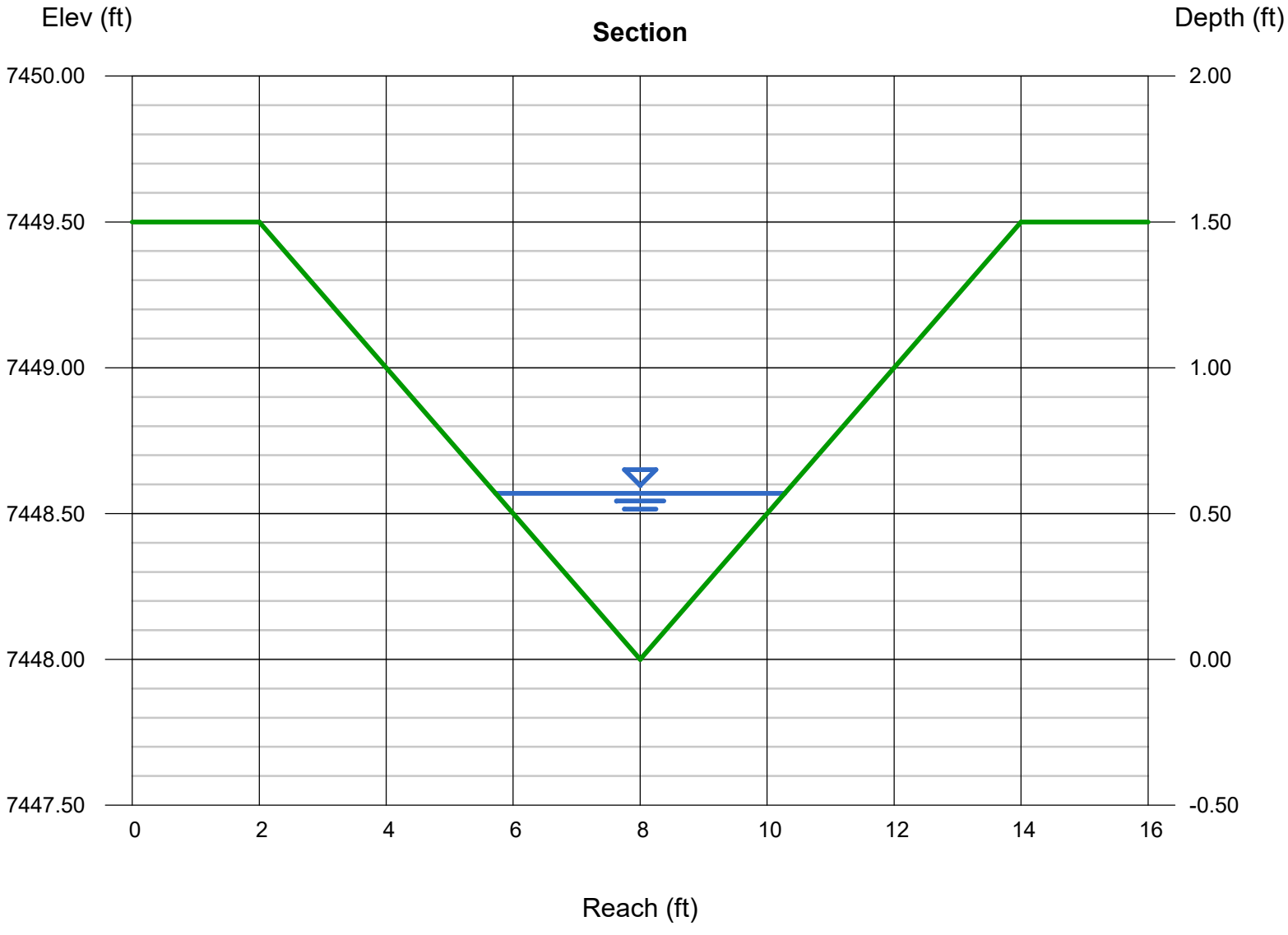
Side Slopes (z:1)	= 4.00, 4.00
Total Depth (ft)	= 1.50
Invert Elev (ft)	= 7448.00
Slope (%)	= 25.00
N-Value	= 0.013

Calculations

Compute by:	Known Q
Known Q (cfs)	= 31.30

Highlighted

Depth (ft)	= 0.57
Q (cfs)	= 31.30
Area (sqft)	= 1.30
Velocity (ft/s)	= 24.08
Wetted Perim (ft)	= 4.70
Crit Depth, Yc (ft)	= 1.31
Top Width (ft)	= 4.56
EGL (ft)	= 9.59



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, May 6 2026

POND F1 OUTLET - 100 YR

Trapezoidal

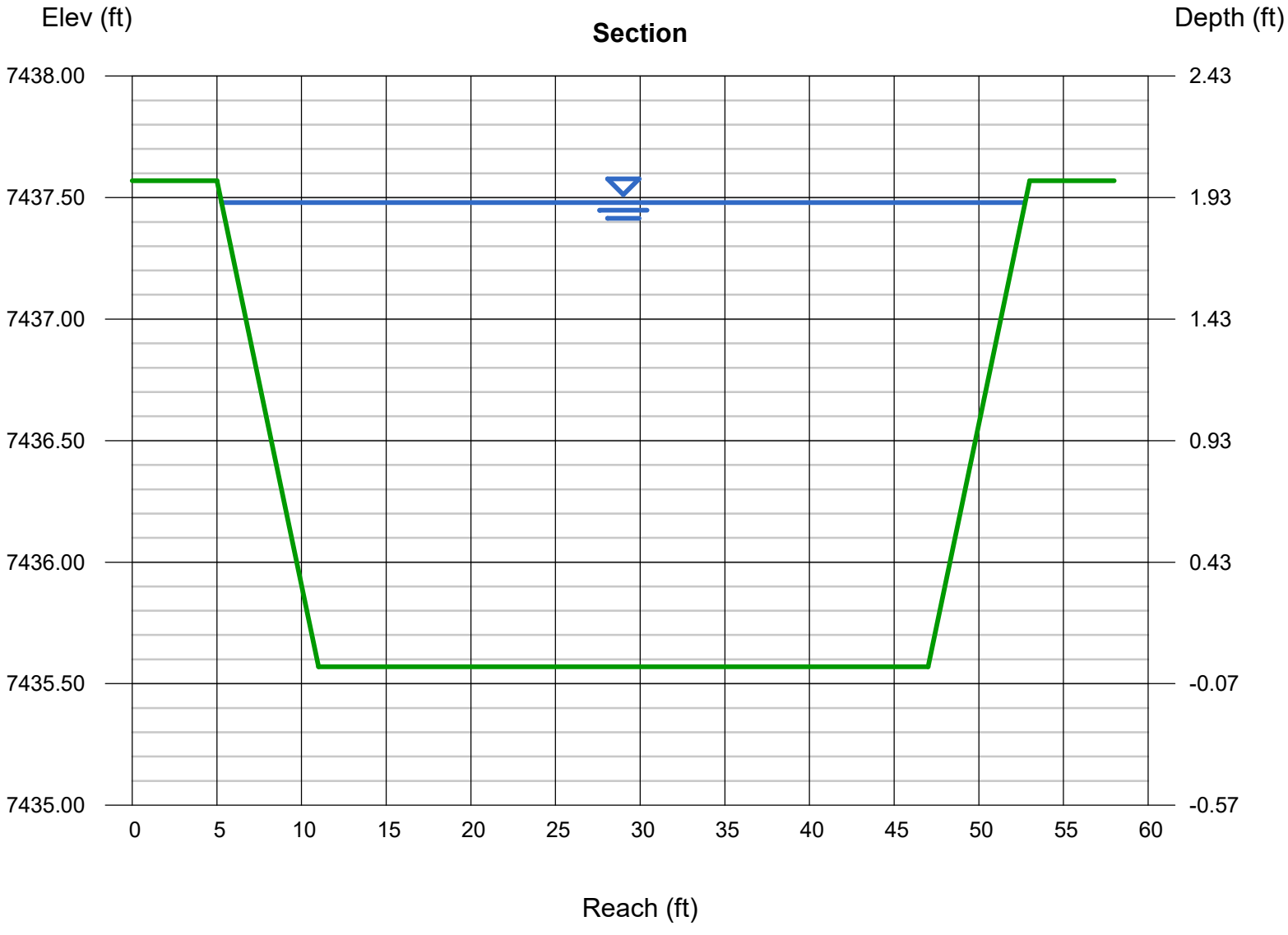
Bottom Width (ft)	= 36.00
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 2.00
Invert Elev (ft)	= 7435.57
Slope (%)	= 0.05
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 123.00

Highlighted

Depth (ft)	= 1.91
Q (cfs)	= 123.00
Area (sqft)	= 79.70
Velocity (ft/s)	= 1.54
Wetted Perim (ft)	= 48.08
Crit Depth, Yc (ft)	= 0.70
Top Width (ft)	= 47.46
EGL (ft)	= 1.95



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, May 6 2026

POND F2 OUTLET - 100 YR

Trapezoidal

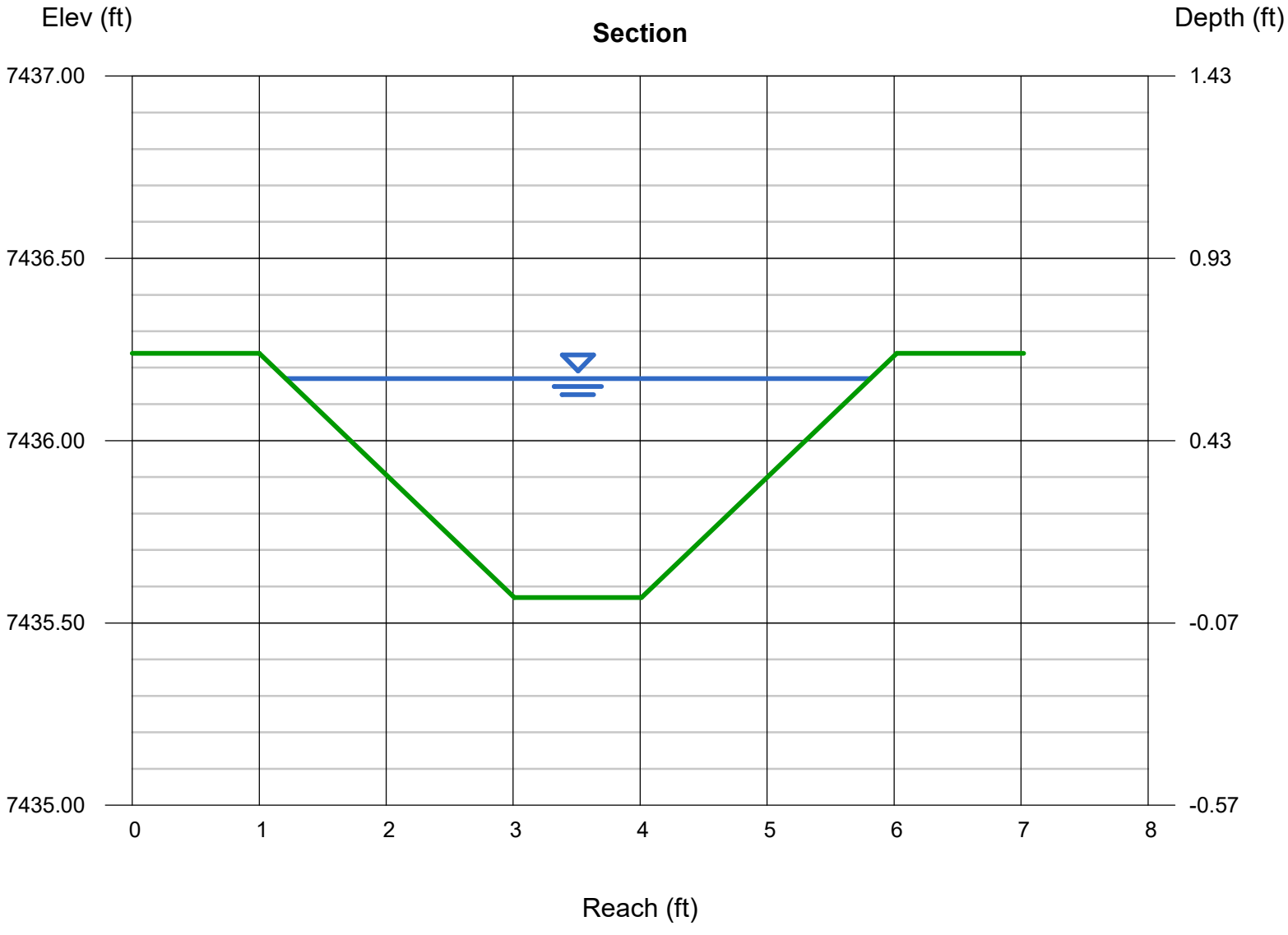
Bottom Width (ft)	= 1.00
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 0.67
Invert Elev (ft)	= 7435.57
Slope (%)	= 12.30
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 14.00

Highlighted

Depth (ft)	= 0.60
Q (cfs)	= 14.00
Area (sqft)	= 1.68
Velocity (ft/s)	= 8.33
Wetted Perim (ft)	= 4.79
Crit Depth, Yc (ft)	= 0.67
Top Width (ft)	= 4.60
EGL (ft)	= 1.68



HRGreen	FLYING HORSE NORTH FILING NO. 7	Calc'd by:	CMD
	211030	Checked by:	RDL
	CULVERT 3 RIPRAP	Date:	5/4/2026

Input Parameters		
Flow (Q)	126.5	cfs
Tailwater depth (Y_t)	1.80	ft
Conduit Diameter (D_c)	54	in
Expansion Factor (per Fig. 9-35)	4.4	
Soil Type	Non-Cohesive Soils	

Calculated Parameters		
Froude Parameter ($Q/D^{2.5}$)	2.94	
D_{50} =	10.98	in
UDFCD Riprap Type =	Type M	
Design D_{50} =	12	in
Minimum Mantle Thickness =	24	in
Minimum Length of Apron =	42.0	ft

Calculated D_{50} for riprap was calculated using Equation 9-16 in the USDCM Vol 2.

$$d_{50} = \frac{0.023Q}{Y_t^{1.2} D_c^{0.3}}$$

Calculated minimum length of apron was calculated using Equations 9-11 and 9-12 in the USDCM Vol. 2

$$L_p = \left(\frac{1}{2\tan\theta}\right)\left(\frac{A_t}{Y_t} - W\right)$$ Equation 9-11

$$A_t = \frac{Q}{V}$$ Equation 9-12

Where:

L_p = length of protection (ft)

W = width of the conduit (ft, use diameter for circular conduits)

Y_t = tailwater depth (ft)

θ = the expansion angle of the culvert flow

Where:

Q = design discharge (cfs)

V = the allowable non-eroding velocity in the downstream channel (ft/sec)

A_t = required area of flow at allowable velocity (ft^2)

Note:

[1] Calculations follow criteria in the USDCM Vol.2 Chapter 9

[2] Calculations assume a circular culvert

[3] This spreadsheet assumes y_t/D_t=0.4 in cases where y_t is unknown or a hydraulic jump is suspected downstream of the outlet.

[4] Per the USDCM Vol.2 in no case should L_p be less than 3D, nor does L_p need to be greater than 10D whenever the Froude parameter is less than 6.0. whenever the Froude parameter is greater than 6, increase the maximum L_p required by 1/4 D_c for each whole number by which the Froude parameter is greater than 6

HRGreen	FLYING HORSE NORTH FILING NO. 7	Calc'd by:	CMD
	211030	Checked by:	RDL
	CULVERT 4.1 RIPRAP	Date:	5/4/2026

Input Parameters		
Flow (Q)	5.4	cfs
Tailwater depth (Y_t)	0.60	ft
Conduit Diameter (D_c)	18	in
Expansion Factor (per Fig. 9-35)	5.75	
Soil Type	Non-Cohesive Soils	

Calculated Parameters		
Froude Parameter ($Q/D^{2.5}$)	3.50	
D_{50} =	2.44	in
UDFCD Riprap Type =	Type VL	
Design D_{50} =	6	in
Minimum Mantle Thickness =	12	in
Minimum Length of Apron =	4.5	ft

Calculated D_{50} for riprap was calculated using Equation 9-16 in the USDCM Vol 2.

$$d_{50} = \frac{0.023Q}{Y_t^{1.2} D_c^{0.3}}$$

Calculated minimum length of apron was calculated using Equations 9-11 and 9-12 in the USDCM Vol. 2

$$L_p = \left(\frac{1}{2\tan\theta}\right)\left(\frac{A_t}{Y_t} - W\right)$$ Equation 9-11

$$A_t = \frac{Q}{V}$$ Equation 9-12

Where:

L_p = length of protection (ft)

W = width of the conduit (ft, use diameter for circular conduits)

Y_t = tailwater depth (ft)

θ = the expansion angle of the culvert flow

Where:

Q = design discharge (cfs)

V = the allowable non-eroding velocity in the downstream channel (ft/sec)

A_t = required area of flow at allowable velocity (ft^2)

Note:

[1] Calculations follow criteria in the USDCM Vol.2 Chapter 9

[2] Calculations assume a circular culvert

[3] This spreadsheet assumes y_t/D_t=0.4 in cases where y_t is unknown or a hydraulic jump is suspected downstream of the outlet.

[4] Per the USDCM Vol.2 in no case should L_p be less than 3D, nor does L_p need to be greater than 10D whenever the Froude parameter is less than 6.0. whenever the Froude parameter is greater than 6, increase the maximum L_p required by 1/4 D_c for each whole number by which the Froude parameter is greater than 6

HRGreen	FLYING HORSE NORTH FILING NO. 7	Calc'd by:	CMD
	211030	Checked by:	RDL
	CULVERT 4.2 RIPRAP	Date:	5/4/2026

Input Parameters		
Flow (Q)	5.4	cfs
Tailwater depth (Y_t)	0.60	ft
Conduit Diameter (D_c)	18	in
Expansion Factor (per Fig. 9-35)	5.75	
Soil Type	Non-Cohesive Soils	

Calculated Parameters		
Froude Parameter ($Q/D^{2.5}$)	3.50	
D_{50} =	2.44	in
UDFCD Riprap Type =	Type VL	
Design D_{50} =	6	in
Minimum Mantle Thickness =	12	in
Minimum Length of Apron =	4.5	ft

Calculated D_{50} for riprap was calculated using Equation 9-16 in the USDCM Vol 2.

$$d_{50} = \frac{0.023Q}{Y_t^{1.2} D_c^{0.3}}$$

Calculated minimum length of apron was calculated using Equations 9-11 and 9-12 in the USDCM Vol. 2

$$L_p = \left(\frac{1}{2\tan\theta}\right)\left(\frac{A_t}{Y_t} - W\right)$$ Equation 9-11

Where:

L_p = length of protection (ft)

W = width of the conduit (ft, use diameter for circular conduits)

Y_t = tailwater depth (ft)

θ = the expansion angle of the culvert flow

$$A_t = \frac{Q}{V}$$ Equation 9-12

Where:

Q = design discharge (cfs)

V = the allowable non-eroding velocity in the downstream channel (ft/sec)

A_t = required area of flow at allowable velocity (ft^2)

Note:

[1] Calculations follow criteria in the USDCM Vol.2 Chapter 9

[2] Calculations assume a circular culvert

[3] This spreadsheet assumes y_t/D_t=0.4 in cases where y_t is unknown or a hydraulic jump is suspected downstream of the outlet.

[4] Per the USDCM Vol.2 in no case should L_p be less than 3D, nor does L_p need to be greater than 10D whenever the Froude parameter is less than 6.0. whenever the Froude parameter is greater than 6, increase the maximum L_p required by 1/4 D_c for each whole number by which the Froude parameter is greater than 6

HRGreen	FLYING HORSE NORTH FILING NO. 7	Calc'd by:	CMD
	211030	Checked by:	RDL
	CULVERT 5 RIPRAP	Date:	5/4/2026

Input Parameters		
Flow (Q)	87.6	cfs
Tailwater depth (Y_t)	1.60	ft
Conduit Diameter (D_c)	48	in
Expansion Factor (per Fig. 9-35)	2.1	
Soil Type	Non-Cohesive Soils	

Calculated Parameters		
Froude Parameter ($Q/D^{2.5}$)	2.74	
D_{50} =	9.08	in
UDFCD Riprap Type =	Type M	
Design D_{50} =	12	in
Minimum Mantle Thickness =	24	in
Minimum Length of Apron =	14.6	ft

Calculated D_{50} for riprap was calculated using Equation 9-16 in the USDCM Vol 2.

$$d_{50} = \frac{0.023Q}{Y_t^{1.2} D_c^{0.3}}$$

Calculated minimum length of apron was calculated using Equations 9-11 and 9-12 in the USDCM Vol. 2

$$L_p = \left(\frac{1}{2\tan\theta}\right)\left(\frac{A_t}{Y_t} - W\right)$$ Equation 9-11

$$A_t = \frac{Q}{V}$$ Equation 9-12

Where:

L_p = length of protection (ft)

W = width of the conduit (ft, use diameter for circular conduits)

Y_t = tailwater depth (ft)

θ = the expansion angle of the culvert flow

Where:

Q = design discharge (cfs)

V = the allowable non-eroding velocity in the downstream channel (ft/sec)

A_t = required area of flow at allowable velocity (ft^2)

Note:

[1] Calculations follow criteria in the USDCM Vol.2 Chapter 9

[2] Calculations assume a circular culvert

[3] This spreadsheet assumes y_t/D_t=0.4 in cases where y_t is unknown or a hydraulic jump is suspected downstream of the outlet.

[4] Per the USDCM Vol.2 in no case should L_p be less than 3D, nor does L_p need to be greater than 10D whenever the Froude parameter is less than 6.0. whenever the Froude parameter is greater than 6, increase the maximum L_p required by 1/4 D_c for each whole number by which the Froude parameter is greater than 6

HRGreen	FLYING HORSE NORTH FILING NO. 7	Calc'd by:	CMD
	211030	Checked by:	RDL
	CULVERT 6 RIPRAP	Date:	5/4/2026

Input Parameters		
Flow (Q)	2.31	cfs
Tailwater depth (Y_t)	0.60	ft
Conduit Diameter (D_c)	18	in
Expansion Factor (per Fig. 9-35)	6.7	
Soil Type	Non-Cohesive Soils	

Calculated Parameters		
Froude Parameter ($Q/D^{2.5}$)	0.84	
D_{50} =	1.04	in
UDFCD Riprap Type =	Type VL	
Design D_{50} =	6	in
Minimum Mantle Thickness =	12	in
Minimum Length of Apron =	4.5	ft

Calculated D_{50} for riprap was calculated using Equation 9-16 in the USDCM Vol 2.

$$d_{50} = \frac{0.023Q}{Y_t^{1.2} D_c^{0.3}}$$

Calculated minimum length of apron was calculated using Equations 9-11 and 9-12 in the USDCM Vol. 2

$$L_p = \left(\frac{1}{2\tan\theta}\right)\left(\frac{A_t}{Y_t} - W\right)$$ Equation 9-11

$$A_t = \frac{Q}{V}$$ Equation 9-12

Where:

L_p = length of protection (ft)

W = width of the conduit (ft, use diameter for circular conduits)

Y_t = tailwater depth (ft)

θ = the expansion angle of the culvert flow

Where:

Q = design discharge (cfs)

V = the allowable non-eroding velocity in the downstream channel (ft/sec)

A_t = required area of flow at allowable velocity (ft^2)

Note:

[1] Calculations follow criteria in the USDCM Vol.2 Chapter 9

[2] Calculations assume a circular culvert

[3] This spreadsheet assumes y_t/D_t=0.4 in cases where y_t is unknown or a hydraulic jump is suspected downstream of the outlet.

[4] Per the USDCM Vol.2 in no case should L_p be less than 3D, nor does L_p need to be greater than 10D whenever the Froude parameter is less than 6.0. whenever the Froude parameter is greater than 6, increase the maximum L_p required by 1/4 D_c for each whole number by which the Froude parameter is greater than 6

HRGreen	FLYING HORSE NORTH FILING NO. 7	Calc'd by:	CMD
	211030	Checked by:	RDL
	CULVERT 8.1 RIPRAP	Date:	5/4/2026

Input Parameters		
Flow (Q)	29.2	cfs
Tailwater depth (Y_t)	1.00	ft
Conduit Diameter (D_c)	30	in
Expansion Factor (per Fig. 9-35)	4.4	
Soil Type	Non-Cohesive Soils	

Calculated Parameters		
Froude Parameter ($Q/D^{2.5}$)	2.95	
D_{50} =	6.12	in
UDFCD Riprap Type =	Type L	
Design D_{50} =	9	in
Minimum Mantle Thickness =	18	in
Minimum Length of Apron =	14.7	ft

Calculated D_{50} for riprap was calculated using Equation 9-16 in the USDCM Vol 2.

$$d_{50} = \frac{0.023Q}{Y_t^{1.2} D_c^{0.3}}$$

Calculated minimum length of apron was calculated using Equations 9-11 and 9-12 in the USDCM Vol. 2

$$L_p = \left(\frac{1}{2\tan\theta}\right)\left(\frac{A_t}{Y_t} - W\right)$$ Equation 9-11

$$A_t = \frac{Q}{V}$$ Equation 9-12

Where:

L_p = length of protection (ft)

W = width of the conduit (ft, use diameter for circular conduits)

Y_t = tailwater depth (ft)

θ = the expansion angle of the culvert flow

Where:

Q = design discharge (cfs)

V = the allowable non-eroding velocity in the downstream channel (ft/sec)

A_t = required area of flow at allowable velocity (ft^2)

Note:

[1] Calculations follow criteria in the USDCM Vol.2 Chapter 9

[2] Calculations assume a circular culvert

[3] This spreadsheet assumes y_t/D_t=0.4 in cases where y_t is unknown or a hydraulic jump is suspected downstream of the outlet.

[4] Per the USDCM Vol.2 in no case should L_p be less than 3D, nor does L_p need to be greater than 10D whenever the Froude parameter is less than 6.0. whenever the Froude parameter is greater than 6, increase the maximum L_p required by 1/4 D_c for each whole number by which the Froude parameter is greater than 6

HRGreen	FLYING HORSE NORTH FILING NO. 7	Calc'd by:	CMD
	211030	Checked by:	RDL
	CULVERT 8.2 RIPRAP	Date:	5/4/2026

Input Parameters		
Flow (Q)	29.2	cfs
Tailwater depth (Y_t)	1.00	ft
Conduit Diameter (D_c)	30	in
Expansion Factor (per Fig. 9-35)	4.4	
Soil Type	Non-Cohesive Soils	

Calculated Parameters		
Froude Parameter ($Q/D^{2.5}$)	2.95	
D_{50} =	6.12	in
UDFCD Riprap Type =	Type L	
Design D_{50} =	9	in
Minimum Mantle Thickness =	18	in
Minimum Length of Apron =	14.7	ft

Calculated D_{50} for riprap was calculated using Equation 9-16 in the USDCM Vol 2.

$$d_{50} = \frac{0.023Q}{Y_t^{1.2} D_c^{0.3}}$$

Calculated minimum length of apron was calculated using Equations 9-11 and 9-12 in the USDCM Vol. 2

$$L_p = \left(\frac{1}{2\tan\theta}\right)\left(\frac{A_t}{Y_t} - W\right)$$ Equation 9-11

$$A_t = \frac{Q}{V}$$ Equation 9-12

Where:

L_p = length of protection (ft)

W = width of the conduit (ft, use diameter for circular conduits)

Y_t = tailwater depth (ft)

θ = the expansion angle of the culvert flow

Where:

Q = design discharge (cfs)

V = the allowable non-eroding velocity in the downstream channel (ft/sec)

A_t = required area of flow at allowable velocity (ft^2)

Note:

[1] Calculations follow criteria in the USDCM Vol.2 Chapter 9

[2] Calculations assume a circular culvert

[3] This spreadsheet assumes y_t/D_t=0.4 in cases where y_t is unknown or a hydraulic jump is suspected downstream of the outlet.

[4] Per the USDCM Vol.2 in no case should L_p be less than 3D, nor does L_p need to be greater than 10D whenever the Froude parameter is less than 6.0. whenever the Froude parameter is greater than 6, increase the maximum L_p required by 1/4 D_c for each whole number by which the Froude parameter is greater than 6

HRGreen	FLYING HORSE NORTH FILING NO. 7	Calc'd by:	CMD
	211030	Checked by:	RDL
	CULVERT 10.1.1 RIPRAP	Date:	5/4/2026

Input Parameters		
Flow (Q)	36	cfs
Tailwater depth (Y_t)	1.27	ft
Conduit Diameter (D_c)	38	in
Expansion Factor (per Fig. 9-35)	5.75	
Soil Type	Non-Cohesive Soils	

Calculated Parameters		
Froude Parameter ($Q/D^{2.5}$)	2.02	
D_{50} =	5.29	in
UDFCD Riprap Type =	Type VL	
Design D_{50} =	6	in
Minimum Mantle Thickness =	12	in
Minimum Length of Apron =	14.5	ft

Calculated D_{50} for riprap was calculated using Equation 9-16 in the USDCM Vol 2.

$$d_{50} = \frac{0.023Q}{Y_t^{1.2} D_c^{0.3}}$$

Calculated minimum length of apron was calculated using Equations 9-11 and 9-12 in the USDCM Vol. 2

$$L_p = \left(\frac{1}{2\tan\theta}\right)\left(\frac{A_t}{Y_t} - W\right)$$ Equation 9-11

$$A_t = \frac{Q}{V}$$ Equation 9-12

Where:

L_p = length of protection (ft)

W = width of the conduit (ft, use diameter for circular conduits)

Y_t = tailwater depth (ft)

θ = the expansion angle of the culvert flow

Where:

Q = design discharge (cfs)

V = the allowable non-eroding velocity in the downstream channel (ft/sec)

A_t = required area of flow at allowable velocity (ft^2)

Note:

[1] Calculations follow criteria in the USDCM Vol.2 Chapter 9

[2] Calculations assume a circular culvert

[3] This spreadsheet assumes y_t/D_t=0.4 in cases where y_t is unknown or a hydraulic jump is suspected downstream of the outlet.

[4] Per the USDCM Vol.2 in no case should L_p be less than 3D, nor does L_p need to be greater than 10D whenever the Froude parameter is less than 6.0. whenever the Froude parameter is greater than 6, increase the maximum L_p required by 1/4 D_c for each whole number by which the Froude parameter is greater than 6

HRGreen	FLYING HORSE NORTH FILING NO. 7	Calc'd by:	CMD
	211030	Checked by:	RDL
	CULVERT 10.1.2 RIPRAP	Date:	5/4/2026

Input Parameters		
Flow (Q)	36	cfs
Tailwater depth (Y_t)	1.00	ft
Conduit Diameter (D_c)	30	in
Expansion Factor (per Fig. 9-35)	4	
Soil Type	Non-Cohesive Soils	

Calculated Parameters		
Froude Parameter ($Q/D^{2.5}$)	3.64	
D_{50} =	7.55	in
UDFCD Riprap Type =	Type L	
Design D_{50} =	9	in
Minimum Mantle Thickness =	18	in
Minimum Length of Apron =	18.8	ft

Calculated D_{50} for riprap was calculated using Equation 9-16 in the USDCM Vol 2.

$$d_{50} = \frac{0.023Q}{Y_t^{1.2} D_c^{0.3}}$$

Calculated minimum length of apron was calculated using Equations 9-11 and 9-12 in the USDCM Vol. 2

$$L_p = \left(\frac{1}{2\tan\theta}\right)\left(\frac{A_t}{Y_t} - W\right)$$ Equation 9-11

$$A_t = \frac{Q}{V}$$ Equation 9-12

Where:

L_p = length of protection (ft)

W = width of the conduit (ft, use diameter for circular conduits)

Y_t = tailwater depth (ft)

θ = the expansion angle of the culvert flow

Where:

Q = design discharge (cfs)

V = the allowable non-eroding velocity in the downstream channel (ft/sec)

A_t = required area of flow at allowable velocity (ft^2)

Note:

[1] Calculations follow criteria in the USDCM Vol.2 Chapter 9

[2] Calculations assume a circular culvert

[3] This spreadsheet assumes y_t/D_t=0.4 in cases where y_t is unknown or a hydraulic jump is suspected downstream of the outlet.

[4] Per the USDCM Vol.2 in no case should L_p be less than 3D, nor does L_p need to be greater than 10D whenever the Froude parameter is less than 6.0. whenever the Froude parameter is greater than 6, increase the maximum L_p required by 1/4 D_c for each whole number by which the Froude parameter is greater than 6

HRGreen	FLYING HORSE NORTH FILING NO. 7	Calc'd by:	CMD
	211030	Checked by:	RDL
	CULVERT 10.2 RIPRAP	Date:	5/4/2026

Input Parameters		
Flow (Q)	35.1	cfs
Tailwater depth (Y_t)	1.00	ft
Conduit Diameter (D_c)	30	in
Expansion Factor (per Fig. 9-35)	4	
Soil Type	Non-Cohesive Soils	

Calculated Parameters		
Froude Parameter ($Q/D^{2.5}$)	3.55	
D_{50} =	7.36	in
UDFCD Riprap Type =	Type L	
Design D_{50} =	9	in
Minimum Mantle Thickness =	18	in
Minimum Length of Apron =	18.1	ft

Calculated D_{50} for riprap was calculated using Equation 9-16 in the USDCM Vol 2.

$$d_{50} = \frac{0.023Q}{Y_t^{1.2} D_c^{0.3}}$$

Calculated minimum length of apron was calculated using Equations 9-11 and 9-12 in the USDCM Vol. 2

$$L_p = \left(\frac{1}{2\tan\theta}\right)\left(\frac{A_t}{Y_t} - W\right)$$ Equation 9-11

$$A_t = \frac{Q}{V}$$ Equation 9-12

Where:

L_p = length of protection (ft)

W = width of the conduit (ft, use diameter for circular conduits)

Y_t = tailwater depth (ft)

θ = the expansion angle of the culvert flow

Where:

Q = design discharge (cfs)

V = the allowable non-eroding velocity in the downstream channel (ft/sec)

A_t = required area of flow at allowable velocity (ft^2)

Note:

[1] Calculations follow criteria in the USDCM Vol.2 Chapter 9

[2] Calculations assume a circular culvert

[3] This spreadsheet assumes y_t/D_t=0.4 in cases where y_t is unknown or a hydraulic jump is suspected downstream of the outlet.

[4] Per the USDCM Vol.2 in no case should L_p be less than 3D, nor does L_p need to be greater than 10D whenever the Froude parameter is less than 6.0. whenever the Froude parameter is greater than 6, increase the maximum L_p required by 1/4 D_c for each whole number by which the Froude parameter is greater than 6

HRGreen	**FLYING HORSE NORTH FILING NO. 7**	**Calc'd by:**	**CMD**
	211030	**Checked by:**	**RDL**
	(POND F1 OUTLET) RIPRAP	**Date:**	**5/4/2026**

Input Parameters		
Flow (Q)	123	cfs
Tailwater depth (Y_t)	1.60	ft
Conduit Diameter (D_c)	48	in
Expansion Factor (per Fig. 9-35)	3.9	
Soil Type	Non-Cohesive Soils	

Calculated Parameters		
Froude Parameter ($Q/D^{2.5}$)	4.00	
D_{50} =	12.74	in
UDFCD Riprap Type =	Type H	
Design D_{50} =	18	in
Minimum Mantle Thickness =	36	in
Minimum Length of Apron =	44.4	ft

Calculated D_{50} for riprap was calculated using Equation 9-16 in the USDCM Vol 2.

$$d_{50} = \frac{0.023Q}{Y_t^{1.2} D_c^{0.3}}$$

Calculated minimum length of apron was calculated using Equations 9-11 and 9-12 in the USDCM Vol. 2

$$L_p = \left(\frac{1}{2\tan\theta}\right)\left(\frac{A_t}{Y_t} - W\right)$$ Equation 9-11

$$A_t = \frac{Q}{V}$$ Equation 9-12

Where:

L_p = length of protection (ft)

W = width of the conduit (ft, use diameter for circular conduits)

Y_t = tailwater depth (ft)

θ = the expansion angle of the culvert flow

Where:

Q = design discharge (cfs)

V = the allowable non-eroding velocity in the downstream channel (ft/sec)

A_t = required area of flow at allowable velocity (ft^2)

Note:

[1] Calculations follow criteria in the USDCM Vol.2 Chapter 9

[2] Calculations assume a circular culvert

[3] This spreadsheet assumes y_t/D_t=0.4 in cases where y_t is unknown or a hydraulic jump is suspected downstream of the outlet.

[4] Per the USDCM Vol.2 in no case should L_p be less than 3D, nor does L_p need to be greater than 10D whenever the Froude parameter is less than 6.0. whenever the Froude parameter is greater than 6, increase the maximum L_p required by 1/4 D_c for each whole number by which the Froude parameter is greater than 6

HRGreen	**FLYING HORSE NORTH FILING NO. 7**	**Calc'd by:**	**CMD**
	211030	**Checked by:**	**RDL**
	(POND F2 OUTLET) RIPRAP	**Date:**	**5/4/2026**

Input Parameters		
Flow (Q)	14	cfs
Tailwater depth (Y_t)	0.60	ft
Conduit Diameter (D_c)	18	in
Expansion Factor (per Fig. 9-35)	2.4	
Soil Type	Non-Cohesive Soils	

Calculated Parameters		
Froude Parameter ($Q/D^{2.5}$)	4.00	
D_{50} =	6.32	in
UDFCD Riprap Type =	Type L	
Design D_{50} =	9	in
Minimum Mantle Thickness =	18	in
Minimum Length of Apron =	7.6	ft

Calculated D_{50} for riprap was calculated using Equation 9-16 in the USDCM Vol 2.

$$d_{50} = \frac{0.023Q}{Y_t^{1.2} D_c^{0.3}}$$

Calculated minimum length of apron was calculated using Equations 9-11 and 9-12 in the USDCM Vol. 2

$$L_p = \left(\frac{1}{2\tan\theta}\right)\left(\frac{A_t}{Y_t} - W\right)$$ Equation 9-11

$$A_t = \frac{Q}{V}$$ Equation 9-12

Where:

L_p = length of protection (ft)

W = width of the conduit (ft, use diameter for circular conduits)

Y_t = tailwater depth (ft)

θ = the expansion angle of the culvert flow

Where:

Q = design discharge (cfs)

V = the allowable non-eroding velocity in the downstream channel (ft/sec)

A_t = required area of flow at allowable velocity (ft^2)

Note:

[1] Calculations follow criteria in the USDCM Vol.2 Chapter 9

[2] Calculations assume a circular culvert

[3] This spreadsheet assumes y_t/D_t=0.4 in cases where y_t is unknown or a hydraulic jump is suspected downstream of the outlet.

[4] Per the USDCM Vol.2 in no case should L_p be less than 3D, nor does L_p need to be greater than 10D whenever the Froude parameter is less than 6.0. whenever the Froude parameter is greater than 6, increase the maximum L_p required by 1/4 D_c for each whole number by which the Froude parameter is greater than 6

FLYING HORSE NORTH FILING NO. 7 - EMERGENCY SPILLWAY RIPRAP SIZING

Riprap Sizing - POND F1 EMERGENCY SPILLWAY				
q (cfs/ft)	S (ft/ft)	C_f	n	D_{50} min. (in)
2.85	0.3	2	0	9.77

Type M Riprap (D_{50} = 12") will be utilized for the emergency spillway.

Riprap Sizing - POND F2 EMERGENCY SPILLWAY				
q (cfs/ft)	S (ft/ft)	C_f	n	D_{50} min. (in)
3.22	0.25	2	0	9.67

Type M Riprap (D50 = 12") will be utilized for the emergency spillway.

$$D_{50} = 5.23\ S^{0.43}\ (1.35 C_f\ q)^{0.56}$$ Equation 13-9

Where:

- D_{50} = median rock size (in)
- S = longitudinal slope (ft/ft)
- C_f = concentration factor (1.0 to 3.0)
- q = unit discharge (cfs/ft)

When:

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

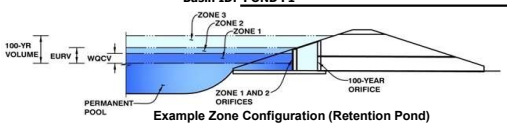
APPENDIX D – WATER QUALITY AND DETENTION

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.07 (June 2025)

Project: FLYING HORSE NORTH FILING NO. 7

Basin ID: POND F1



Example Zone Configuration (Retention Pond)

Watershed Information

Selected SCM Type =	**EDB**	
Watershed Area =	246.45	acres
Watershed Length =	5,992	ft
Watershed Length to Centroid =	2,737	ft
Watershed Slope =	0.040	ft/ft
Watershed Imperviousness =	8.28%	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 =	User Input	

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

			Optional User Overrides	
Water Quality Capture Volume (WQCV) =	1.169	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	1.889	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 0.92 in.) =	0.921	acre-feet	0.92	inches
5-yr Runoff Volume (P1 = 1.19 in.) =	2.445	acre-feet	1.19	inches
10-yr Runoff Volume (P1 = 1.44 in.) =	5.532	acre-feet	1.44	inches
25-yr Runoff Volume (P1 = 1.82 in.) =	14.580	acre-feet	1.82	inches
50-yr Runoff Volume (P1 = 2.14 in.) =	20.582	acre-feet	2.14	inches
100-yr Runoff Volume (P1 = 2.48 in.) =	28.912	acre-feet	2.48	inches
500-yr Runoff Volume (P1 = 3.37 in.) =	47.148	acre-feet	3.37	inches
Approximate 2-yr Detention Volume =	0.914	acre-feet		
Approximate 5-yr Detention Volume =	1.495	acre-feet		
Approximate 10-yr Detention Volume =	3.511	acre-feet		
Approximate 25-yr Detention Volume =	5.583	acre-feet		
Approximate 50-yr Detention Volume =	6.068	acre-feet		
Approximate 100-yr Detention Volume =	8.201	acre-feet		

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	1.169	acre-feet
Zone 2 Volume (EURV - Zone 1) =	0.720	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	6.312	acre-feet
Total Detention Basin Volume =	8.201	acre-feet
Initial Surcharge Volume (ISV) =	user	ft^3
Initial Surcharge Depth (ISD) =	user	ft
Total Available Detention Depth (H_{total}) =	user	ft
Depth of Trickle Channel (H_{TC}) =	user	ft
Slope of Trickle Channel (S_{TC}) =	user	ft/ft
Slopes of Main Basin Sides (S_{main}) =	user	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	user	

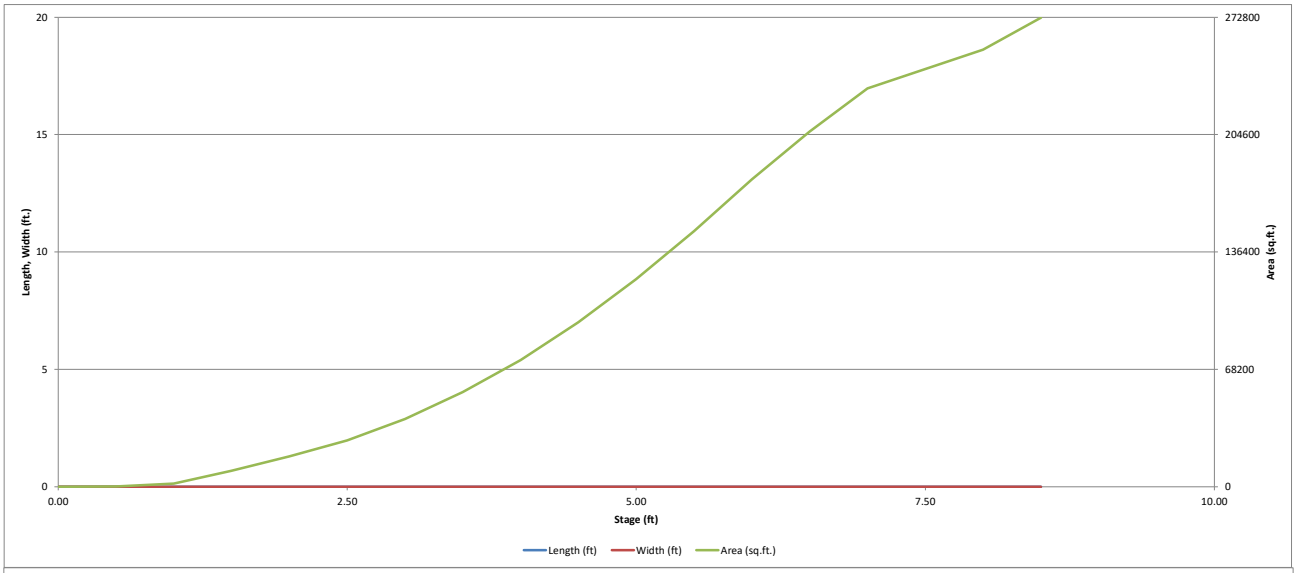
Initial Surcharge Area (A_{ISV}) =	user	ft^2
Surcharge Volume Length (L_{ISV}) =	user	ft
Surcharge Volume Width (W_{ISV}) =	user	ft
Depth of Basin Floor (H_{FLOOR}) =	user	ft
Length of Basin Floor (L_{FLOOR}) =	user	ft
Width of Basin Floor (W_{FLOOR}) =	user	ft
Area of Basin Floor (A_{FLOOR}) =	user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

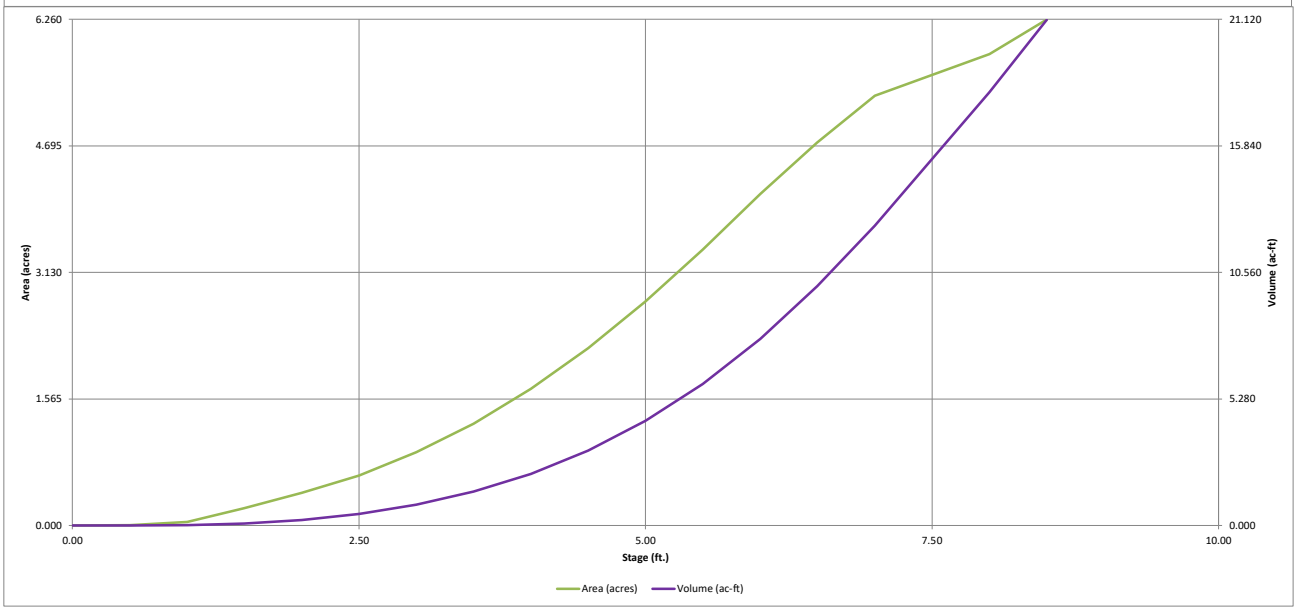
Depth Increment = ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	--	0.00	--	--	--	20	0.000		
7,437.50	--	0.50	--	--	--	200	0.005	55	0.001
7,438.00	--	1.00	--	--	--	1,949	0.045	592	0.014
7,438.50	--	1.50	--	--	--	9,398	0.216	3,429	0.079
7,439.00	--	2.00	--	--	--	17,576	0.403	10,172	0.234
7,439.50	--	2.50	--	--	--	26,954	0.619	21,305	0.489
7,440.00	--	3.00	--	--	--	39,427	0.905	37,900	0.870
7,440.50	--	3.50	--	--	--	54,947	1.261	61,493	1.412
7,441.00	--	4.00	--	--	--	73,697	1.692	93,654	2.150
7,441.50	--	4.50	--	--	--	95,635	2.195	135,987	3.122
7,442.00	--	5.00	--	--	--	120,685	2.771	190,067	4.363
7,442.50	--	5.50	--	--	--	148,569	3.411	257,381	5.909
7,443.00	--	6.00	--	--	--	178,668	4.102	339,190	7.787
7,443.50	--	6.50	--	--	--	206,439	4.739	435,467	9.997
7,444.00	--	7.00	--	--	--	231,486	5.314	544,948	12.510
7444.50	--	8.00	--	--	--	254,055	5.832	787,718	18.084
7445	--	8.50	--	--	--	272,551	6.257	919,370	21.106

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.07 (June 2025)



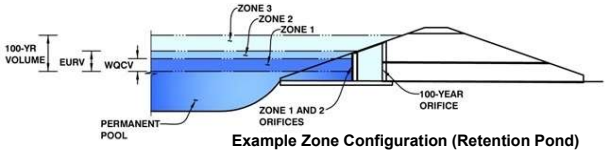


DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.07 (June 2025)

Project: **FLYING HORSE NORTH FILING NO. 7**

Basin ID: **POND F1**



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	3.30	1.169	Orifice Plate
Zone 2 (EURV)	3.84	0.720	Circular Orifice
Zone 3 (100-year)	6.10	6.312	Weir&Pipe (Restrict)
Total (all zones)		8.201	

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

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

Calculated Parameters for Underdrain

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

Centroid of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)	WQ Orifice Area per Row =	2.410E-02	ft^2
Depth at top of Zone using Orifice Plate =	3.30	ft (relative to basin bottom at Stage = 0 ft)	Elliptical Half-Width =	N/A	feet
Orifice Plate: Orifice Vertical Spacing =	13.20	inches	Elliptical Slot Centroid =	N/A	feet
Orifice Plate: Orifice Area per Row =	3.47	sq. inches (use rectangular openings)	Elliptical Slot Area =	N/A	ft^2

Calculated Parameters for Plate

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

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	1.10	2.20					
Orifice Area (sq. inches)	3.47	3.47	3.47					

	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)

	Zone 2 Circular	Not Selected		Zone 2 Circular	Not Selected	
Invert of Vertical Orifice =	3.30	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Area =	0.00	N/A	ft^2
Depth at top of Zone using Vertical Orifice =	3.84	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Centroid =	0.02	N/A	feet
Vertical Orifice Diameter =	0.50	N/A	inches				

Calculated Parameters for Vertical Orifice

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

	Zone 3 Weir	Not Selected		Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	4.17	N/A	ft (relative to basin bottom at Stage = 0 ft)	Height of Grate Upper Edge, H_t =	4.17	N/A	feet
Overflow Weir Front Edge Length =	16.00	N/A	feet	Overflow Weir Slope Length =	5.00	N/A	feet
Overflow Weir Grate Slope =	0.00	N/A	H:V	Grate Open Area / 100-yr Orifice Area =	5.62	N/A	
Horiz. Length of Weir Sides =	5.00	N/A	feet	Overflow Grate Open Area w/o Debris =	55.68	N/A	ft^2
Overflow Grate Type =	Type C Grate	N/A		Overflow Grate Open Area w/ Debris =	27.84	N/A	ft^2
Debris Clogging % =	50%	N/A	%				

Calculated Parameters for Overflow Weir

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

	Zone 3 Restrictor	Not Selected		Zone 3 Restrictor	Not Selected	
Depth to Invert of Outlet Pipe =	1.25	N/A	ft (distance below basin bottom at Stage = 0 ft)	Outlet Orifice Area =	9.91	N/A	ft^2
Outlet Pipe Diameter =	48.00	N/A	inches	Outlet Orifice Centroid =	1.63	N/A	feet
Restrictor Plate Height Above Pipe Invert =	35.30		inches	Half-Central Angle of Restrictor Plate on Pipe =	2.06	N/A	radians

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	7.04	ft (relative to basin bottom at Stage = 0 ft)	Spillway Design Flow Depth=	0.94	feet
Spillway Crest Length =	100.00	feet	Stage at Top of Freeboard =	8.98	feet
Spillway End Slopes =	4.00	H:V	Basin Area at Top of Freeboard =	6.26	acres
Freeboard above Max Water Surface =	1.00	feet	Basin Volume at Top of Freeboard =	21.11	acre-ft

Calculated Parameters for Spillway

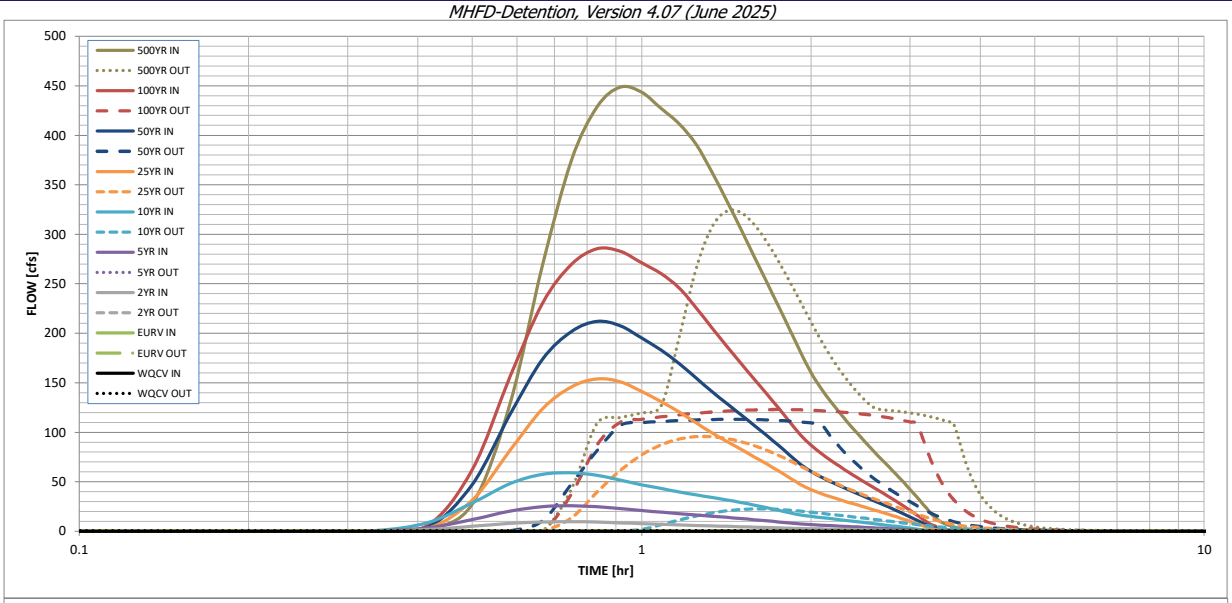
Routed Hydrograph Results

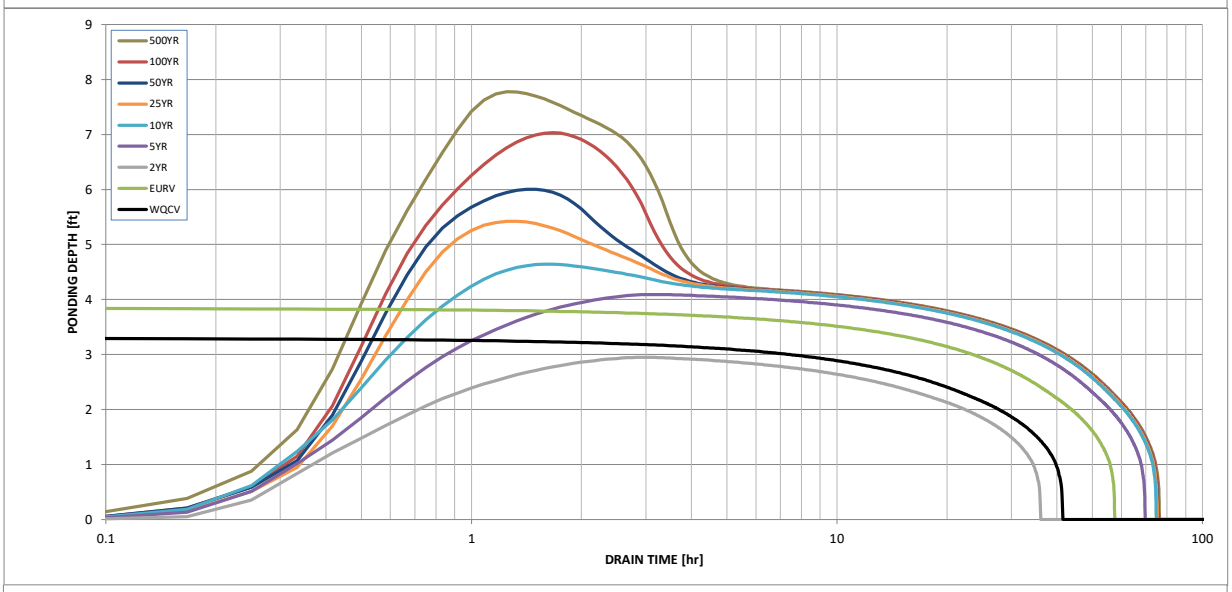
The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

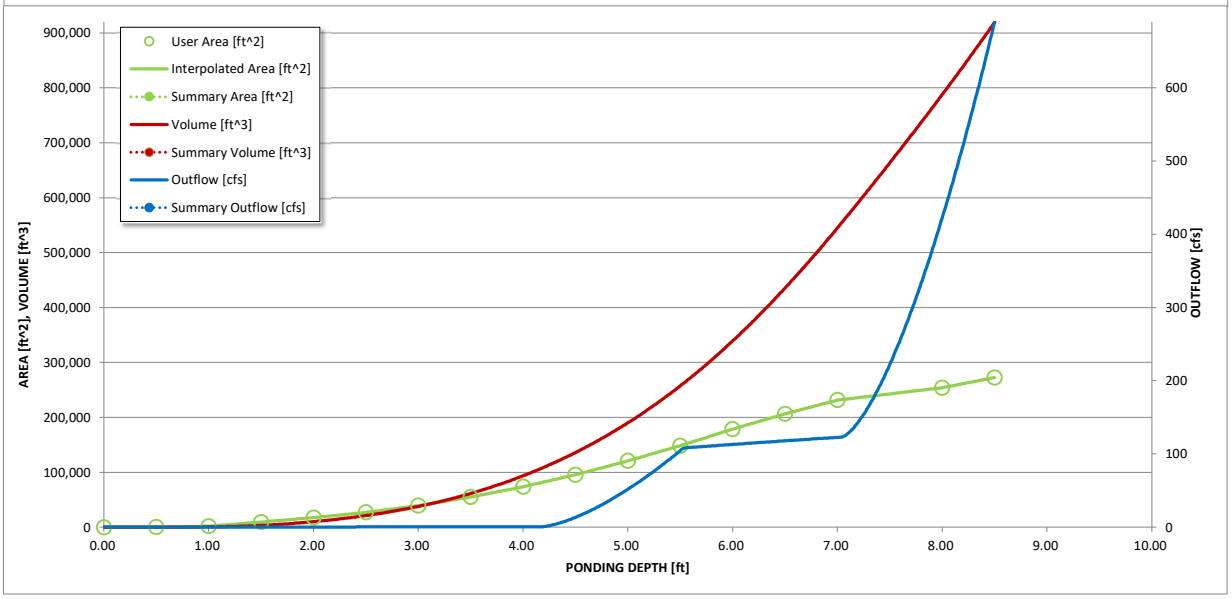
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	N/A	N/A	0.92	1.19	1.44	1.82	2.14	2.48	3.37
CUHP Runoff Volume (acre-ft) =	1.169	1.889	0.921	2.445	5.532	14.580	20.582	28.912	47.148
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	0.921	2.445	5.532	14.580	20.582	28.912	47.148
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	5.9	20.0	53.0	147.5	205.0	278.0	440.7
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.02	0.08	0.22	0.60	0.83	1.13	1.79
Peak Inflow Q (cfs) =	N/A	N/A	9.8	25.7	59.1	154.0	211.9	285.3	448.7
Peak Outflow Q (cfs) =	0.5	0.6	0.5	0.6	22.6	95.6	113.1	123.0	323.4
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.0	0.4	0.6	0.6	0.4	0.7
Structure Controlling Flow =	Plate	Vertical Orifice 1	Plate	Vertical Orifice 1	Overflow Weir 1	Overflow Weir 1	Outlet Plate 1	Outlet Plate 1	Spillway
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	N/A	0.4	1.7	2.0	2.2	2.3
Max Velocity through Grate 2 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours) =	38	53	33	64	64	54	48	42	29
Time to Drain 99% of Inflow Volume (hours) =	**40**	55	35	67	70	66	63	60	54
Maximum Ponding Depth (ft) =	3.30	3.84	2.95	4.09	4.64	5.42	6.01	7.03	7.78
Area at Maximum Ponding Depth (acres) =	1.12	1.55	0.87	1.78	2.36	3.31	4.10	5.33	5.71
Maximum Volume Stored (acre-ft) =	1.174	1.890	0.817	2.306	3.440	5.640	7.787	12.670	16.756

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.07 (June 2025)







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

DETENTION BASIN OUTLET STRUCTURE DESIGN

Outflow Hydrograph Workbook Filename:

Inflow Hydrographs

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

	SOURCE	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP
Time Interval	TIME	WQCV [cfs]	EURV [cfs]	2 Year [cfs]	5 Year [cfs]	10 Year [cfs]	25 Year [cfs]	50 Year [cfs]	100 Year [cfs]	500 Year [cfs]
5.00 min	0:00:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:05:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:10:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04
	0:15:00	0	0.00	0.04	0.08	0.11	0.09	0.13	0.13	0.27
	0:20:00	0	0.00	0.25	0.39	0.63	0.37	0.49	0.53	2.24
	0:25:00	0	0.00	1.85	3.61	8.84	2.77	4.21	6.23	27.84
	0:30:00	0	0.00	5.04	11.84	28.77	31.81	47.63	62.78	128.75
	0:35:00	0	0.00	7.96	20.43	48.19	81.61	118.04	155.99	269.08
	0:40:00	0	0.00	9.48	24.88	57.59	123.73	173.93	230.50	374.56
	0:45:00	0	0.00	9.81	25.70	59.12	145.82	201.79	269.53	428.72
	0:50:00	0	0.00	9.36	24.77	56.52	153.98	211.87	285.30	448.73
	0:55:00	0	0.00	8.51	22.87	51.66	150.99	207.58	282.85	443.48
	1:00:00	0	0.00	7.72	20.92	47.01	141.14	195.07	271.03	426.96
	1:05:00	0	0.00	7.06	19.35	43.30	130.92	182.79	260.27	411.56
	1:10:00	0	0.00	6.43	17.88	39.77	120.48	169.52	245.76	390.71
	1:15:00	0	0.00	5.88	16.48	36.71	109.42	154.68	225.69	362.94
	1:20:00	0	0.00	5.42	15.24	34.25	99.45	141.10	205.61	334.12
	1:25:00	0	0.00	5.01	14.08	31.82	90.91	129.20	187.29	305.87
	1:30:00	0	0.00	4.63	12.92	29.22	82.98	117.96	170.02	278.17
	1:35:00	0	0.00	4.25	11.76	26.55	75.40	107.20	154.01	252.10
	1:40:00	0	0.00	3.88	10.62	23.87	68.15	96.93	139.09	227.57
	1:45:00	0	0.00	3.50	9.49	21.22	61.06	86.89	124.63	203.90
	1:50:00	0	0.00	3.13	8.37	18.65	54.07	77.05	110.59	181.13
	1:55:00	0	0.00	2.83	7.43	16.53	47.29	67.57	97.25	160.39
	2:00:00	0	0.00	2.61	6.79	15.08	42.10	60.46	87.00	144.36
	2:05:00	0	0.00	2.42	6.28	13.92	38.14	54.94	78.91	131.33
	2:10:00	0	0.00	2.24	5.78	12.82	34.85	50.20	71.87	119.67
	2:15:00	0	0.00	2.05	5.30	11.76	31.90	45.89	65.51	108.97
	2:20:00	0	0.00	1.87	4.83	10.72	29.22	41.95	59.67	99.07
	2:25:00	0	0.00	1.69	4.37	9.70	26.66	38.20	54.21	89.80
	2:30:00	0	0.00	1.52	3.93	8.71	24.18	34.61	49.09	81.13
	2:35:00	0	0.00	1.36	3.51	7.75	21.79	31.17	44.34	73.08
	2:40:00	0	0.00	1.19	3.09	6.82	19.42	27.80	39.67	65.26
	2:45:00	0	0.00	1.04	2.69	5.91	17.08	24.46	35.04	57.60
	2:50:00	0	0.00	0.88	2.29	5.01	14.75	21.15	30.42	49.99
	2:55:00	0	0.00	0.73	1.89	4.12	12.43	17.86	25.80	42.40
	3:00:00	0	0.00	0.57	1.50	3.23	10.12	14.57	21.20	34.83
	3:05:00	0	0.00	0.42	1.11	2.35	7.81	11.29	16.60	27.29
	3:10:00	0	0.00	0.28	0.73	1.49	5.51	8.03	12.02	19.82
	3:15:00	0	0.00	0.18	0.44	0.88	3.28	4.89	7.63	13.23
	3:20:00	0	0.00	0.13	0.31	0.63	1.96	3.12	5.01	9.17
	3:25:00	0	0.00	0.11	0.24	0.49	1.20	2.04	3.36	6.47
	3:30:00	0	0.00	0.09	0.19	0.39	0.76	1.37	2.20	4.50
	3:35:00	0	0.00	0.08	0.15	0.31	0.47	0.89	1.39	3.05
	3:40:00	0	0.00	0.06	0.12	0.24	0.31	0.61	0.82	1.98
	3:45:00	0	0.00	0.05	0.09	0.18	0.20	0.40	0.43	1.20
	3:50:00	0	0.00	0.04	0.07	0.13	0.12	0.26	0.21	0.71
	3:55:00	0	0.00	0.04	0.05	0.09	0.09	0.19	0.15	0.50
	4:00:00	0	0.00	0.03	0.04	0.06	0.06	0.14	0.12	0.36
	4:05:00	0	0.00	0.02	0.03	0.04	0.04	0.10	0.09	0.29
	4:10:00	0	0.00	0.02	0.02	0.03	0.03	0.08	0.07	0.22
	4:15:00	0	0.00	0.01	0.02	0.02	0.02	0.06	0.06	0.17
	4:20:00	0	0.00	0.01	0.01	0.02	0.02	0.04	0.04	0.12
	4:25:00	0	0.00	0.01	0.01	0.01	0.01	0.03	0.03	0.08
	4:30:00	0	0.00	0.00	0.00	0.01	0.01	0.02	0.02	0.05
	4:35:00	0	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02
	4:40:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	4:45:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:50:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:55:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:00:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:05:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:10:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:15:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:20:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:25:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:30:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:35:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:40:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:45:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:50:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:55:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:00:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.07 (June 2025)

Summary Stage-Area-Volume-Discharge Relationships

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

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

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

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

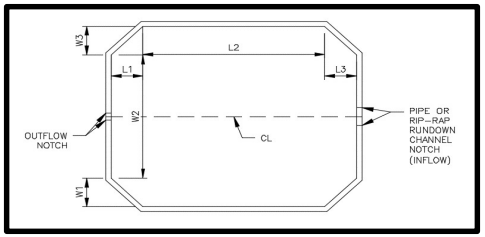
Also include the inverts of all outlets (e.g. vertical orifice, overflow grate, and spillway, where applicable).

HR GREEN FOREBAY SIZING

PROJECT: FLYING HORSE NORTH FILING 7
DATE: 11/10/2025
DESIGNED BY: CMD
CHECKED BY: RDL
POND OR DP: FOREBAY A (POND F1)

		INNER DIMENSIONS			OUTER DIMENSIONS	
LENGTH						
L1		5	FT		5.67	FT
L2		19.330	FT		19.33	FT
L3		5	FT		5.67	FT
INNER L		29.33	FT	OUTER TOTAL L	30.670	FT
WIDTH						
W1		5	FT		5.67	FT
W2		14.50	FT (75% of L2)		14.50	FT
W3		5	FT		5.67	FT
INNER W		24.50	FT	OUTER TOTAL W	25.84	FT
BAFFLE		(W2 x 0.67' + 2' x 0.67')				
AREA		11.05333	SF			

TRIANGLES	50	
RECTANGLE	280.2	
BAFFLE	11.053325	
TOTAL SURFACE AREA	**319.2**	**SQ FT**



FOREBAY HT.	**1.5**	**FT**		
FOREBAY VOLUME	**479**	**CF**	SUFFICIENT VOLUME?	**YES**
	17.7	**CY**		
	0.011	**AC-FT**		

REQ'D VOL (1% WQCV)	0.010	AC-FT
(per UD-BMP calc)	434	CF
Notch Width per UD-BMP	8.0	in

*t = 5 mins

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, concrete pad with slotted metal edge, or similar design	Size to drain in 4 to 5 minutes using Equation 4-1			
Minimum Forebay Volume [1]		1% of WQCV			
Forebay Depth [1]		12 to 15 inches	15 to 18 inches	18 to 24 inches	24 to 30 inches

[1] Appropriate volume and depth should consider maintenance and access needs. The values provided are approximate and provide a starting point for design.

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

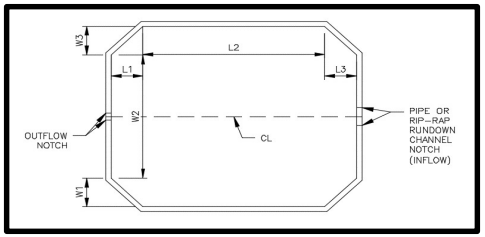
h_{max} = maximum depth of the forebay (feet)

HR GREEN FOREBAY SIZING

PROJECT: FLYING HORSE NORTH FILING 7
DATE: 11/10/2025
DESIGNED BY: CMD
CHECKED BY: RDL
POND OR DP: FOREBAY B (POND F1)

		INNER DIMENSIONS			OUTER DIMENSIONS	
LENGTH						
L1		1	FT		1.67	FT
L2		7.750	FT		7.75	FT
L3		1	FT		1.67	FT
INNER L		9.75	FT	OUTER TOTAL L	11.090	FT
WIDTH						
W1		1	FT		1.67	FT
W2		5.81	FT (75% of L2)		5.81	FT
W3		1	FT		1.67	FT
INNER W		7.81	FT	OUTER TOTAL W	9.15	FT
BAFFLE		(W2 x 0.67' + 2' x 0.67')				
AREA		5.234375	SF			

TRIANGLES	2	
RECTANGLE	45.0	
BAFFLE	5.234375	
TOTAL SURFACE AREA	**41.8**	**SQ FT**



FOREBAY HT.	**1**	**FT**		
FOREBAY VOLUME	**42**	**CF**	SUFFICIENT VOLUME?	**YES**
	1.5	**CY**		
	0.001	**AC-FT**		

REQ'D VOL (1% WQCV)	0.001	AC-FT	
(per UD-BMP calc)	38	CF	
Notch Width per UD-BMP	1.3	in	*t = 5 mins

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, concrete pad with slotted metal edge, or similar design	Size to drain in 4 to 5 minutes using Equation 4-1			
Minimum Forebay Volume [1]		1% of WQCV			
Forebay Depth [1]		12 to 15 inches	15 to 18 inches	18 to 24 inches	24 to 30 inches

[1] Appropriate volume and depth should consider maintenance and access needs. The values provided are approximate and provide a starting point for design.

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

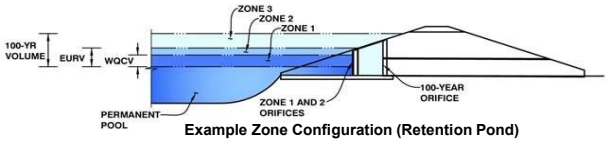
h_{max} = maximum depth of the forebay (feet)

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)

Project: **Flying Horse North PUD Amendment**

Basin ID: **Pond F2**



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	**EDB**	
Watershed Area =	35.16	acres
Watershed Length =	2,910	ft
Watershed Length to Centroid =	760	ft
Watershed Slope =	0.050	ft/ft
Watershed Imperviousness =	9.56%	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 =	User Input	

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

			Optional User Overrides
Water Quality Capture Volume (WQCV) =	0.189	acre-feet	acre-feet
Excess Urban Runoff Volume (EURV) =	0.315	acre-feet	acre-feet
2-yr Runoff Volume (P1 = 0.92 in.) =	0.154	acre-feet	0.92 inches
5-yr Runoff Volume (P1 = 1.19 in.) =	0.383	acre-feet	1.19 inches
10-yr Runoff Volume (P1 = 1.44 in.) =	0.830	acre-feet	1.44 inches
25-yr Runoff Volume (P1 = 1.82 in.) =	2.117	acre-feet	1.82 inches
50-yr Runoff Volume (P1 = 2.14 in.) =	2.975	acre-feet	2.14 inches
100-yr Runoff Volume (P1 = 2.48 in.) =	4.160	acre-feet	2.48 inches
500-yr Runoff Volume (P1 = 3.37 in.) =	6.764	acre-feet	3.37 inches
Approximate 2-yr Detention Volume =	0.155	acre-feet	
Approximate 5-yr Detention Volume =	0.250	acre-feet	
Approximate 10-yr Detention Volume =	0.549	acre-feet	
Approximate 25-yr Detention Volume =	0.854	acre-feet	
Approximate 50-yr Detention Volume =	0.932	acre-feet	
Approximate 100-yr Detention Volume =	1.250	acre-feet	

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	0.189	acre-feet
Zone 2 Volume (EURV - Zone 1) =	0.126	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	0.935	acre-feet
Total Detention Basin Volume =	1.250	acre-feet

Depth Increment = 0.50 ft

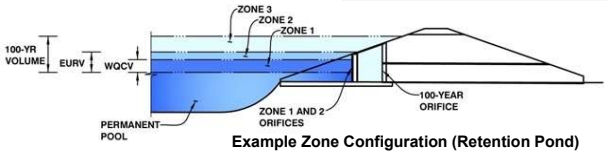
Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	--	0.00	--	--	--	50	0.001		
7,428.00	--	0.50	--	--	--	195	0.004	2,590	0.059
7,428.50	--	1.00	--	--	--	4,000	0.092	7,808	0.179
7,429.00	--	1.50	--	--	--	7,480	0.172	15,658	0.359
7,429.50	--	2.00	--	--	--	17,000	0.390	26,278	0.603
7,430.00	--	2.50	--	--	--	26,310	0.604	39,202	0.900
7,430.50	--	3.00	--	--	--	38,000	0.872	53,520	1.229
7,431.00	--	3.50	--	--	--	50,259	1.154	68,927	1.582
7,431.50	--	4.00	--	--	--	54,500	1.251	85,452	1.962
7,432.00	--	4.50	--	--	--	59,780	1.372	103,123	2.367
7,432.50	--	5.00	--	--	--	62,000	1.423	121,969	2.800
7,433.00	--	5.50	--	--	--	64,296	1.476	142,017	3.260
7,433.50	--	6.00	--	--	--	66,000	1.515	163,296	3.749
7,434.00	--	6.50	--	--	--	68,572	1.574	185,834	4.266
7,434.50	--	7.00	--	--	--	70,000	1.607	209,659	4.813
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DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)

Project: **Flying Horse North PUD Amendment**

Basin ID: **Pond F2**



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	1.04	0.189	Orifice Plate
Zone 2 (EURV)	1.40	0.126	Orifice Plate
Zone 3 (100-year)	3.04	0.935	Weir&Pipe (Restrict)
Total (all zones)		1.250	

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

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

Underdrain Orifice Diameter = inches

Calculated Parameters for Underdrain

Underdrain Orifice Area = ft^2

Underdrain Orifice Centroid = feet

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

Centroid of Lowest Orifice = 0.00 ft (relative to basin bottom at Stage = 0 ft)

Depth at top of Zone using Orifice Plate = 1.40 ft (relative to basin bottom at Stage = 0 ft)

Orifice Plate: Orifice Vertical Spacing = 5.60 inches

Orifice Plate: Orifice Area per Row = N/A sq. inches

Calculated Parameters for Plate

WQ Orifice Area per Row = N/A ft^2

Elliptical Half-Width = N/A feet

Elliptical Slot Centroid = N/A feet

Elliptical Slot Area = N/A ft^2

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

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	0.47	0.93					
Orifice Area (sq. inches)	1.75	2.10	1.00					

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

User Input: Vertical Orifice (Circular or Rectangular)

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

Calculated Parameters for Vertical Orifice

	Not Selected	Not Selected	
Vertical Orifice Area =	N/A	N/A	ft^2
Vertical Orifice Centroid =	N/A	N/A	feet

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

	Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	2.88	N/A	ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length =	6.00	N/A	feet
Overflow Weir Grate Slope =	0.00	N/A	H:V
Horiz. Length of Weir Sides =	4.00	N/A	feet
Overflow Grate Type =	Type C Grate	N/A	
Debris Clogging % =	50%	N/A	%

Calculated Parameters for Overflow Weir

	Zone 3 Weir	Not Selected	
Height of Grate Upper Edge, H_t =	2.88	N/A	feet
Overflow Weir Slope Length =	4.00	N/A	feet
Grate Open Area / 100-yr Orifice Area =	12.48	N/A	
Overflow Grate Open Area w/o Debris =	16.70	N/A	ft^2
Overflow Grate Open Area w/ Debris =	8.35	N/A	ft^2

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

	Zone 3 Restrictor	Not Selected	
Depth to Invert of Outlet Pipe =	0.50	N/A	ft (distance below basin bottom at Stage = 0 ft)
Outlet Pipe Diameter =	18.00	N/A	inches
Restrictor Plate Height Above Pipe Invert =	12.75		inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

	Zone 3 Restrictor	Not Selected	
Outlet Orifice Area =	1.34	N/A	ft^2
Outlet Orifice Centroid =	0.59	N/A	feet
Half-Central Angle of Restrictor Plate on Pipe =	2.00	N/A	radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage= 4.79 ft (relative to basin bottom at Stage = 0 ft)

Spillway Crest Length = 15.00 feet

Spillway End Slopes = 4.00 H:V

Freeboard above Max Water Surface = 1.00 feet

Calculated Parameters for Spillway

Spillway Design Flow Depth= 0.92 feet

Stage at Top of Freeboard = 6.71 feet

Basin Area at Top of Freeboard = 1.09 acres

Basin Volume at Top of Freeboard = 4.49 acre-ft

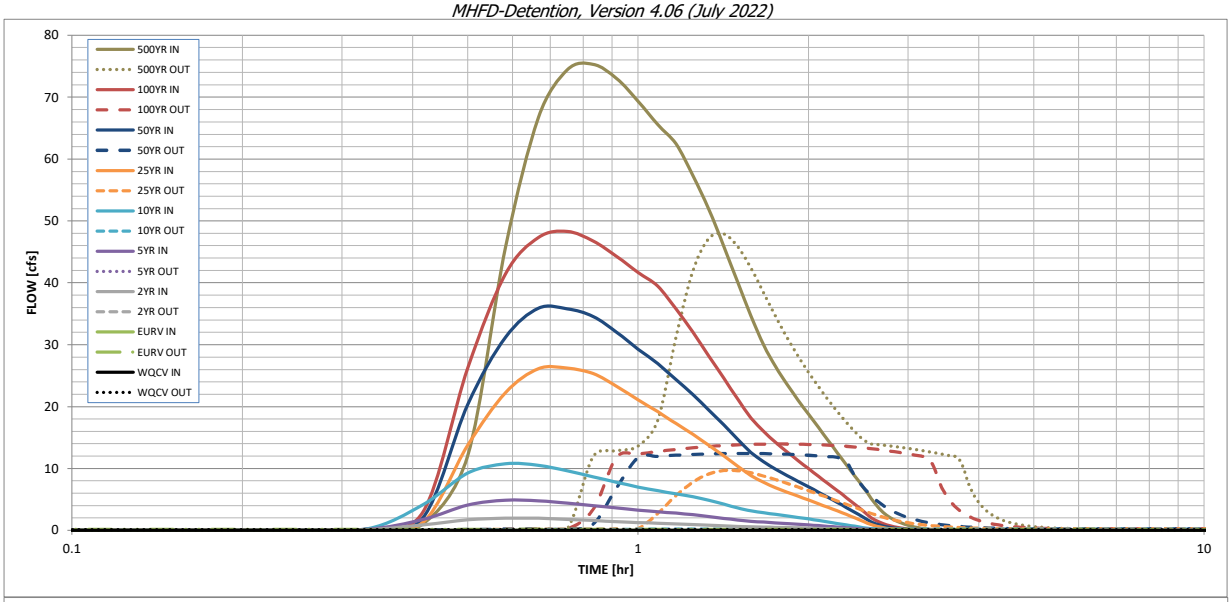
Routed Hydrograph Results

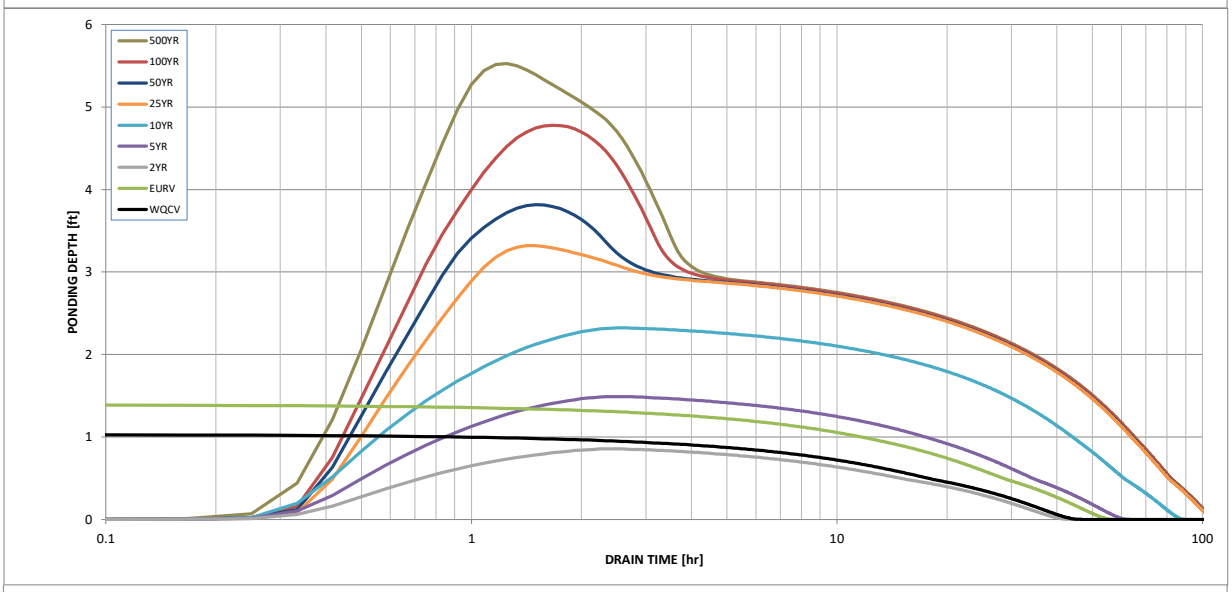
The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

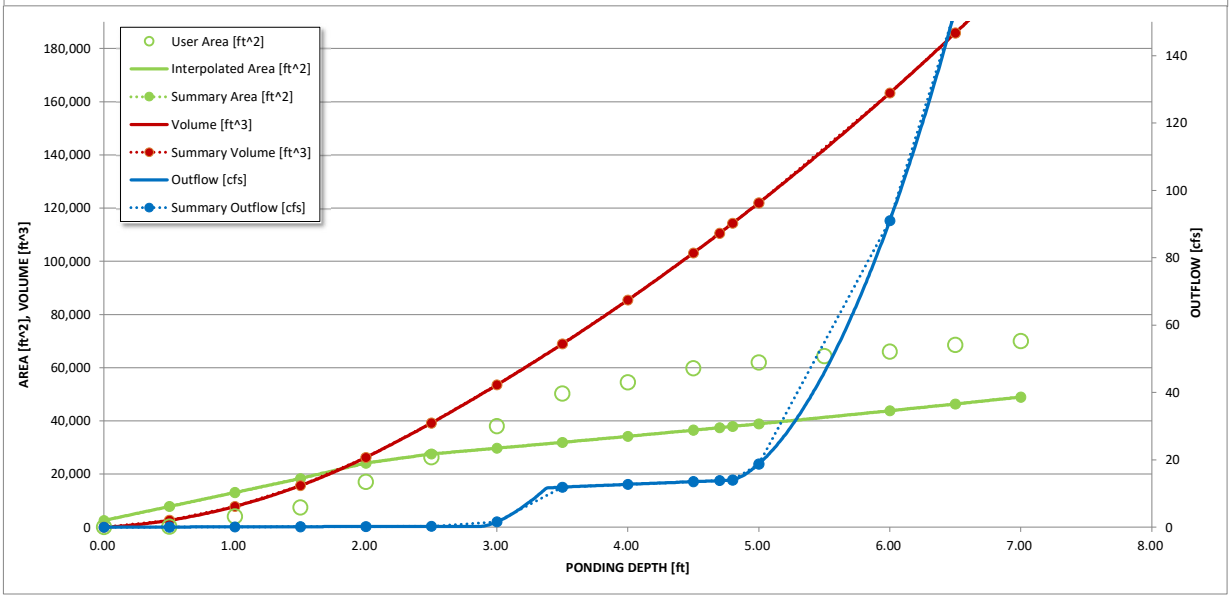
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	N/A	N/A	0.92	1.19	1.44	1.82	2.14	2.48	3.37
CUHP Runoff Volume (acre-ft) =	0.189	0.315	0.154	0.383	0.830	2.117	2.975	4.160	6.764
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	0.154	0.383	0.830	2.117	2.975	4.160	6.764
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	0.4	2.6	8.3	24.0	33.6	46.0	72.8
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.01	0.07	0.24	0.68	0.96	1.31	2.07
Peak Inflow Q (cfs) =	N/A	N/A	2.0	4.9	10.7	26.2	35.9	48.3	75.3
Peak Outflow Q (cfs) =	0.1	0.2	0.1	0.2	0.2	9.7	12.4	14.0	47.9
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.1	0.0	0.4	0.4	0.3	0.7
Structure Controlling Flow =	Plate	Plate	Plate	Plate	Plate	Overflow Weir 1	Outlet Plate 1	Outlet Plate 1	Spillway
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	N/A	N/A	0.6	0.7	0.8	0.9
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	47	37	52	72	80	76	71	63
Time to Drain 99% of Inflow Volume (hours) =	**42**	52	40	57	80	94	91	87	80
Maximum Ponding Depth (ft) =	1.04	1.40	0.86	1.49	2.32	3.32	3.82	4.78	5.53
Area at Maximum Ponding Depth (acres) =	0.31	0.40	0.26	0.42	0.60	0.71	0.76	0.87	0.95
Maximum Volume Stored (acre-ft) =	0.19	0.32	0.14	0.36	0.79	1.44	1.81	2.61	3.28

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)







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

DETENTION BASIN OUTLET STRUCTURE DESIGN

Outflow Hydrograph Workbook Filename:

Inflow Hydrographs

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

	SOURCE	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP
Time Interval	TIME	WQCV [cfs]	EURV [cfs]	2 Year [cfs]	5 Year [cfs]	10 Year [cfs]	25 Year [cfs]	50 Year [cfs]	100 Year [cfs]	500 Year [cfs]
5.00 min	0:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
	0:15:00	0.00	0.00	0.02	0.05	0.07	0.06	0.08	0.08	0.14
	0:20:00	0.00	0.00	0.13	0.19	0.29	0.17	0.21	0.23	1.05
	0:25:00	0.00	0.00	0.89	1.75	4.14	1.31	2.01	2.96	12.06
	0:30:00	0.00	0.00	1.69	4.07	9.25	13.74	20.32	26.22	45.71
	0:35:00	0.00	0.00	1.95	4.87	10.74	22.23	31.19	41.43	66.69
	0:40:00	0.00	0.00	1.96	4.78	10.51	26.13	35.89	47.33	74.41
	0:45:00	0.00	0.00	1.78	4.39	9.62	26.20	35.79	48.29	75.32
	0:50:00	0.00	0.00	1.59	4.00	8.64	25.34	34.57	46.77	73.02
	0:55:00	0.00	0.00	1.42	3.62	7.78	23.29	32.03	44.27	69.32
	1:00:00	0.00	0.00	1.27	3.28	7.01	21.09	29.30	41.66	65.57
	1:05:00	0.00	0.00	1.15	3.01	6.41	19.17	26.94	39.45	62.46
	1:10:00	0.00	0.00	1.04	2.78	5.91	17.26	24.37	35.79	57.29
	1:15:00	0.00	0.00	0.94	2.52	5.42	15.50	21.93	32.01	51.94
	1:20:00	0.00	0.00	0.84	2.23	4.86	13.74	19.46	28.21	45.94
	1:25:00	0.00	0.00	0.73	1.94	4.23	12.05	17.07	24.61	40.10
	1:30:00	0.00	0.00	0.64	1.67	3.62	10.37	14.71	21.20	34.63
	1:35:00	0.00	0.00	0.57	1.47	3.16	8.86	12.60	18.18	29.95
	1:40:00	0.00	0.00	0.53	1.33	2.85	7.76	11.10	15.99	26.46
	1:45:00	0.00	0.00	0.49	1.21	2.58	6.90	9.90	14.23	23.60
	1:50:00	0.00	0.00	0.45	1.10	2.33	6.18	8.86	12.68	21.07
	1:55:00	0.00	0.00	0.41	0.99	2.09	5.52	7.92	11.28	18.78
	2:00:00	0.00	0.00	0.37	0.88	1.85	4.91	7.05	9.98	16.65
	2:05:00	0.00	0.00	0.32	0.76	1.60	4.31	6.18	8.72	14.53
	2:10:00	0.00	0.00	0.28	0.65	1.35	3.72	5.33	7.54	12.52
	2:15:00	0.00	0.00	0.23	0.54	1.12	3.14	4.51	6.42	10.63
	2:20:00	0.00	0.00	0.18	0.43	0.88	2.57	3.70	5.30	8.77
	2:25:00	0.00	0.00	0.14	0.33	0.66	2.01	2.90	4.20	6.95
	2:30:00	0.00	0.00	0.10	0.22	0.44	1.45	2.11	3.10	5.15
	2:35:00	0.00	0.00	0.06	0.14	0.27	0.91	1.35	2.05	3.53
	2:40:00	0.00	0.00	0.05	0.10	0.19	0.55	0.86	1.34	2.44
	2:45:00	0.00	0.00	0.04	0.08	0.15	0.34	0.57	0.90	1.73
	2:50:00	0.00	0.00	0.03	0.06	0.12	0.22	0.38	0.60	1.21
	2:55:00	0.00	0.00	0.03	0.05	0.09	0.14	0.26	0.38	0.83
	3:00:00	0.00	0.00	0.02	0.04	0.07	0.09	0.17	0.23	0.55
	3:05:00	0.00	0.00	0.02	0.03	0.05	0.06	0.12	0.13	0.34
	3:10:00	0.00	0.00	0.01	0.02	0.04	0.04	0.08	0.07	0.21
	3:15:00	0.00	0.00	0.01	0.02	0.03	0.03	0.06	0.05	0.14
	3:20:00	0.00	0.00	0.01	0.01	0.02	0.02	0.04	0.03	0.10
	3:25:00	0.00	0.00	0.01	0.01	0.01	0.01	0.03	0.03	0.08
	3:30:00	0.00	0.00	0.01	0.01	0.01	0.01	0.02	0.02	0.06
	3:35:00	0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.02	0.05
	3:40:00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.04
	3:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02
	3:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
	3:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	4:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)

Summary Stage-Area-Volume-Discharge Relationships

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

Stage - Storage Description	Stage [ft]	Area [ft^2]	Area [acres]	Volume [ft^3]	Volume [ac-ft]	Total Outflow [cfs]
	0.00	2,551	0.059	0	0.000	0.00
	0.50	7,810	0.179	2,590	0.059	0.05
	1.00	13,063	0.300	7,808	0.179	0.12
	1.50	18,338	0.421	15,658	0.359	0.17
	2.00	24,140	0.554	26,278	0.603	0.20
	2.50	27,559	0.633	39,202	0.900	0.23
	3.00	29,711	0.682	53,520	1.229	1.60
	3.50	31,918	0.733	68,927	1.582	11.90
	4.00	34,182	0.785	85,452	1.962	12.74
	4.50	36,503	0.838	103,123	2.367	13.53
	4.70	37,453	0.860	110,519	2.537	13.83
	4.80	37,929	0.871	114,288	2.624	14.03
	5.00	38,879	0.893	121,969	2.800	18.80
	6.00	43,802	1.006	163,296	3.749	91.02
	6.50	46,349	1.064	185,834	4.266	153.65
	7.00	48,951	1.124	209,659	4.813	234.48

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

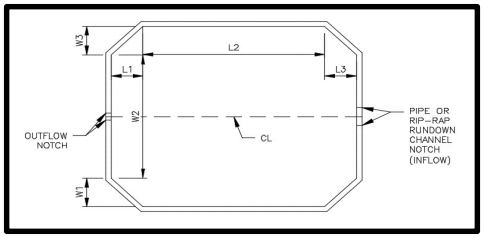
Also include the inverts of all outlets (e.g. vertical orifice, overflow grate, and spillway, where applicable).

HR GREEN FOREBAY SIZING

PROJECT: FLYING HORSE NORTH FILING 7
DATE: 11/6/2025
DESIGNED BY: RDL
CHECKED BY: RDL
POND OR DP: FOREBAY C (POND F2)

	INNER DIMENSIONS			OUTER DIMENSIONS	
LENGTH					
L1	5	FT		5.67	FT
L2	8.750	FT		8.75	FT
L3	5	FT		5.67	FT
INNER L	18.75	FT	OUTER TOTAL L	20.083	FT
WIDTH					
W1	5	FT		5.67	FT
W2	6.56	FT (75% of L2)		6.56	FT
W3	5	FT		6.33	FT
INNER W	16.56	FT	OUTER TOTAL W	17.90	FT
BAFFLE	(W2 x 0.67' + 4' x 0.67')				
AREA	5.401875	SF			

TRIANGLES	50	
RECTANGLE	57.4	
BAFFLE	5.401875	
TOTAL SURFACE AREA	**102.0**	**SQ FT**



FOREBAY HT.	**1.5**	**FT**		
FOREBAY VOLUME	**153**	**CF**	SUFFICIENT VOLUME?	**YES**
	5.7	**CY**		
	0.004	**AC-FT**		

REQ'D VOL (1% WQCV)	0.003	AC-FT
(per UD-BMP calc)	146	CF
Notch Width per UD-BMP	2.6	in

*t = 5 mins

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, concrete pad with slotted metal edge, or similar design	Size to drain in 4 to 5 minutes using Equation 4-1			
Minimum Forebay Volume [1]		1% of WQCV			
Forebay Depth [1]		12 to 15 inches	15 to 18 inches	18 to 24 inches	24 to 30 inches

[1] Appropriate volume and depth should consider maintenance and access needs. The values provided are approximate and provide a starting point for design.

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

Design Procedure Form: Runoff Reduction

UD-BMP (Version 3.07, March 2018)

Designer:	**Colin Dombrowski**
Company:	**HR Green**
Date:	**March 18, 2026**
Project:	**Flying Horse North Filing No. 7**
Location:	**Black Forest Road and Hodgen Road**

SITE INFORMATION (User Input in Blue Cells)

WQCV Rainfall Depth: 0.60 inches

Depth of Average Runoff Producing Storm, d_6 = 0.43 inches (for Watersheds Outside of the Denver Region, Figure 3-1 in USDCM Vol. 3)

Area Type	SPA											
Area ID	SPA											
Downstream Design Point ID	1											
Downstream BMP Type	None											
DCIA (ft^2)	--											
UIA (ft^2)	--											
RPA (ft^2)	--											
SPA (ft^2)	83,311											
HSG A (%)	100%											
HSG B (%)	0%											
HSG C/D (%)	0%											
Average Slope of RPA (ft/ft)	--											
UIA:RPA Interface Width (ft)	--											

CALCULATED RUNOFF RESULTS

Area ID	SPA											
UIA:RPA Area (ft^2)	--											
L / W Ratio	--											
UIA / Area	--											
Runoff (in)	0.00											
Runoff (ft^3)	0											
Runoff Reduction (ft^3)	4166											

CALCULATED WQCV RESULTS

Area ID	SPA											
WQCV (ft^3)	0											
WQCV Reduction (ft^3)	0											
WQCV Reduction (%)	0%											
Untreated WQCV (ft^3)	0											

CALCULATED DESIGN POINT RESULTS (sums results from all columns with the same Downstream Design Point ID)

Downstream Design Point ID	1											
DCIA (ft^2)	0											
UIA (ft^2)	0											
RPA (ft^2)	0											
SPA (ft^2)	83,311											
Total Area (ft^2)	83,311											
Total Impervious Area (ft^2)	0											
WQCV (ft^3)	0											
WQCV Reduction (ft^3)	0											
WQCV Reduction (%)	0%											
Untreated WQCV (ft^3)	0											

CALCULATED SITE RESULTS (sums results from all columns in worksheet)

Total Area (ft^2)	83,311
Total Impervious Area (ft^2)	0
WQCV (ft^3)	0
WQCV Reduction (ft^3)	0
WQCV Reduction (%)	0%
Untreated WQCV (ft^3)	0

SEDIMENT BASIN A - POND A INITIAL PHASE
SEDIMENT BASIN STAGE-STORAGE CALCULATIONS

Elevation	Area S.F.	Area Acre	Volume Cu. Ft.	Volume Acre-Ft	Cumm Vol Cu. Ft.	Cumm Vol Acre-Ft	Proration Enter Vol. in Cu-Ft*	Proration Enter Vol. in Acre-Ft*	Elev. ft.
7437.0	**20**								
7438.0	**1949**		722		**722**	**0.017**			
7439.0	**17756**		8,529		**9,251**	**0.212**			
7440.0	**39427**		27,881		**37,132**	**0.852**	60,293	1.3841	**7,440.42**
7441.0	**73697**		55,676		**92,808**	**2.131**	180,880	4.1524	**7,441.92**
7442.0	**120685**		96,230		**189,038**	**4.340**			
7443.0	**178668**		148,732		**337,770**	**7.754**			
7444.0	**231486**		204,508		**542,278**	**12.449**			
7445.0	**272551**		251,739		**794,017**	**18.228**			

COLUMN 1	COLUMN 2	COLUMN 3	COLUMN 4
ORIFICE 1-1	ORIFICE 1-2	ORIFICE 1-3	ORIFICE 1-4
ORIFICE 2-1	ORIFICE 2-2	ORIFICE 2-3	ORIFICE 2-4
ORIFICE 3-1	ORIFICE 3-2	ORIFICE 3-3	ORIFICE 3-4
ORIFICE 4-1	ORIFICE 4-2	ORIFICE 4-3	ORIFICE 4-4
ORIFICE 5-1	ORIFICE 5-2	ORIFICE 5-3	ORIFICE 5-4

SED Basin riser pipe orifice calculations				
A_0 =	area per row of orifices spaved on 4" centers (in^2)			
V=	4.1524	design volume (acre feet)	*<15 ac.	
T_D=	72	time to drain the prescribed colume (hrs) (Typically 72 hours for EURV)		
H=	1.499	depth of volume (ft)		
S=	0.0001	Trickel channel slope (ft/ft) [Use 0.0001 for flat slope]		
			S=0%	
A_0 =	9.6786	in^2	**2.4197**	**in^2 (one-quarter of total)**
Dia	1.76	in		
	3.51	Dia=/2	**USE DIA. OF 7/4" (1-3/4")**	
	7.02	Dia=/4		
	14.04	Dia=/8		
	28.08	Dia=/16		
	56.17	Dia=/32		

SEDIMENT VOLUME CALCULATIONS				
Disturbed area-acres	30.50	Acres		
Undisturbed area-acres	197.06	Acres		
Total Area-acres	227.56	Acres		
Sediment volume	180,880	cu-ft	4.1524	Acres-ft
Volume below lowest hole	60,293	cu-ft	1.3841	Acres-ft
Volume above lowest hole	180,880	cu-ft	4.1524	Acres-ft
Total Volume	241,113	cu-ft	5.5352	Acres-ft

Note: **Enter values in highlighted cells only.**

HRG Response:
MHFD Volume 3, Detail SC-7 and MHFD Orifice Sizing Equation Technical Memorandum information added to TSB sizing/stage-storage sheets

SEDIMENT BASIN B - POND B INITIAL PHASE
SEDIMENT BASIN STAGE-STORAGE CALCULATIONS

Elevation	Area S.F.	Area Acre	Volume Cu. Ft.	Volume Acre-Ft	Cumm Vol Cu. Ft.	Cumm Vol Acre-Ft	Proration Enter Vol. in Cu-Ft*	Proration Enter Vol. in Acre-Ft*	Elev. Cu-Ft
7427.5	50								
7428.0	195		57		57	0.001			
7429.0	7480		2,961		3,018	0.069			
7430.0	26310		15,939		18,958	0.435	27,633	0.6344	7,430.23
7431.0	50259		37,644		56,602	1.299	82,900	1.9031	7,431.48
7432.0	59780		54,951		111,553	2.561			
7433.0	64296		62,024		173,577	3.985			
7434.0	68572		66,423		239,999	5.510			
7434.5	70000		34,642		274,642	6.305			

COLUMN 1	COLUMN 2	CENTROID EL.
ORIFICE 1-1	ORIFICE 1-2	7,430.23
ORIFICE 2-1	ORIFICE 2-2	7,430.56
ORIFICE 3-1	ORIFICE 3-2	7,430.89
ORIFICE 4-1	ORIFICE 4-2	7,431.22

I don't understand how you got or chose these values. Can you add a note to these TSB sheets explaining these unknown formulas, decisions, design storms?

Without the excel file, it's hard for me to review these tables that I've never seen before. In the future, for large TSB sizing and forebay sizing, please use MHFD's spreadsheets since we know their formula's are vetted and accurate (ie: meet their criteria), whereas when you use your own spreadsheets, we have no idea if what you are showing is acceptable or not.

SED Basin riser pipe orifice calculations				
A_0 =	area per row of orifices spaved on 4" centers (in^2)			
V=	1.9031	design volume (acre feet) *<15 ac.		
T_D=	72	time to drain the prescribed colume (hrs) (Typically 72 hours for EURV)		
H=	1.248	depth of volume (ft)		
S=	0.0001	Trickel channel slope (ft/ft) [Use 0.0001 for flat slope]		
			S=0%	
A_0 =	4.9192	in^2	**2.4596**	**in^2 (half of total)**
Dia	1.77	in		
	3.54	Dia=/2	**USE DIA. OF 1-3/4"**	
	7.08	Dia=/4		
	14.16	Dia=/8		
	28.31	Dia=/16		
	56.63	Dia=/32		

SEDIMENT VOLUME CALCULATIONS				
Disturbed area-acres	25.00	Acres		
Undisturbed area-acres	30.80	Acres		
Total Area-acres	55.80	Acres		
Sediment volume	82,900	cu-ft	1.9031	Acres-ft
Volume below lowest hole	27,633	cu-ft	0.6344	Acres-ft
Volume above lowest hole	82,900	cu-ft	1.9031	Acres-ft
Total Volume	110,506	cu-ft	2.5369	Acres-ft

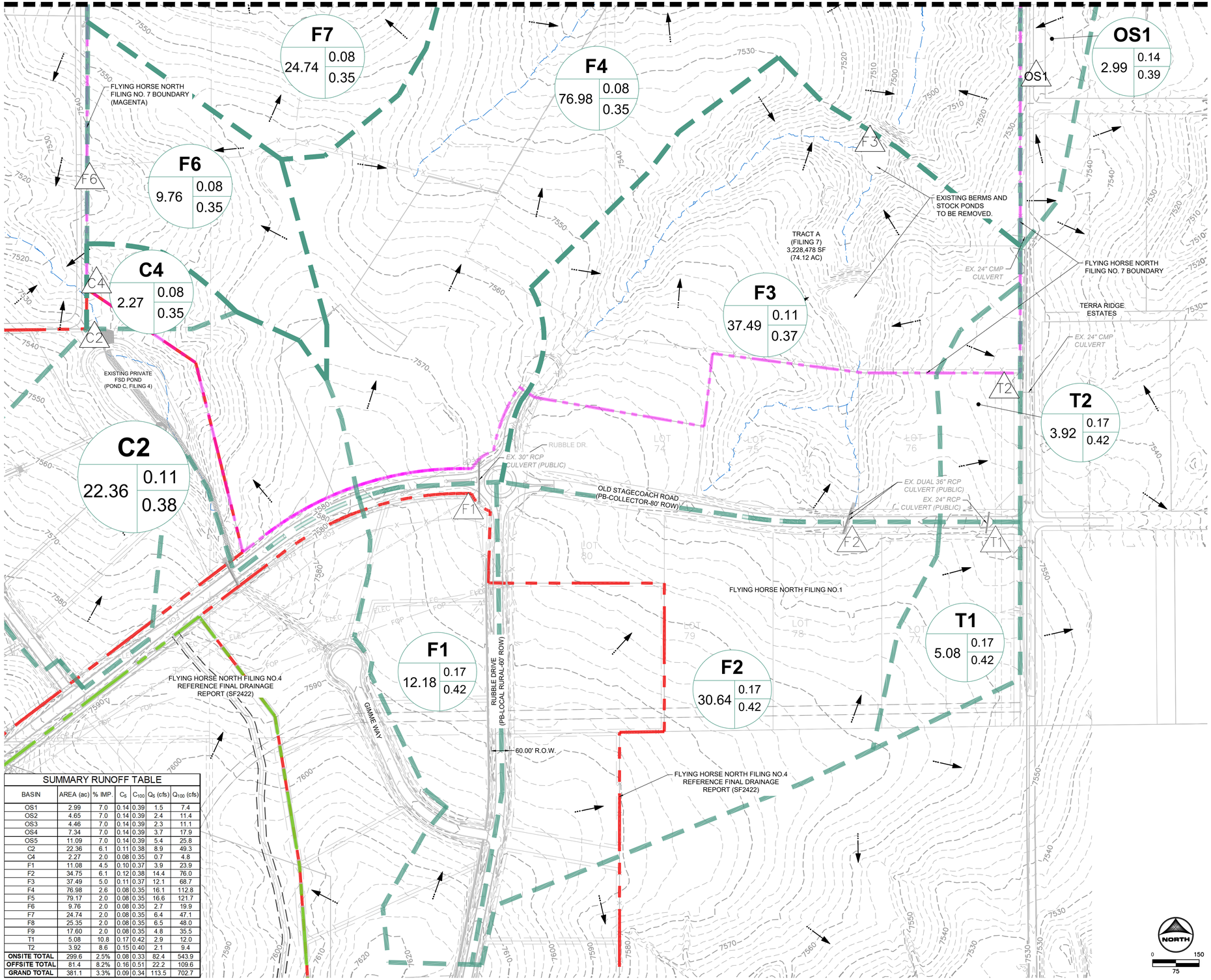
Note: **Enter values in highlighted cells only.**

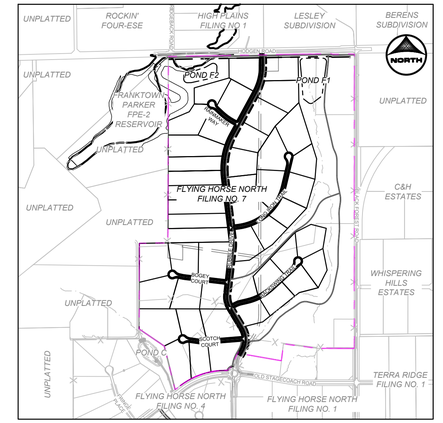
APPENDIX E – REFERENCE MATERIAL

APPENDIX F – DRAINAGE MAPS

DOMBROWSKI, COLIN, 3/19/2026 2:47 PM

MATCHLINE SEE SHEET 02





KEY MAP
SCALE: 1" = 1000'

LEGEND:

- PROPOSED MAJOR CONTOUR — 5250
- PROPOSED MINOR CONTOUR
- EXISTING MAJOR CONTOUR — 5250
- EXISTING MINOR CONTOUR
- PROPOSED STORM SEWER
- EXISTING STORM SEWER
- EXISTING DRAINAGE SWALE
- PROPOSED DRAINAGE SWALE
- EXISTING TERTIARY DRAINAGE WAY
- FILING NO. 4 PARCEL BOUNDARY
- FILING NO. 5 PARCEL BOUNDARY
- FILING NO. 7 PARCEL BOUNDARY
- FLOW DIRECTION
- DRAINAGE BASIN
- DESIGN POINT — X
- SWALE CROSS SECTION
- BASIN LABEL — BASIN DESIGNATION: A1; AREA (AC.): 1.00; MINOR 5-YR RUNOFF COEF.: 0.40; MAJOR 100-YR RUNOFF COEF.: 0.60

SUMMARY RUNOFF TABLE

BASIN	AREA (ac)	% IMP.	C_5	C_{100}	Q_5 (cfs)	Q_{100} (cfs)
OS1	2.99	7.0	0.14	0.39	1.5	7.4
OS2	4.65	7.0	0.14	0.39	2.4	11.4
OS3	4.46	7.0	0.14	0.39	2.3	11.1
OS4	7.34	7.0	0.14	0.39	3.7	17.9
OS5	11.09	7.0	0.14	0.39	5.4	25.8
C2	22.36	6.1	0.11	0.38	8.9	49.3
C4	2.27	2.0	0.08	0.35	0.7	4.8
F1	11.08	4.5	0.10	0.37	3.9	23.9
F2	34.75	6.1	0.12	0.38	14.4	76.0
F3	37.49	5.0	0.11	0.37	12.1	68.7
F4	76.98	2.6	0.08	0.35	16.1	112.8
F5	79.17	2.0	0.08	0.35	16.6	121.7
F6	9.76	2.0	0.08	0.35	2.7	19.9
F7	24.74	2.0	0.08	0.35	6.4	47.1
F8	25.35	2.0	0.08	0.35	6.5	48.0
F9	17.60	2.0	0.08	0.35	4.8	35.5
T1	5.08	10.8	0.17	0.42	2.9	12.0
T2	3.92	8.6	0.15	0.40	2.1	9.4
ONSITE TOTAL	299.6	2.5%	0.08	0.33	82.4	543.9
OFFSITE TOTAL	81.4	8.2%	0.16	0.51	22.2	109.6
GRAND TOTAL	381.1	3.3%	0.09	0.34	113.5	702.7

CUMULATIVE DESIGN POINT SUMMARY TABLE

DESIGN POINT	CONTRIBUTING BASINS	ΣQ_5 (cfs)	ΣQ_{100} (cfs)	Tributary Area (ac.)	Weighted % Impervious
OS1	OS1	1.5	7.4	3.0	7.0
OS2	OS2	2.4	11.4	4.7	7.0
OS3	OS3	2.3	11.1	4.5	7.0
OS4	OS4	3.7	17.9	7.3	7.0
OS5	OS5	5.4	25.8	11.1	7.0
C4	C3	0.7	4.8	2.3	2.0
F1	F1	3.9	23.9	11.1	4.5
F2	F2	14.4	76.0	34.8	6.1
F3	F2 + F3	17.7	96.6	72.2	5.5
F4	F2 - F4 + OS1 - OS3	20.5	123.3	161.3	4.2
F5	F2 - F5 + OS1 - OS5	18.8	116.4	258.9	3.7
F6	F6	2.7	19.9	9.8	2.0
F7	F7	6.4	47.1	24.7	2.0
F8	F8	6.5	48.0	25.4	2.0
F9	F9	4.8	35.5	17.6	2.0
T1	T1	2.9	12.0	5.1	10.8
T2	T1 + T2	3.5	15.1	9.0	9.8

NORTH
0 150
75

PCD FILE NO.: SF2532

DRAWN BY: CVW JOB DATE: 3/18/2026
APPROVED: RDL JOB NUMBER: 211030.270
CAD DATE: 3/19/2026
CAD FILE: J:\2021\211030\CAD\Dwgs\C\Drainage\FDR Filing 7 - North\Ex_Drainage_FHN F7

BAR IS ONE INCH ON OFFICIAL DRAWINGS. 0 1"
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

FLYING HORSE NORTH FILING 7
PRI #2, LLC.
EL PASO COUNTY, CO

FINAL DRAINAGE REPORT
EXISTING DRAINAGE MAP

SHEET DR 01

HR GREEN Xrefs: xv-util-1030; xv-dsgn-1030; xv-row-1030; xc-row-030.240; xc-dsgn-240; xc-row-030.250; xc-dsgn-250; VicinityMap_Block; XC-BASIN; xgt-1-dh01-1030.260

DOMBROWSKI, COLIN, 3/19/2026 2:47 PM

HR GREEN Xrefs: xv--utl$-1030; xv--dsgn-1030; xv--row-1030; xc--row-030.240; xc--dsgn-240; xc--row-030.250; xc--dsgn-250; VicinityMap_Block; XC-BASIN; xg1--1--dn01--1030.260

EX. DUAL 48" RCP CULVERT (PUBLIC)

EX. 54" RCP CULVERT (PUBLIC)

JURISDICTIONAL EARTH DAM (80130)
LENGHT: 907 FT
HEIGHT: 25 FT
CREST ELEVATION: 7440.00'

CURRENT 100-YEAR FLOODPLAIN PER LOMR 18-08-0702P

TRACT B (FILING 7) 445,517 SF (10.23 AC)

FRANKTOWN PARKER FPE-2 RESERVOIR

100-YEAR CWCB DRAFT FLOODPLAIN

FEMA MAP LOMR 18-08-0702P
EFFECTIVE DATE: 4/04/2019
ZONE A

EXISTING STOCK POND TO BE REMOVED

EXISTING STOCK POND TO BE REMOVED

EX. 24" CMP CULVERT (PUBLIC)

EX. 24" CMP CULVERT (PUBLIC)

TRACT A (FILING 7) 3,228,478 SF (74.12 AC)

EXISTING STOCK POND TO BE REMOVED.

BLACK FOREST ROAD (PB-MINOR ARTERIAL-80' ROW)

EX. 24" CMP CULVERT (PUBLIC)

EX. 24" CMP CULVERT (PUBLIC)

EX. 24" CMP CULVERT (PUBLIC)

EX. CHEROKEE WELL SITE

C&H ESTATES

MATCHLINE SEE SHEET 01

F9		
17.60	0.08	0.35

F8		
25.35	0.08	0.35

F5		
79.17	0.08	0.35

F7		
24.74	0.08	0.35

F4		
76.98	0.08	0.35

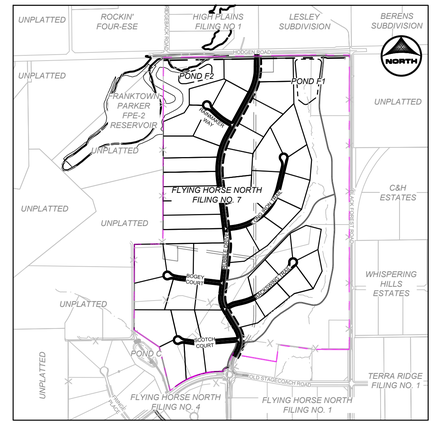
OS5		
11.09	0.14	0.39

OS4		
7.34	0.14	0.39

OS3		
4.46	0.14	0.39

OS2		
4.65	0.14	0.39

OS1		
2.99	0.14	0.39



KEY MAP
SCALE: 1" = 1000'

LEGEND:

- PROPOSED MAJOR CONTOUR — 5250
- PROPOSED MINOR CONTOUR
- EXISTING MAJOR CONTOUR — 5250
- EXISTING MINOR CONTOUR
- PROPOSED STORM SEWER
- EXISTING STORM SEWER
- EXISTING DRAINAGE SWALE
- PROPOSED DRAINAGE SWALE
- EXISTING TERTIARY DRAINAGE WAY
- FILING NO. 4 PARCEL BOUNDARY
- FILING NO. 5 PARCEL BOUNDARY
- FILING NO. 7 PARCEL BOUNDARY
- FLOW DIRECTION
- DRAINAGE BASIN
- DESIGN POINT — X
- SWALE CROSS SECTION
- BASIN LABEL — BASIN DESIGNATION; MINOR 5-YR RUNOFF COEF.; MAJOR 100-YR RUNOFF COEF.; AREA (AC.)

A1		
1.00	0.40	0.60

SUMMARY RUNOFF TABLE

BASIN	AREA (ac)	% IMP.	C_5	C_{100}	Q_5 (cfs)	Q_{100} (cfs)
OS1	2.99	7.0	0.14	0.39	1.5	7.4
OS2	4.65	7.0	0.14	0.39	2.4	11.4
OS3	4.46	7.0	0.14	0.39	2.3	11.1
OS4	7.34	7.0	0.14	0.39	3.7	17.9
OS5	11.09	7.0	0.14	0.39	5.4	25.8
C2	22.36	6.1	0.11	0.38	8.9	49.3
C4	2.27	2.0	0.08	0.35	0.7	4.8
F1	11.08	4.5	0.10	0.37	3.9	23.9
F2	34.75	6.1	0.12	0.38	14.4	76.0
F3	37.49	5.0	0.11	0.37	12.1	68.7
F4	76.98	2.6	0.08	0.35	16.1	112.8
F5	79.17	2.0	0.08	0.35	16.6	121.7
F6	9.76	2.0	0.08	0.35	2.7	19.9
F7	24.74	2.0	0.08	0.35	6.4	47.1
F8	25.35	2.0	0.08	0.35	6.5	48.0
F9	17.60	2.0	0.08	0.35	4.8	35.5
T1	5.08	10.8	0.17	0.42	2.9	12.0
T2	3.92	8.6	0.15	0.40	2.1	9.4
ONSITE TOTAL	299.6	2.5%	0.08	0.33	82.4	543.9
OFFSITE TOTAL	81.4	8.2%	0.16	0.51	22.2	109.6
GRAND TOTAL	381.1	3.3%	0.09	0.34	113.5	702.7

CUMULATIVE DESIGN POINT SUMMARY TABLE

DESIGN POINT	CONTRIBUTING BASINS	ΣQ_5 (cfs)	ΣQ_{100} (cfs)	Tributary Area (ac.)	Weighted % Impervious
OS1	OS1	1.5	7.4	3.0	7.0
OS2	OS2	2.4	11.4	4.7	7.0
OS3	OS3	2.3	11.1	4.5	7.0
OS4	OS4	3.7	17.9	7.3	7.0
OS5	OS5	5.4	25.8	11.1	7.0
C4	C3	0.7	4.8	2.3	2.0
F1	F1	3.9	23.9	11.1	4.5
F2	F2	14.4	76.0	34.8	6.1
F3	F2 + F3	17.7	96.6	72.2	5.5
F4	F2 - F4 + OS1 - OS3	20.5	123.3	161.3	4.2
F5	F2 - F5 + OS1 - OS5	18.8	116.4	258.9	3.7
F6	F6	2.7	19.9	9.8	2.0
F7	F7	6.4	47.1	24.7	2.0
F8	F8	6.5	48.0	25.4	2.0
F9	F9	4.8	35.5	17.6	2.0
T1	T1	2.9	12.0	5.1	10.8
T2	T1 + T2	3.5	15.1	9.0	9.8

NORTH
0 150
75

PCD FILE NO.: SF2532

DRAWN BY: CVW JOB DATE: 3/18/2026
APPROVED: RDL JOB NUMBER: 211030.270
CAD DATE: 3/19/2026
CAD FILE: J:\2021\211030\CAD\Dwgs\C\Drainage\FDR Filing 7 - North\Ex_Drainage_FHN F7

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

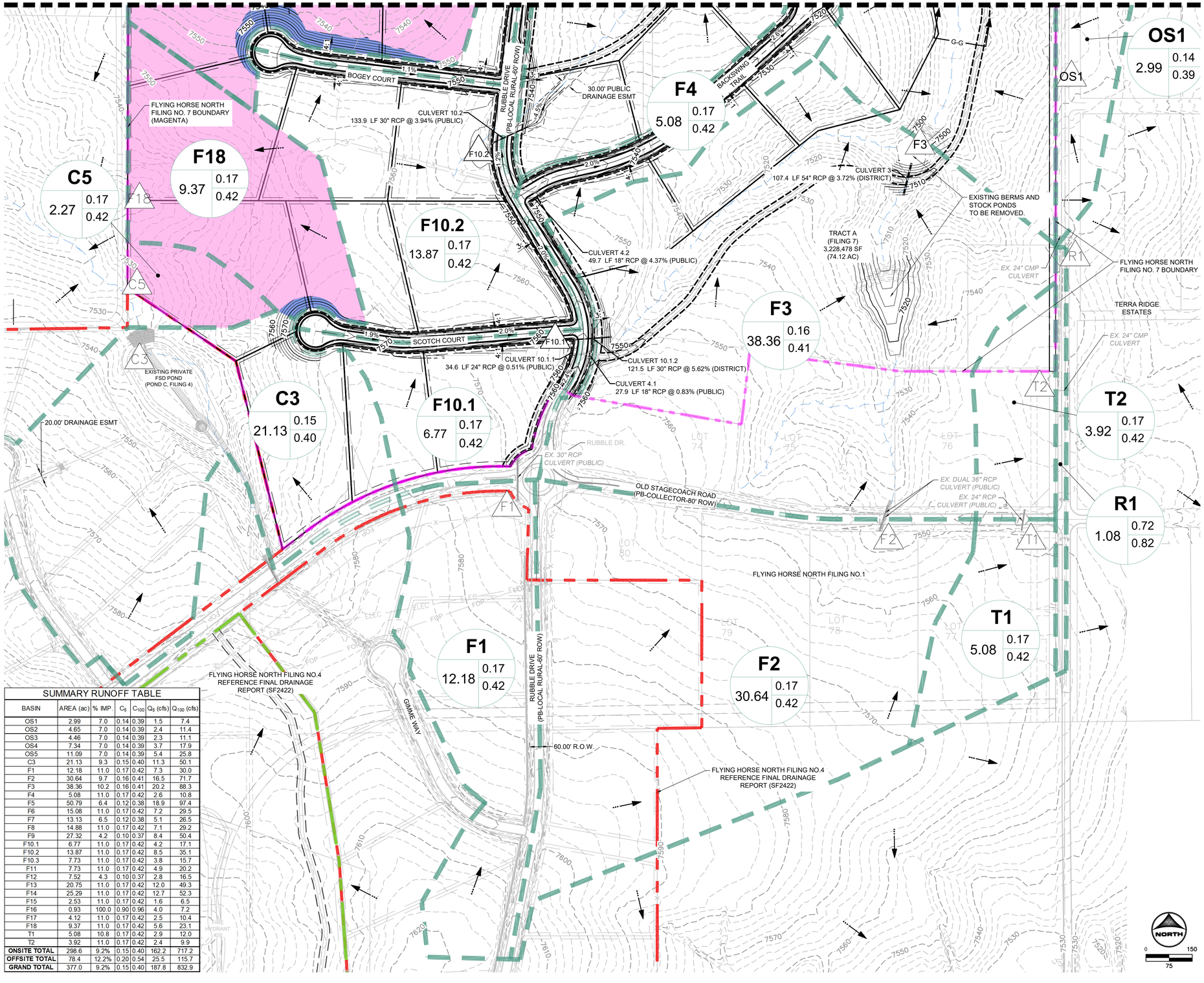
FLYING HORSE NORTH FILING 7
PRI #2, LLC.
EL PASO COUNTY, CO

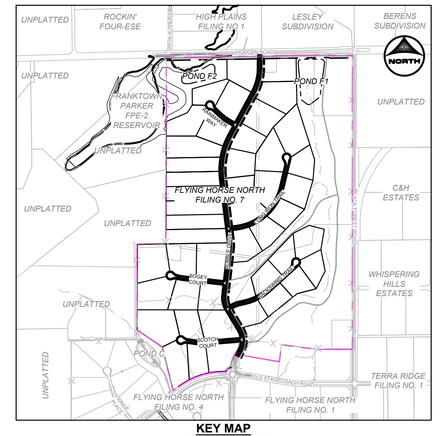
FINAL DRAINAGE REPORT
EXISTING DRAINAGE MAP

SHEET DR 02

DOMBROWSKI, COLIN, 8/27/2026 9:52 AM

MATCHLINE SEE SHEET 04





KEY MAP
SCALE: 1" = 1000'

LEGEND:

- PROPOSED MAJOR CONTOUR — 5250
- PROPOSED MINOR CONTOUR
- EXISTING MAJOR CONTOUR — 5250
- EXISTING MINOR CONTOUR
- PROPOSED STORM SEWER
- EXISTING STORM SEWER
- EXISTING DRAINAGE SWALE
- PROPOSED DRAINAGE SWALE
- EXISTING TERTIARY DRAINAGE WAY
- FILING NO. 4 PARCEL BOUNDARY
- FILING NO. 5 PARCEL BOUNDARY
- FILING NO. 7 PARCEL BOUNDARY
- FLOW DIRECTION
- DRAINAGE BASIN
- DESIGN POINT — X
- SWALE CROSS SECTION
- BASIN LABEL — BASIN DESIGNATION: A1; AREA (AC.): 1.00; MINOR 5-YR RUNOFF COEF.: 0.40; MAJOR 100-YR RUNOFF COEF.: 0.60

UNDISTURBED AREA
NOT TRIBUTARY TO A POND
TOTAL AREA = 62.28 ACRES

AREA EXCLUDED FROM WQ TREATMENT
PER ECM APP I.7.1.C.1 (FILING NO. 7)
TOTAL AREA = 0.93 ACRES

SEPARATE PERVIOUS AREAS (SPA)
TOTAL AREA = 1.91 ACRES

SUMMARY RUNOFF TABLE

BASIN	AREA (ac)	% IMP.	C_5	C_{100}	Q_5 (cfs)	Q_{100} (cfs)
OS1	2.99	7.0	0.14	0.39	1.5	7.4
OS2	4.65	7.0	0.14	0.39	2.4	11.4
OS3	4.46	7.0	0.14	0.39	2.3	11.1
OS4	7.34	7.0	0.14	0.39	3.7	17.9
OS5	11.09	7.0	0.14	0.39	5.4	25.8
C3	21.13	9.3	0.15	0.40	11.3	50.1
F1	12.18	11.0	0.17	0.42	7.3	30.0
F2	30.64	9.7	0.16	0.41	16.5	71.7
F3	38.36	10.2	0.16	0.41	20.2	88.3
F4	5.08	11.0	0.17	0.42	2.6	10.8
F5	50.79	6.4	0.12	0.38	18.9	97.4
F6	15.08	11.0	0.17	0.42	7.2	29.5
F7	13.13	6.5	0.12	0.38	5.1	26.5
F8	14.88	11.0	0.17	0.42	7.1	29.2
F9	27.32	4.2	0.10	0.37	8.4	50.4
F10.1	6.77	11.0	0.17	0.42	4.2	17.1
F10.2	13.87	11.0	0.17	0.42	8.5	35.1
F10.3	7.73	11.0	0.17	0.42	3.8	15.7
F11	7.73	11.0	0.17	0.42	4.9	20.2
F12	7.52	4.3	0.10	0.37	2.8	16.5
F13	20.75	11.0	0.17	0.42	12.0	49.3
F14	25.29	11.0	0.17	0.42	12.7	52.3
F15	2.53	11.0	0.17	0.42	1.6	6.5
F16	0.93	100.0	0.90	0.96	4.0	7.2
F17	4.12	11.0	0.17	0.42	2.5	10.4
F18	9.37	11.0	0.17	0.42	5.6	23.1
T1	5.08	10.8	0.17	0.42	2.9	12.0
T2	3.92	11.0	0.17	0.42	2.4	9.9
ONSITE TOTAL	298.6	9.2%	0.15	0.40	162.2	717.2
OFFSITE TOTAL	78.4	12.2%	0.20	0.54	25.5	115.7
GRAND TOTAL	377.0	9.2%	0.15	0.40	187.8	832.9

CUMULATIVE DESIGN POINT SUMMARY TABLE

DESIGN POINT	CONTRIBUTING BASINS	ΣQ_5 (cfs)	ΣQ_{100} (cfs)	Tributary Area (ac.)	Weighted % Impervious
OS1	OS1	1.5	7.4	3.0	7.0
OS2	OS2	2.4	11.4	4.7	7.0
OS3	OS3	2.3	11.1	4.5	7.0
OS4	OS4	3.7	17.9	7.3	7.0
OS5	OS5	5.4	25.8	11.1	7.0
C3	C3	11.3	50.1	21.1	9.3
F1	F1	7.3	30.0	12.2	11.0
F2	F2	16.5	71.7	30.6	9.7
F3	F2 + F3	29.0	126.5	69.0	9.9
F4	F4	2.6	10.8	5.1	11.0
F5	F2 - F5 + F10S + OS1 - OS3	46.1	212.9	143.7	8.5
F6	F6	7.2	29.5	15.1	11.0
F7	F2 - F7 + F10S + OS1 - OS4	55.0	253.4	179.3	8.5
F8	F8	7.1	29.2	14.9	11.0
F9	F9	8.4	50.4	27.3	4.2
F10.1	F1 + F10.1	8.7	36.0	19.0	11.0
F10.2	F10.2	8.5	35.1	13.9	11.0
F10.3	F10.3	3.8	15.7	7.7	11.0
F11	F11	4.9	20.2	7.7	11.0
F12	F12	2.8	16.5	7.5	4.3
F13	F13	12.0	49.3	20.8	11.0
F14	F14	12.7	52.3	25.3	11.0
F15	F15	1.6	6.5	2.5	11.0
F16	F16	4.0	7.2	0.9	100.0
F17	F17	2.5	10.4	4.1	11.0
F18	F18	5.6	23.1	9.4	11.0
T1	T1	2.9	12.0	5.1	10.8
T2	T1, T2	5.2	21.3	9.0	10.9

PCD FILE NO.: SF2532

DRAWN BY: CVW | JOB DATE: 8/21/2026
APPROVED: RDL | JOB NUMBER: 211030.270
CAD DATE: 8/27/2026
CAD FILE: J:\2021\211030\CAD\Dwgs\C\Drainage\FDR Filing 7 - North\Pr_Drainage_FHN F7

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
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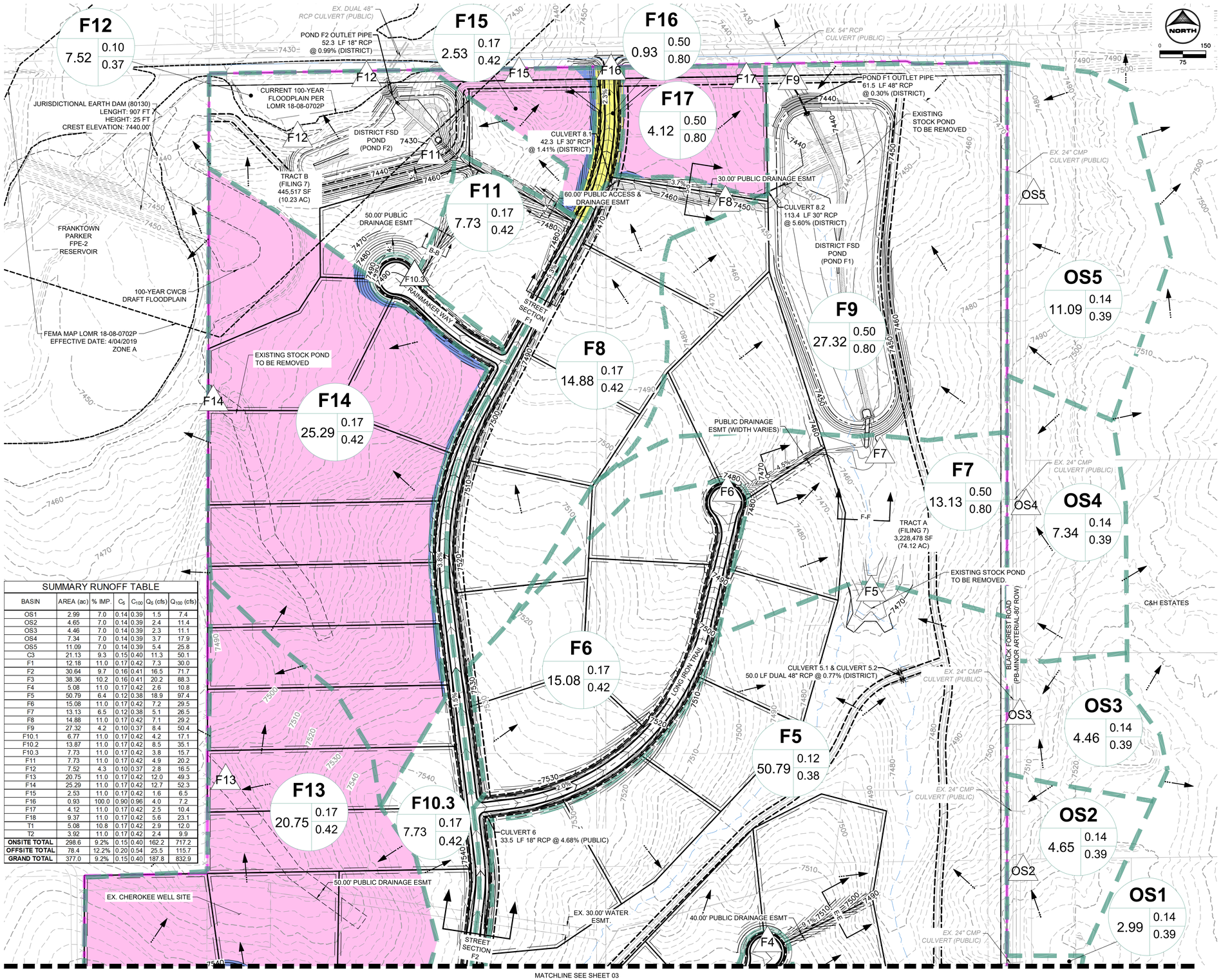
FLYING HORSE NORTH FILING 7
PRI #2, LLC.
EL PASO COUNTY, CO

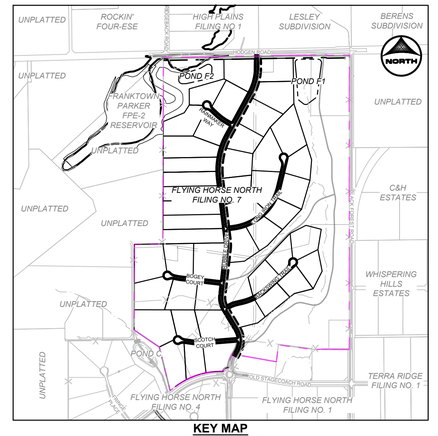
FINAL DRAINAGE REPORT
PROPOSED DRAINAGE MAP

SHEET DR 03

HR GREEN Xrefs: xv-util-1030; xv-dsgn-1030; xv-row-1030; xc-row-030.240; xc-row-030.260; xc-dsgn-240; xc-dsgn-260; xc-row-030.250; xc-dsgn-250; VicinityMap_Block; XC-BASIN; xg1-1-dh01-1030.260

DOMBROWSKI, COLIN, 8/27/2026 9:53 AM
HR GREEN Xrefs: xv-util-1030; xv-dsgn-1030; xv-row-1030; xc-row-030.240; xc-row-030.260; xc-dsgn-240; xc-dsgn-260; xc-row-030.250; xc-dsgn-250; VicinityMap_Block; XC-BASIN; xg1-1-dh01-1030.260





KEY MAP
SCALE: 1" = 1000'

LEGEND:

- PROPOSED MAJOR CONTOUR — 5250
- PROPOSED MINOR CONTOUR
- EXISTING MAJOR CONTOUR — 5250
- EXISTING MINOR CONTOUR
- PROPOSED STORM SEWER
- EXISTING STORM SEWER
- EXISTING DRAINAGE SWALE
- PROPOSED DRAINAGE SWALE
- EXISTING TERTIARY DRAINAGE WAY
- FILING NO. 4 PARCEL BOUNDARY
- FILING NO. 5 PARCEL BOUNDARY
- FILING NO. 7 PARCEL BOUNDARY
- FLOW DIRECTION
- DRAINAGE BASIN
- DESIGN POINT
- SWALE CROSS SECTION
- BASIN LABEL
- BASIN DESIGNATION: A1
- AREA (AC.): 1.00
- MINOR 5-YR RUNOFF COEF.: 0.40
- MAJOR 100-YR RUNOFF COEF.: 0.60
- UNDISTURBED AREA NOT TRIBUTARY TO A POND TOTAL AREA = 62.28 ACRES
- AREA EXCLUDED FROM WQ TREATMENT PER ECM APP I.7.1.C.1 (FILING NO. 7) TOTAL AREA = 0.93 ACRES
- SEPARATE PERVIOUS AREAS (SPA) TOTAL AREA = 1.91 ACRES

SUMMARY RUNOFF TABLE

BASIN	AREA (ac)	% IMP.	C_5	C_{100}	Q_5 (cfs)	Q_{100} (cfs)
OS1	2.99	7.0	0.14	0.39	1.5	7.4
OS2	4.65	7.0	0.14	0.39	2.4	11.4
OS3	4.46	7.0	0.14	0.39	2.3	11.1
OS4	7.34	7.0	0.14	0.39	3.7	17.9
OS5	11.09	7.0	0.14	0.39	5.4	25.8
C3	21.13	9.3	0.15	0.40	11.3	50.1
F1	12.18	11.0	0.17	0.42	7.3	30.0
F2	30.64	9.7	0.16	0.41	16.5	71.7
F3	38.36	10.2	0.16	0.41	20.2	88.3
F4	5.08	11.0	0.17	0.42	2.6	10.8
F5	50.79	6.4	0.12	0.38	18.9	97.4
F6	15.08	11.0	0.17	0.42	7.2	29.5
F7	13.13	6.5	0.12	0.38	5.1	26.5
F8	14.88	11.0	0.17	0.42	7.1	29.2
F9	27.32	4.2	0.10	0.37	8.4	50.4
F10.1	6.77	11.0	0.17	0.42	4.2	17.1
F10.2	13.87	11.0	0.17	0.42	8.5	35.1
F10.3	7.73	11.0	0.17	0.42	3.8	15.7
F11	7.73	11.0	0.17	0.42	4.9	20.2
F12	7.52	4.3	0.10	0.37	2.8	16.5
F13	20.75	11.0	0.17	0.42	12.0	49.3
F14	25.29	11.0	0.17	0.42	12.7	52.3
F15	2.53	11.0	0.17	0.42	1.6	6.5
F16	0.93	100.0	0.90	0.96	4.0	7.2
F17	4.12	11.0	0.17	0.42	2.5	10.4
F18	9.37	11.0	0.17	0.42	5.6	23.1
T1	5.08	10.8	0.17	0.42	2.9	12.0
T2	3.92	11.0	0.17	0.42	2.4	9.9
ONSITE TOTAL	298.6	9.2%	0.15	0.40	162.2	717.2
OFFSITE TOTAL	78.4	12.2%	0.20	0.54	25.5	115.7
GRAND TOTAL	377.0	9.2%	0.15	0.40	187.8	832.9

CUMULATIVE DESIGN POINT SUMMARY TABLE

DESIGN POINT	CONTRIBUTING BASINS	ΣQ_5 (cfs)	ΣQ_{100} (cfs)	Tributary Area (ac.)	Weighted % Impervious
OS1	OS1	1.5	7.4	3.0	7.0
OS2	OS2	2.4	11.4	4.7	7.0
OS3	OS3	2.3	11.1	4.5	7.0
OS4	OS4	3.7	17.9	7.3	7.0
OS5	OS5	5.4	25.8	11.1	7.0
C3	C3	11.3	50.1	21.1	9.3
F1	F1	7.3	30.0	12.2	11.0
F2	F2	16.5	71.7	30.6	9.7
F3	F2 + F3	29.0	126.5	69.0	9.9
F4	F4	2.6	10.8	5.1	11.0
F5	F2 - F5 + F10S + OS1 - OS3	46.1	212.9	143.7	8.5
F6	F6	7.2	29.5	15.1	11.0
F7	F2 - F7 + F10S + OS1 - OS4	55.0	253.4	179.3	8.5
F8	F8	7.1	29.2	14.9	11.0
F9	F9	8.4	50.4	27.3	4.2
F10.1	F1 + F10.1	8.7	36.0	19.0	11.0
F10.2	F10.2	8.5	35.1	13.9	11.0
F10.3	F10.3	3.8	15.7	7.7	11.0
F11	F11	4.9	20.2	7.7	11.0
F12	F12	2.8	16.5	7.5	4.3
F13	F13	12.0	49.3	20.8	11.0
F14	F14	12.7	52.3	25.3	11.0
F15	F15	1.6	6.5	2.5	11.0
F16	F16	4.0	7.2	0.9	100.0
F17	F17	2.5	10.4	4.1	11.0
F18	F18	5.6	23.1	9.4	11.0
T1	T1	2.9	12.0	5.1	10.8
T2	T1, T2	5.2	21.3	9.0	10.9

PCD FILE NO.: SF2532

DRAWN BY: CVW	JOB DATE: 8/21/2026	BAR IS ONE INCH ON OFFICIAL DRAWINGS.	
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SHEET DR 04