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Flying Horse North Filing No. 8
Final Drainage Report

September 2026

Prepared For:

Mr. Drew Balsick

Vice President / Project Manager

Flying Horse Development, LLC
2138 Flying Horse Club Drive

Colorado Springs, CO 80921

(719) 785-3237

Prepared By:

HR Green Development, LLC

1975 Research Parkway, Ste. 160

Colorado Springs, CO 80920

Contact: Richie Lyon, PE

Richie.Lyon@hrgreen.com

719-318-0871

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Engineer's Statement

This report and plan for the drainage design of the development, Flying Horse North Filing No. 8, 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.



RichardDLyon 9/25/2026

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

9/25/2026

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 Flying Horse North Filing No. 8.

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.

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. 5 area.

Additionally, a PDR for a Major PUD Amendment for Flying Horse North Subdivision Filing Nos. 6, 7, & 8 (PUDSP252) has been prepared that addresses the Filing No. 8 area for stormwater drainage and infrastructure planning.

The items discussed in this FDR include final plat layout, land uses, and drainage patterns for Flying Horse North Filing No. 8. Included in this report are final hydrologic and hydraulic drainage calculations and design as required for the final design of the development of the public roadway extensions and the fifty (50) single-family residential estate lots included in this filing. 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, a majority of the site is within the East Cherry Creek Drainage Basin. 10.23 acres of the site is within the Black Squirrel Creek Drainage Basin, which is a subbasin of the Arkansas River Drainage Basin. A Drainage Basin Planning Study (DBPS) does not currently exist for the East Cherry Creek Drainage Basin. This FDR is consistent with the 2022 MDDP prepared by HR Green Development, LLC. and a recent PDR Amendment for the Major PUD Amendment for Filings 6, 7, and 8 which complies with standard El Paso County regulations regarding drainage within this corridor.

A majority of the Filing No. 8 area, which consists of fifty (50) single-family residential estate lot of 2.5-acres minimum area within the total filing boundary area of 155.58 acres falls within the East Cherry Creek Basin. Three (3) tracts primarily used for drainage will also be platted in this area. The remaining area of Filing No. 8 site, consisting of a Tract B and portions of Lots 38, 39, and 40, is within the Black Squirrel Creek Drainage Basin. The filing primarily consists of the extension of 60’ public rights-of-way for Sandbagger Drive from the existing Filing No. 6 termination point of this public roadway, and the extension of public roadway Holmes Road from the temporary roadway termination cul-de-sac of Filing 6 to the southern boundary of

Flying Horse North where a connection to the existing Holmes Road is to be made. Par Court and Wedge Trail are public rural roadways that are proposed to extend off of Holmes Road. Proposed developed areas are provided with water quality and full spectrum detention (FSD) prior to release offsite from the subdivision, except for portions of Lots 38, 39, and 40 (to be discussed in later sections). Much of the developed Filing area is planned to be treated by proposed, private FSD pond, Pond J. This pond will be maintained by the Flying Horse North Metropolitan District. The remaining developed area within this filing, except for a small area that drains directly offsite, is tributary to the existing downstream Irrigation Reservoir (Pond 13) within Filing No. 1.

The basins and sub-basins assessed as a part of this FDR are consistent with the basins represented in the Major PUD Amendment PDR (PUDSP252) in order to show compliance with the previous study and the subdivision as a whole. The Filing No. 8 area is shown in the 2025 PDR proposed hydrology maps within Basins I and J. Intermediate conveyance infrastructure such as natural channels and proposed culverts were preliminarily analyzed in that report, and shall be finalized in the following sections of this report.

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. 8 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. Filing No. 8 is within Section 31 and Section 36, Township 11 South, and Range 65 West of the Sixth Principal Meridian and is located south of Filing No. 5 and west of Filing No. 6.

The Filing No. 8 area totals approximately 159.44 acres for the development of fifty (50) single-family residential estate lots and three (3) tracts primarily for drainage use. The remaining areas are 60’ public right-of-way for public roadways of Sandbagger Drive, Holmes Road, Par Court, and Wedge Trail. The rights-of-way within this filing are typical of the Flying Horse North right-of-way sections which include the 28’ width asphalt paved rural local roadways with 2’ gravel shoulders, roadside ditches where applicable, 5’ public improvement easements, 10’ public utility easements, and any applicable trail easements as needed. There is a 25’ regional trail easement to the east of Holmes Road that is to connect to the regional trail system throughout Flying Horse North, specifically connecting to the platted Filing No. 5 regional trail easement.

Filing No. 8 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 approximately 90 percent as evidenced by a field survey and aerial imagery. The existing vegetation includes native grasses and weeds, shrubs, and pinyon pine trees. Previous clearing of future planned roadways was done several years ago, and native grass and weeds have covered those areas.

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

Amendment to the Final Drainage Report for Cathedral Pines prepared by Stillwater Engineering – dated August 28th, 2006

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. 6 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

The majority of the Flying Horse North Filing No. 8 area 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, two major drainage basins have been designated within the 2025 PDR for the Major PUD Amendment (PUDSP252), Basins I and J. Basin I is tributary to the Filing No. 1 Irrigation Reservoir referred to as Pond 13 and Design Point I9. Basin J is tributary to Pond J in the Major PUD Amendment.

The remaining portion of the site that drains within the Black Squirrel Creek Basin will be discussed in the sections below.

This Filing No. 8 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 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.

The runoff within the “I” Basins of the Filing No. 8 site will be captured and treated in Pond 13 in Filing No. 1. The runoff within the “J” Basins is to be captured and treated within proposed private Pond J.

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 and Black Squirrel Creek Basin. Flying Horse North will construct multiple full spectrum detention facilities to limit the effects of development and mimic natural flow patterns. Flying Horse North Filing No. 8 development will follow historic drainage patterns and utilize the existing natural swales throughout the area for conveyance of stormwater runoff toward respective detention facilities, including a proposed private FSD pond (Pond J) and the existing Irrigation Reservoir (Pond 13).

c. Site Characteristics

Per the NRCS web soil survey, the site is made up entirely of Type B soils. Filing No. 8 is within the East Cherry Creek Basin which consists of Peyton sandy loam and Peyton-Pring complex. See Appendix A for the NRCS soil map.

The current ground cover in Filing No. 8 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 adjacent to 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. Roadside swales are included as a part of the typical roadway section for cut conditions 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 will continue to be used for conveyance of storm drainage flows. 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 natural features of the site including existing trees and vegetation.

Drainageways of note including roadside swales are described within this report with parameters to demonstrate compliance with swale design criteria and capacities. Culvert pipes are sized to convey upstream flow under proposed roadways and maintain historic drainage patterns.

e. Existing and proposed land uses

The existing Filing No. 8 area is open rangeland within a forested area consisting of sparse native grasses, weeds, and pinyon pine trees as well as baren pervious soil. The 2018 Classic Report assumed 2-acre single-family residential estate lot development with the same percent imperviousness within the filing area. This report includes the final design layout of fifty (50) 2.5-acre lots and two (2) tracts primarily used for drainage with rural roadway sections, 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

b. Major Basin Description

Per FEMA FIRM 08041C0315G (eff. 12/7/2018), there are no FEMA Floodplains within this Filing.

The site has been divided into several major drainage basins where each basin is tributary to a full spectrum detention pond facility (except for Basin OS-1 and OS-3 to the southwest, located in the Black Squirrel Creek Drainage Basin). These basins and associated sub-basins are described in more detail in the next section of this report.

c. Existing Subbasin Description

The existing conditions for Filing No. 8 have been analyzed and the delineated basins presented in the Existing Conditions Map in Appendix F are described as follows:

Existing Basin I3: 9.51 acres, 2.5 acre residential (Q_5 = 6.3 cfs, Q_{100} = 26.0 cfs)

Runoff from 2.5 acre residential lot areas within this basin initially sheet flows southwest over existing topography through Filing 5 and eventually concentrates within the existing channel that conveys flows from the southeast to the northwest, culminating at design point I9. The runoff is released to Pond 13 as concentrated flow into a riprap apron. Slopes in this basin average between 2% and 3:1.

Existing Basin I4: 2.34 acres, undeveloped, roadway (Q_5 = 1.5 cfs, Q_{100} = 6.0 cfs)

Runoff generated in this basin sheet flows from the south to north and is collected in existing roadside ditches (West side of Street Section I4) on the south side of Sandbagger Drive to design point I4 where drainage is directed east through a proposed public 18-inch RCP culvert to Basin I5.

The street channel sections are lined with North American Green P300 erosion control blanketing (or approved equal). Calculations for the channel lining and culvert hydraulics can be found in Appendix C.

Existing Basin I5: 20.40 acres, undeveloped, roadway (Q_5 = 15.0 cfs, Q_{100} = 51.9 cfs)

Basin I5 is defined by the Flying Horse North Foundation project, reference final drainage report (PPR258). Runoff generated in this basin will sheet from southeast to northwest and is collected in roadside ditches (east side of Street Section I4 and south side of Street Section I6) that culminate with flows from design point I4 at rates of Q5=16.4, Q100=57.4 cfs at design point I5. Culminated flows are conveyed north via proposed 42” public RCP culvert which outfalls onto a proposed rip rap pad and subsequently an existing tertiary channel (Channel Section I1).

The street channel sections are lined with North American Green P300 erosion control blanketing (or approved equal). Calculations for the channel lining and culvert hydraulics can be found in Appendix C.

Existing Basin I6: 1.69 acres, undeveloped (Q_5 = 0.5 cfs, Q_{100} = 3.8 cfs)

Runoff generated in this basin sheet flows from southeast to northwest over existing topography out of the Filing 8 boundary. The flows are funneled through design point I6 before continuing through the existing golf course. The runoff flows through an existing swale on the golf course to the northwest, culminating at design point I9, and ultimately outfalls to the existing Irrigation Reservoir, Pond 13 via existing rip rap run down.

Existing Basin I7: 23.02 acres, undeveloped (Q_5 = 6.0 cfs, Q_{100} = 44.2 cfs)

Basin I7's runoff sheets flows from south to north over existing topography and crosses the Filing 8 boundary and into the existing golf course swale, ultimately draining to the irrigation reservoir.

Existing Basin I8: 6.38 acres, undeveloped (Q_5 = 1.8 cfs, Q_{100} = 13.6 cfs)

Runoff generated in this basin sheet flows over existing topography to the west out of the filing boundary and onto the golf course through design point I8. The runoff flows through the golf course to the northwest and outfalls to the existing detention pond, Pond 13.

Existing Basin I9: 0.54 acres, undeveloped (Q_5 = 0.2 cfs, Q_{100} = 1.4 cfs)

Runoff generated in this basin sheet flows into the channel within the basin, which flows northwest and ends at a riprap outfall into Irrigation Reservoir Pond 13. The basin accepts flows from Basins I4, I5, I6, and I7, totaling Q5=27.9 and Q100=126.5 at the design point.

Existing Basin J3: 30.10 acres, undeveloped, 5.0 acre residential, 2.5 acre residential (Q5 = 11.5 cfs, Q100 = 59.1 cfs)

Runoff generated in this basin includes offsite flow from the southeast to the northwest onto the site. Drainage sheet flows across existing topography through native grass and ultimately concentrates in an existing natural tertiary swale at design point J3. The swale continues northwest into Basin J5. Slopes in this basin average between 5% and 9%. There is an existing stock pond at the design point that is being removed in the proposed condition.

Existing Basin J4: 92.88 acres, undeveloped / 5.0 acre single family residential (Q5 = 19.5 cfs, Q100 = 142.8 cfs)

Runoff generated in this basin includes offsite flow from the south of the property flowing north onto the site. Drainage sheet flows across existing topography through native grass and ultimately concentrates in an existing natural tertiary swale at design point J4. Slopes in this basin average between 2% and 33%. There is an existing stock pond within this basin that is being removed in the proposed condition.

Existing Basin J5: 42.29 acres, undeveloped (Q5 = 10.1 cfs, Q100 = 71.9 cfs)

Runoff generated in this basin sheet flows across existing topography to the center of the basin, through native grass until concentrating within the existing natural drainage channel that traverses the center of the basin and flows to the northwest. Slopes in this basin average between 3% and 16%. Flows from this basin combine with runoff of basin J3 at rates of 11.5 and 59.1 cfs in the 5 and 100 year events, respectively.

Design Point J5 was established to allow for comparison of flow rates at the proposed Pond J Location. This design point represents the culmination of flows from Design Points J4 and J5 at the offsite outfall onto the golf course. Combined flows at this design point are 38.5 and 259.0 cfs in the 5 and 100 year events, respectively.

Existing Basin OS-1. 23.50 acres, undeveloped, golf course (Q_5 = 7.4 cfs, Q_{100} = 48.2 cfs)

Runoff generated in this basin sheet flows over undeveloped land and golf course area and flows directly to the deign point at the southern edge of the site. Basin OS-1 is a portion of a larger basin, OS-B12, previously studied with the Amendment to the Final Drainage Report for Cathedral Pines Filing 2. This is further discussed in the Proposed Basin OS-1 description.

Existing Basin OS-2. 1.55 acres, undeveloped, golf course (Q_5 = 0.5 cfs, Q_{100} = 3.4 cfs)

Runoff generated in this basin sheet flows over undeveloped land and golf course area to the deign point at the north edge of the westernmost portion of the site. Runoff continues north from the design point and flows through channels within the existing golf course and ultimately drains to the existing Irrigation Reservoir, Pond 13.

d. Proposed Subbasin Description

The following design points are presented on the Developed Conditions Drainage Map and are described as follows:

Proposed Basin I3: 9.51 acres, residential (2.5 acre lots) (Q_5 = 6.3 cfs, Q_{100} = 26.0 cfs)

Runoff from 2.5 acre residential lot areas within this basin initially sheet flows southwest over existing topography through Filing 5 and eventually concentrates within the existing channel that conveys flows from the southeast to the northwest, culminating at design point I7. The runoff is released to Pond 13 as concentrated flow into a riprap apron. Slopes in this basin average between 2% and 3:1.

Proposed Basin I4: 2.94 acres, residential (2.5 acre lots) (Q_5 = 1.8 cfs, Q_{100} = 7.4 cfs)

Runoff generated in this basin will sheet flow from the south to north and is collected in existing roadside ditches (West side of Street Section I4) on the south side of Sandbagger Drive to design point I4 where drainage will be directed east through a proposed public 18-inch RCP culvert to Basin I5.

Proposed Basin I5: 20.40 acres, residential (2.5 acre lots) (Q_5 = 15.0 cfs, Q_{100} = 51.9 cfs)

Basin I5 is defined by the Flying Horse North Foundation project, reference final drainage report (PPR258). Runoff generated in this basin will sheet from SE to NW and is collected in roadside ditches (East side of Street Section I4 and south side of Street Section I6) that culminate with flows from design point I4 at rates of Q5=16.7, Q100=58.7 cfs at design point I5. These street sections are lined with North American Green TMAX erosion control blanketing (or approved equal). Culminated flows are conveyed north via proposed 42” public RCP culvert which outfalls onto a proposed rip rap pad and subsequently an existing tertiary channel (Channel Section I1).

Proposed Basin I6: 1.69 acres, residential (2.5 acre lots) (Q_5 = 1.1 cfs, Q_{100} = 4.6 cfs)

Runoff generated in this basin will sheet flow over existing topography from SE to NW out of the filing 6 boundary and eventually into an existing golf course pond. The flows are funneled through design point I6 before it flows to the NW and onto the golf course. The runoff will flow through the golf course to the

northwest, culminating at design point I7, and ultimately outfalls to the existing Irrigation Reservoir, Pond 13 via existing rip rap run down.

Proposed Basin I7: 18.90 acres, residential (2.5 acre lots) (Q_5 = 10.5 cfs, Q_{100} = 43.2 cfs)

Basin I7's runoff sheet flows from south to north over 2.5 acre residential lot area out of the Filing 8 boundary into the existing golf course. The runoff flows through the existing golf course to the northwest and outfall to the existing Irrigation reservoir, Pond 13, via existing rip rap rundown.

Proposed Basin I8: 5.82 acres, residential (2.5 acre lots) (Q_5 = 3.6 cfs, Q_{100} = 14.8 cfs)

Runoff generated in this basin sheet flows over existing topography to the west out of the filing boundary and onto the golf course through design point I8. The runoff will flow through the golf course to the northwest and outfall to the existing detention pond, Pond 13.

Flows have decreased in the proposed condition compared to the PDR Amendment (PUDSP252) due to variance in the basin geometry delineation, but this basin was previously analyzed under the same hydrologic characteristics.

Proposed Basin I9: 5.82 acres, residential (2.5 acre lots) (Q_5 = 3.6 cfs, Q_{100} = 14.8 cfs)

Runoff generated in this basin sheet flows over existing topography to the west out of the filing boundary and onto the golf course through design point I8. The runoff will flow through the golf course to the northwest and outfall to the existing detention pond, Pond 13.

Basins I3 through I7 are all tributaries to the I7 design point and contribute to its cumulative Q_5 and Q_{100} calculation of 33.2 and 127.5 cfs, respectively. The runoff will flow through the golf course to the northwest and outfall to the existing Irrigation reservoir, Pond 13, via existing rip rap rundown.

Flows are marginally increased from the PDR Amendment's reported 33.1 and 126.2 cfs at the equivalent design point I7 in the 5 and 100 year events, respectively, due to the addition of Basin I9. Therefore, the assumptions from said report regarding the capacity of Pond 13 and any intermediate infrastructure are maintained.

Proposed Basin J1: 25.63 acres, residential (2.5 & 5 acre lots) (Q5 = 13.7 cfs, Q100 = 61.6 cfs)

Runoff generated in this basin includes offsite flow from the south of the property flowing north onto the site. Drainage ultimately sheet flows across existing topography and in proposed roadside ditches and collects at design point J1 where it is conveyed under Holmes Road through a public 36-inch RCP culvert to Basin J6.

Culvert hydraulics are represented in Appendix C.

Proposed Basin J2: 25.08 acres, residential (2.5 acre & 5.0 acre lots) (Q5 = 13.2 cfs, Q100 = 58.4 cfs)

Runoff generated in this basin includes offsite flow from the south and east of the property that flows northwest onto the site. Drainage sheet flows across existing topography and proposed roadway until concentrating in the proposed roadside ditch on the south side of Holmes Road. The roadside ditch conveys runoff to the low point at design point J2 where the flows are routed under Holmes Road through a proposed public 42-inch RCP culvert to Basin J6.

Culvert hydraulics are represented in Appendix C.

Proposed Basin J3: 34.37 acres, undeveloped, residential (2.5 & 5 acre lots) residential (Q_5 = 15.2 cfs, Q_{100} = 70.2 cfs)

Runoff generated in this basin includes offsite flow from the southeast of the property flowing northwest onto the site. Drainage sheet flows across existing topography and proposed roadways until concentrating within the proposed roadside ditch. Flows within the roadside ditch are conveyed to the low point at design point J3 where they are conveyed under Holmes Road via a proposed public 42-inch RCP culvert to Basin J9.

Section I-I of the channel directly downstream of the culvert was analyzed and has been determined to need P300 erosion control blanketing. Channel section and culvert hydraulics can be found in Appendix C.

Proposed Basin J4: 1.22 acres, residential (2.5 acre lots) (Q5 = 0.9 cfs, Q100 = 3.5 cfs)

Runoff generated in this basin sheet flows over 2.5 acre residential lot area from southwest to northeast and collects in roadside ditches ultimately funneling to design point J4. From this design point, it is conveyed to Basin J6 via proposed 18" public RCP.

Proposed Basin J5. 2.53 acres, residential (2.5 acre lots) (Q_5 = 1.6 cfs, Q_{100} = 6.4 cfs)

Runoff generated in this basin sheet flows over 2.5 acre residential lot area from southwest to northeast and collects in roadside ditches along Wedge Trail, ultimately funneling to design point J5. From this design point, it is conveyed to Basin J6 via proposed 18" public RCP.

Proposed Basin J6. 33.02 acres, undeveloped, (Q_5 = 18.5 cfs, Q_{100} = 76.2 cfs)

Runoff generated in this basin sheet flows over 2.5 acre residential lot area from southwest to northeast and collects in roadside ditches ultimately funneling to design point J5. From this design point, it is conveyed to Basin J6 via proposed swale that ties into the existing downstream channel.

Design Point J6 represents the culmination of flows from design points J1, J2, J4, J5, J6, and J7 at rates of 46.9 and 201.5 cfs in the 5 and 100 year events, respectively. Section K-K was analyzed with this combination of flows, and it was determined that P300 channel lining was necessary throughout this section. Channel lining and culvert hydraulics calcs can be found in Appendix C.

Proposed Basin J7. 1.83 acres, residential (2.5 acre lots) (Q_5 = 1.1 cfs, Q_{100} = 4.7 cfs)

Runoff generated in this basin sheet flows over roadway and concentrates in roadside ditches flowing northwest along Par Court, ultimately funneling into a proposed swale that redirects flows west to basin J6. The channel segment between J6 and J7 shall be lined with P300 erosion control blanketing per the results of Section K-K.

Proposed Basin J8. 2.05 acres, residential (2.5 acre lots) (Q_5 = 1.3 cfs, Q_{100} = 5.5 cfs)

Runoff generated in this basin sheet flows from east to west over 2.5 acre residential lot area directly into proposed Pond J.

Proposed Basin J9. 26.36 acres, residential (2.5 acre lots) (Q_5 = 13.8 cfs, Q_{100} = 56.9 cfs)

Runoff generated in this basin sheet flows over 2.5 acre residential lot area to the center of the basin, ultimately funneling into a ditch that redirects flows west towards the design point, where flows are conveyed into Pond J via a district culvert pipe.

Channel Section J5 directly downstream of Section I-I was analyzed and has been determined to need P300 erosion control blanketing. Channel section hydraulics can be found in Appendix C.

Proposed Basin J10. 2.25 acres, residential (2.5 acre lots) (Q_5 = 1.4 cfs, Q_{100} = 5.9 cfs)

Runoff generated in this basin sheet flows southeast to northwest over 2.5 acre residential lot area to the roadside ditch alongside Sandbagger Drive at the design point, ultimately being conveyed west through basin J11.

Channel Section J1 was analyzed and has been determined to need P300 erosion control blanketing. Channel section hydraulics can be found in Appendix C.

Proposed Basin J11. 3.25 acres, residential (2.5 acre lots) (Q_5 = 1.7 cfs, Q_{100} = 7.1 cfs)

Runoff generated in this basin sheet flows over roadway before concentrating in the roadside ditches along Sandbagger Drive which flow northwest towards the design point. From the design point, flows are directed southwest in an earthen channel (Section H-H), where a culvert conveys runoff into the forebay of proposed Pond J. Pond access runs parallel to this channel.

This Channel Section was analyzed and has been determined to need P300 erosion control blanketing. Channel section hydraulics can be found in Appendix C.

Proposed Basin J12. 4.94 acres, residential (2.5 acre lots) (Q_5 = 3.3 cfs, Q_{100} = 13.4 cfs)

Runoff generated in this basin sheet flows over 2.5 acre residential lot area from east to west. Approximately 50% of this basin is tributary to Section H-H, while the remaining portion sheet flows directly into proposed Pond J.

Proposed Basin J13. 6.79 acres, pond (Q_5 = 1.9 cfs, Q_{100} = 14.2 cfs)

Runoff generated in this basin sheet flows over pond area to the center of the basin, ultimately funneling culminated flows from design points J6, J8, J9, J11, J12, and basin J13. Combined flows at this design point are 64.9 and 280.4 cfs in the 5 and 100 year events, respectively.

Proposed Basin OS-1. 23.46 acres, residential (2.5 acre lots), golf course (Q_5 = 10.7 cfs, Q_{100} = 53.7 cfs)

Runoff generated in this basin sheet flows over 2.5 acre lot residential and golf course area to the deign point at the southern edge of the site. Basin OS-1 is a portion of a larger basin, OS-B12, previously studied with the Amendment to the Final Drainage Report for Cathedral Pines Filing 2. Basin OS-B12 was analyzed with runoff coefficients corresponding to one-third acre lots with 30% imperviousness, while the proposed Basin OS-1 has an overall imperviousness of 6.9%. Therefore, it has been determined that existing downstream drainage ways and detention ponds within the Cathedral Pines Subdivision are not negatively impacted by the development because the proposed development within Basin OS-1 follows existing drainage patterns and is a lower imperviousness than anticipated by the previous study. Lots immediately south of Basin OS-1 are not anticipated to experience any negative impacts due to any minimal increase in flows due to future large lot home site development. Development of homesites is excluded from water quality treatment requirement per ECM App I.7.1.B.5.

Proposed Basin OS-2. 1.55 acres, undeveloped, golf course (Q_5 = 0.5 cfs, Q_{100} = 3.4 cfs)

Runoff generated in this basin sheet flows over undeveloped land and golf course area to the deign point at the north edge of the westernmost portion of the site. Runoff continues north from the design point and

flows through channels within the existing golf course and ultimately drains to the existing Irrigation Reservoir, Pond 13.

e. Water Quality and Detention Facilities

There is an existing stormwater facility, Pond 13, located downstream north of this filing and is west of Filing No. 5. Pond 13 is designed with Flying Horse North Filing No. 1 (SF181) as a retention pond using the Mile High Flood District (MHFD) Detention workbook. The reservoir facility provides detention and water quality through a separate stormwater detention and water quality component in the form of a private concrete outlet box with an orifice plate and 30-inch RCP outlet pipe. The stormwater outlet box is constructed outside of the reservoirs dam embankment. The total tributary area contributing to Pond 13 as identified in *The Irrigation Reservoir Embankment Design Report* by Classic Consulting is 366.80 acres and of that area, 59.15 acres comes from within the Filing No. 8 boundary. The contributing area to Pond 13 in the Classic Consulting design report (corresponding to basins delineated in this report) included 2-acre residential land use, so an overall imperviousness of 14% was calculated (using linear interpolation between a 1 acre and 2.5 acre lot at 20% and 11% imperviousness, respectively). The area contributing to the pond from Filing No. 8 contains residential land use for 2.5 acre lots from this filing, 2.5 acre lots from Filing 6, and the existing Foundation site making the calculated imperviousness 13.41%. While the Filing No. 8 area is an addition to the 2016 PUD and its drainage planning, the imperviousness and its generated stormwater is minimal and falls within the capacity of downstream Pond 13.

Pond J, owned and maintained by the Flying Horse North Metropolitan District, provides full spectrum detention for 169.32 acres of the site within the J basins at an overall imperviousness of 9.39%. The proposed pond provides the required volume stages for Water Quality Capture Volume (WQCV), Excess Urban Runoff Volume (EURV), and the 100-year stage (flood control volume). The pond includes the required infrastructure such as concrete forebays, riprap armored emergency spillway, concrete trickle channels, and a 2.5-foot depth micro-pool attached to the outlet structure. The pond includes 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 pond includes 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 peak outflow from the district 60” RCP outlet pipe is 198.9 cfs in the 100-year storm event. The emergency outfall and outlet pipe from Pond J are armored for erosion protection and outflows follow existing drainage patterns, running through natural tertiary swales and through the golf course to the north. The downstream outfall location experiences decreased 100-year flows in the proposed condition (198.9 cfs) compared to the existing condition (259.2 cfs). Therefore, Pond J has a suitable outfall.

Basin OS-1 consists of 23.46 acres that is tributary to an offsite pond that was constructed with the Cathedral Pines Subdivision. Detention is not required for the basin as the proposed impervious area tributary to the off-site pond is less than the impervious area assumed for design of the Cathedral Pines Subdivision storm infrastructure. Future home site development within this basin is excluded from water quality via the ECM large lot exclusion, and

Pond imperviousness calculations are shown in the Proposed Rational Calcs in Appendix B. Pond hydraulics for proposed Pond J are provided in Appendix D.

f. 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 fifty (50) 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. 5 are designed per the findings of this report and existing Filing No. 1 storm infrastructure and design points are to remain as-is.

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 and proposed stormwater facilities.

IV. Hydraulic Analysis

a. Major Drainageways

There are no major drainageways that exist within the development of Filing No. 8; 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.

b. Storm Sewer Infrastructure and Culvert Pipes

The Filing No. 8 development consists of rural development with fifty (50) 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

There is one proposed full spectrum stormwater pond associated with this filing. The vast majority of Filing No. 8 is tributary this pond, Pond J, while the remaining majority is tributary to the Filing No. 1 Irrigation Reservoir Pond 13 which provides water quality and detention. A small portion of the site at the southwest drains directly offsite following existing drainage patterns through natural drainage ways. This area that is tributary to Cathedral Pines Pond B38 has a proposed imperviousness less than what was planned for the area in the Cathedral Pines drainage reports.

On site practices for the estate home 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.

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 lawn (golf course 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. 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 detention and sediment ponds that are designed per current El Paso County DCM V2 and the MHFD. Existing Pond 13 provides WQCV for its tributary basins, including the "I" Basins in this filing. Disturbed areas will be routed through existing and proposed detention ponds and outfall to the East Cherry Creek Basin. Areas that fall under the "large lot" exclusion I.7.1.B.5 of the El Paso County ECM have been proven to be excluded from WQCV requirements. While water quality is not required for these areas, it is understood that runoff from these areas will still be routed through the existing detention ponds. The areas that fall under the exclusion under I.7.1.B.5 of the El Paso County ECM may not exceed 10 percent imperviousness unless a study specific to the watershed and/or MS4 shows that expected soil and vegetation conditions are suitable for infiltration/filtration of the WQCV for a typical site, and the permittee accepts such study as applicable with the MS4 boundaries. The maximum total lot impervious covered under this exclusion shall be 20 percent. This exclusion does not include grading related to roadway construction.

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.

The following fees for the Filing No. 8 platted area within the Black Squirrel Creek Basin are due prior to platting:

The fees are calculated using the following impervious acreage method approved by El Paso County. The acreage for Flying Horse Filing No. 8 within the Black Squirrel Creek Basin is 13.50 acres. This area is made up of 2.5 acre lots, undeveloped area, and golf course area, which has a combined imperviousness of 6.9%. The acreage of imperviousness is calculated below:

2.5 ac. Lots (including roads and tracts)

13.50 ac. @ 6.9% imperviousness = 0.93 Impervious ac.

The following calculations are based on the 2026 drainage/bridge fees for the Black Squirrel Creek Drainage Basin:

Filing 8 Fees:

Bridge Fees

$780.00 x 0.93 ac. = $725.40

Drainage Fees

$12,387.00 x 0.93 ac. = $11,519.91

The development qualifies for a 25% reduction in the drainage fee per EPC Land Development Code 8.5.5.C.3.c.i as the area of the subdivision within the Black Squirrel Creek Basin consists entirely of 2.5 acre or larger lots.

$11,519.91 x 0.75 = $8,639.93

Filing 8 Fees Total:

Bridge Fees ($725.40) + Drainage Fees ($8,639.93) = **$9,365.33**

VIII. Permanent Control Measure Cost Estimates

There is one (1) private full-spectrum detention pond within Filing No. 8 referred to as Pond J. A cost estimate of the construction and infrastructure for each respective pond is provided below and reflected in the Financial Assurances Estimate for the filing.

FHN F8 Pond J Cost Estimate				
Item	Unit	Qty.	Unit Estimate	Total Estimate
Outlet Structure & Micropool	EA	1	$37,500.00	$37,500.00
Forebay	EA	3	$22,500.00	$67,500.00
Concrete Trickle Channel	LF	920	$105.00	$96,600.00
Overflow Rip Rap Spillway	CY	400	$44.00	$17,600.00
Forebay Rip Rap	CY	60	$47.00	$2,820.00
Overflow Spillway Type II Bedding	TN	50	$37.50	$1,875.00
Handrail	LF	74	$100.50	$7,437.00
Stabilization Bedding	TN	150	$37.50	$5,625.00
Concete Pump Truck	EA	6	$875.00	$5,250.00
Road Base	CY	816	$71.00	$57,936.00
24" RCP	LF	60	$161.00	$9,660.00
48" RCP	LF	36	$349.00	$12,564.00
60" RCP	LF	118	$476.00	$56,168.00
			Total	**$378,535.00**

IX. Summary

Flying Horse North Filing No. 8 is a 159.44 acre filing within Flying Horse North that consists of fifty (50) single-family residential estate lots, two tracts primarily for drainage use, and right-of-way for Sandbagger Drive, Holmes Road, Par Court, and Wedge Trail.

Pond J (district owned and maintained) is located on the western boundary of the filing, adjacent to the golf course, and serves as full spectrum detention for a majority of the filing area that flows north. Pond 13 (district owned and maintained) is located outside of the Filing No. 8 boundary and is the downstream

permanent control measure for the remaining filing that drains north. Imperviousness is reduced for the tributary area to this pond from the 2018 Classic Report, therefore, this pond has sufficient capacity for full spectrum detention and no improvements are proposed.

Flows at the southwest of the site flowing directly offsite are not anticipated to have any negative impacts on downstream drainage infrastructure as the proposed development falls within the assumptions of the FDR for Cathedral Pines Subdivision Filing No. 2 and does not change existing drainage patterns.

The Filing No. 8 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. 8.

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

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

Flying Horse North Filing No. 5 Final Drainage Report, HR Green Development, LLC., December 2024.

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

Amendment to the Final Drainage Report for Cathedral Pines prepared by Stillwater Engineering – dated August 28th, 2006

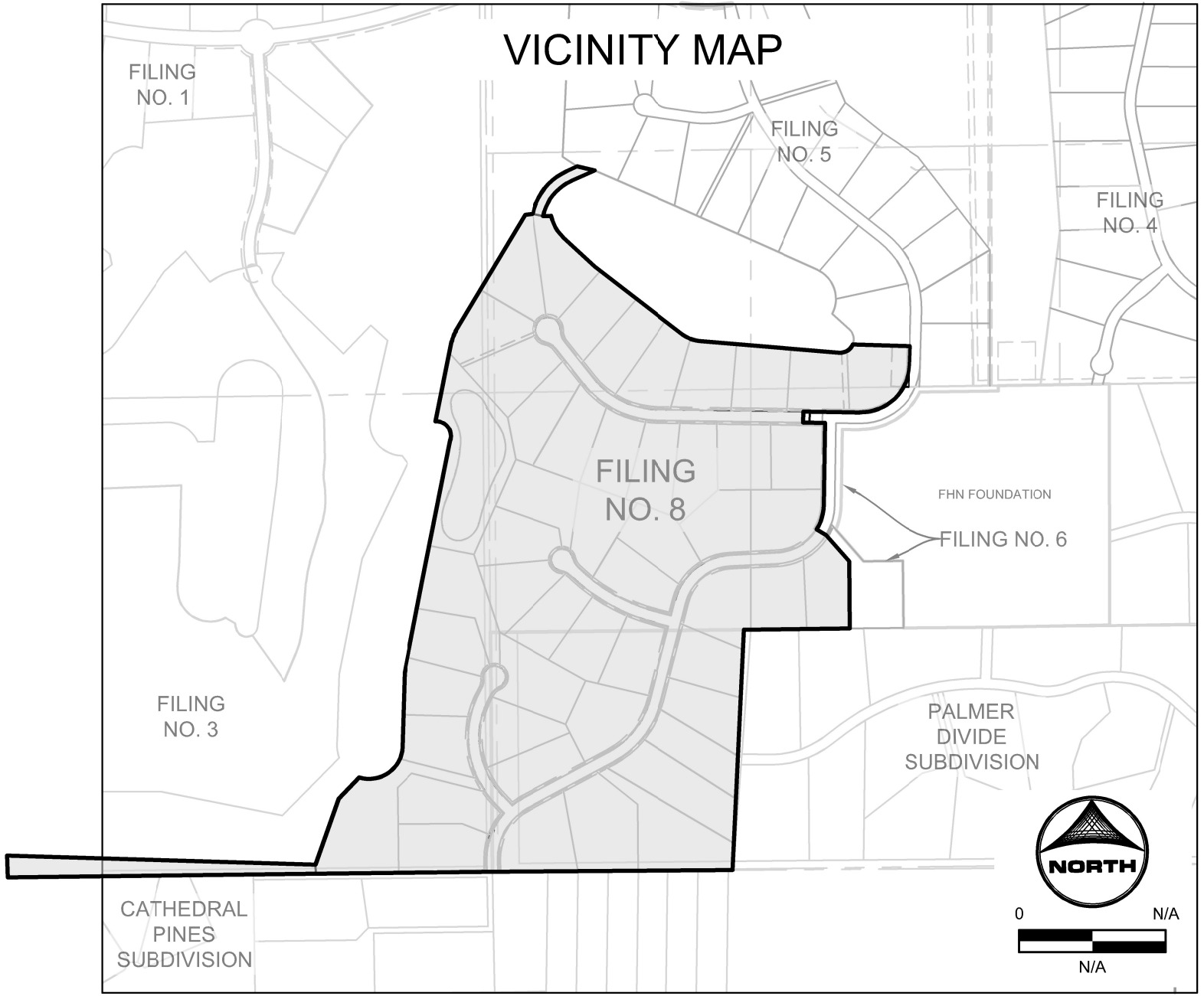
APPENDIX A

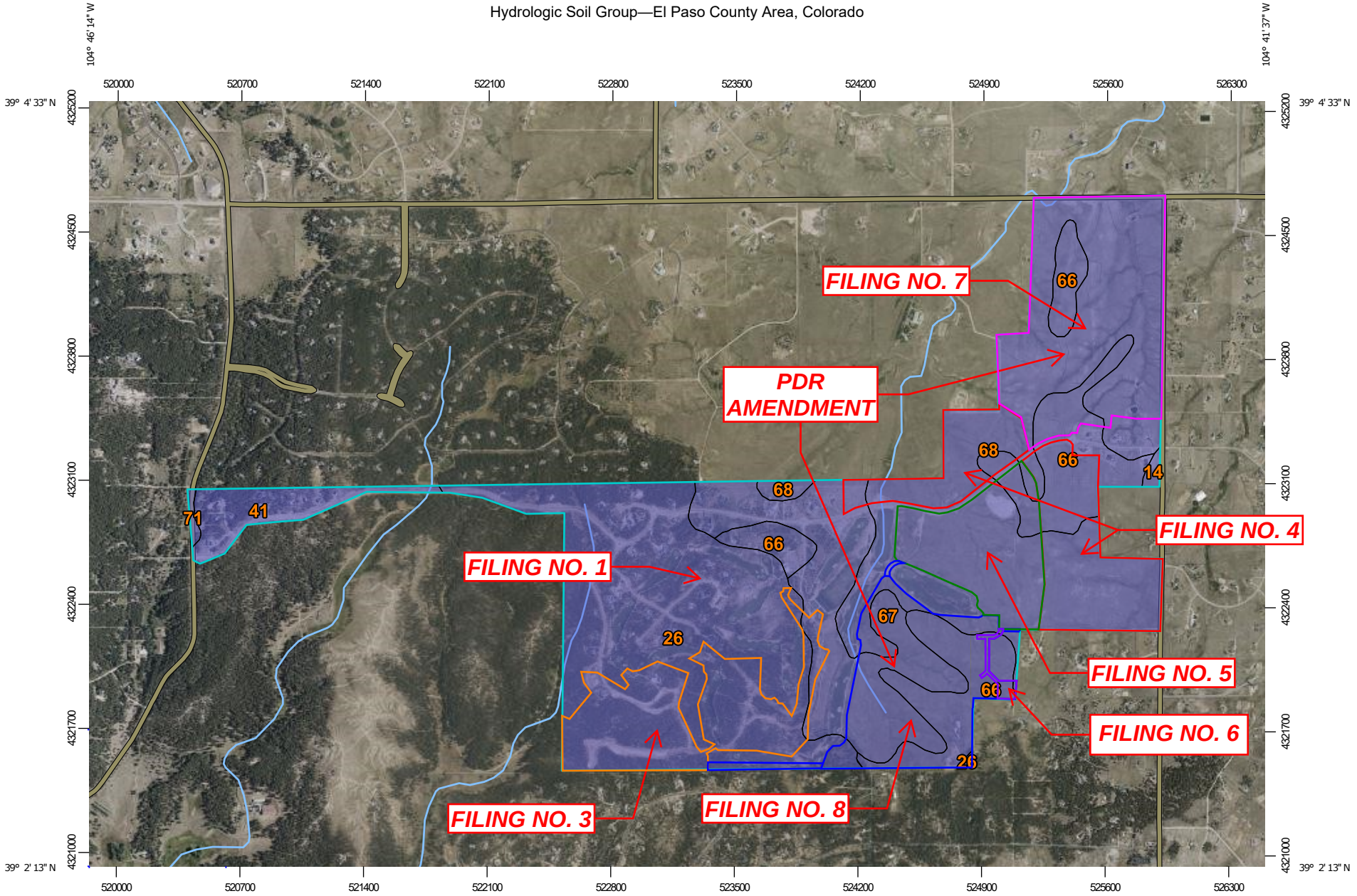
VICINITY MAP

NRCS SOILS MAP

FEMA FLOODPLAIN MAP

EL PASO COUNTY MAJOR DRAINAGE BASINS MAP


VICINITY MAP
FILING NO. 1
FILING NO. 5
FILING NO. 4
FILING NO. 8
FHN FOUNDATION
FILING NO. 6
FILING NO. 3
PALMER DIVIDE SUBDIVISION
CATHEDRAL PINES SUBDIVISION
NORTH
0
N/A
N/A



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

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

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

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

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

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

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

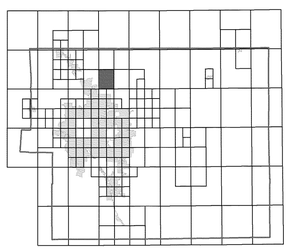
If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip.

El Paso County Vertical Datum Offset Table

Flooding Source	Vertical Datum Offset (ft)

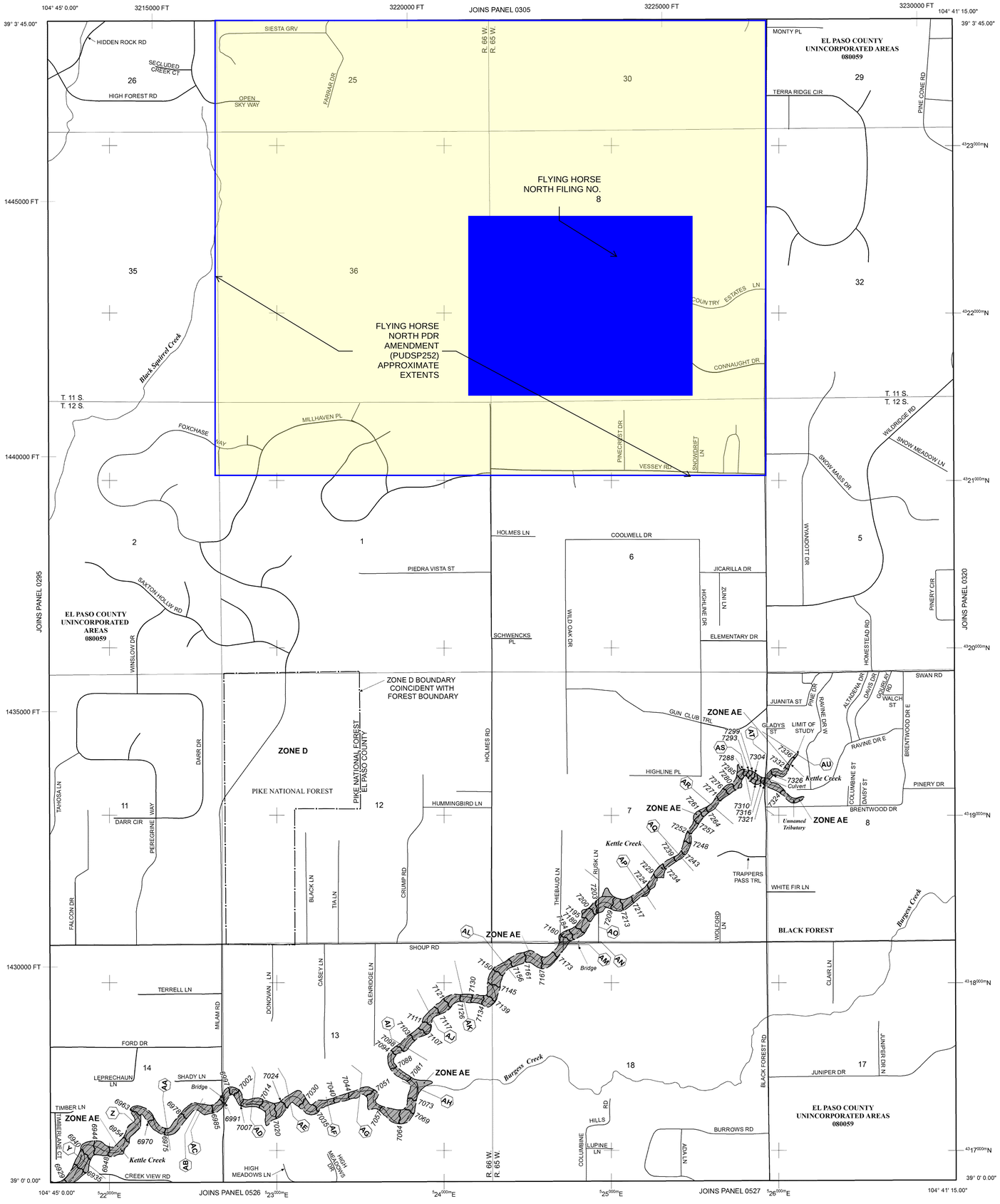
REFER TO SECTION 3.3 OF THE EL PASO COUNTY FLOOD INSURANCE STUDY FOR STREAM BY STREAM VERTICAL DATUM CONVERSION INFORMATION

Panel Location Map



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

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



LEGEND

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

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

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

FLOODWAY AREAS IN ZONE AE

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

OTHER FLOOD AREAS

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

OTHER AREAS

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

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

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

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

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

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

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

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

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

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

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

MAP SCALE 1" = 1000'
500 0 1000 2000 FEET
300 0 300 600 METERS

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

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

MAP NUMBER
08041C0315G

MAP REVISED
DECEMBER 7, 2018

Federal Emergency Management Agency

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
Pike National Forest
USAF Academy
Fort Carson
Air Force Academy FOMO3200
Manitou Reservoir FOFO7400
Upper Monument Creek FOMO5800
Beaver Creek FOMO4600
Kettle Creek FOMO3000
Cottonwood Creek FOMO2200
Sand Creek FOFO4000
Little Fountain Creek FOFO1800
Turkey Creek TUTU0200
Red Creek BEBE0200
Young Hollow FOFO0200
Southwest Area FOFO4600
Fort Carson FOFO2200
Jimmy Camp Creek FOFO2000
Ruxton Creek FOFO7000
Upper Beaver Creek BEBE0400
West Cherry Creek CYCY0400
East Cherry Creek CYCY0200
West Kiowa Creek KIKI0200
East Kiowa Creek KIKI0400
Bijou Creek BIBI0200
Upper Big Sandy Creek BGBG1400
Calhan BGBG1000
Lenard BGBG1200
Antelope Creek BGBG0800
Ramah BGBG0600
Simla BGBG0400
Mustang Creek BGBG0200
Upper Black Squirrel Creek CHBS2000
Upper Bracket Creek CHBR0600
Geick Ranch CHMS0400
La Vega Ranch CHBR0400
Hook And Line Ranch CHBS1800
Haegler Ranch CHMS0200
Curtis Ranch CHWS1000
Solbers Ranch CHWS0800
Bennett Ranch CHWS1200
Falcon CHWS1400
Baggett CHBR0200
West Big Springs Creek CHBG0200
Upper Big Springs Creek CHBG0400
Lower Big Springs Creek CHBS1400
Ellicott Consolidated CHBS1200
Ellicott CHBS1600
Telephone Exchange CHWS0200
Livestock Company CHWS0400
Upper East Chico CHEC0400
Middle East Chico CHEC0200
Upper Chico Creek CHCH1600
Upper Dry Squirrel CHDS0200
Drennan CHDS0400
Crows Roost CHBS1000
Lower Black Squirrel CHBS0600
Squirrel Creek CHBS0200
Haynes Creek HAHA0600
East Haynes HAHA0400
West Haynes HAHA0200
Finch Ranch CHCH0400
Windmill CHCH0200
Lower East Chico CHCH0800
Chico Creek CHCH1400
West Chico Tributary CHCH1200
Upper Williams Creek FOWI0600
Upper Williams Tributary FOWI0400
Lower Williams Creek FOFO1000
Lower Williams Tributary FOWI0200
Lower Dry Squirrel CHDS0400
Hammer Ranch CHCH0600
Williams Ranch FOFO0400
West Chico Creek CHCH0600
Calhan Reservoir FOFO1400
Sand Canyon FOFO1600
Midway Ranch FOFO1800
Big Johnson FOFO2600
Windmill Gulch FOFO3000
Fishers Canyon FOFO3600
Upper Fountain FOFO7600
Sand Creek FOFO5800
Williams Canyon FOFO7200
Sutherland Creek FOFO6400
Bear Creek FOFO4800
Shooks Run FOFO4400
Spring Creek FOFO4200
Templeton Gap FOMO1200
Douglas Creek FOMO1000
Dry Creek FOMO2400
South Pine Creek FOMO2600
Pine Creek FOMO2800
Monument Branch FOMO3800
Black Squirrel Creek FOMO3600
Black Forest FOMO4200
Jackson Creek FOMO4400
Monument Rock FOMO5000
Dirty Woman Creek FOMO5200
Peyton
Falcon
Calhan
Ellicott
Yoder
Rush
Truckton
Ramah
Cascade
Chipita Park
Cripple Creek
Victor
Green Mountain Falls
Manitou Springs
COLORADO SPRINGS
Peterson AFB
Schriever AFB
Peterson Field FOFO3400
Municipal Airport
AFA Aux Field
SITE
I-25
I-70
I-76
I-85
I-87
I-115
US 24
US 83
US 85
US 94
US 105

HRGreen

APPENDIX B

HYDROLOGY CALCULATIONS

FLYING HORSE NORTH FILING 8
EXISTING CONDITIONS
EL PASO COUNTY, COLORADO

Calc'd by:	CVW
Checked by:	RDL
Date:	4/1/2026

SUMMARY RUNOFF TABLE

BASIN	AREA (ac)	% IMP.	C_5	C_{100}	Q_5 (cfs)	Q_{100} (cfs)
I3	9.51	11.0	0.17	0.42	6.3	26.0
I4	2.34	13.3	0.17	0.42	1.5	6.0
I5	20.40	18.9	0.22	0.45	15.0	51.9
I6	1.69	2.0	0.08	0.35	0.5	3.8
I7	23.02	2.0	0.08	0.35	6.0	44.2
I8	6.38	2.0	0.08	0.35	1.8	13.6
I9	0.54	2.0	0.08	0.35	0.2	1.4
J3	30.10	6.0	0.12	0.38	11.5	59.1
J4	92.88	2.0	0.08	0.35	19.5	142.8
J5	42.29	2.4	0.08	0.35	10.1	71.9
OS-1	23.50	3.3	0.09	0.36	7.4	48.2
OS-2	1.55	2.0	0.08	0.35	0.5	3.4

CUMULATIVE DESIGN POINT SUMMARY TABLE

DESIGN POINT	CONTRIBUTING BASINS	ΣQ_5 (cfs)	ΣQ_{100} (cfs)	Tributary Area (ac.)	Weighted % Impervious
I3	I3	6.3	26.0	9.5	11.0
I4	I4	1.5	6.0	2.3	13.3
I5	I4, I5	16.4	57.4	22.7	18.3
I6	I6	0.5	3.8	1.7	2.0
I7	I7	6.0	44.2	23.0	2.0
I8	I8	1.8	13.6	6.4	2.0
I9	I3, I4, I5, I6, I7, I9	27.9	126.5	57.5	9.9
J3	J3	11.5	59.1	30.1	6.0
J4	J4	19.5	142.8	92.9	2.0
J5	J3, J5	38.5	259.0	72.4	3.9
OS-1	OS-1	7.4	48.2	23.5	3.3
OS-2	OS-2	7.4	48.2	23.5	3.3

HRGreen

FLYING HORSE NORTH FILING 8

EXISTING CONDITIONS

EL PASO COUNTY, COLORADO

Calc'd by: CVW

Checked by: RDL

Date: 4/1/2026

COMPOSITE 'C' FACTORS

BASIN	GOLF COURSE / UNDEVELOPED	ROADWAY	ROOF	RESIDENTIAL (2.5 AC LOT)	RESIDENTIAL (5.0 AC LOT)	TOTAL	SOIL TYPE	GOLF COURSE / UNDEVELOPED			ROADWAY			ROOF			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}**	%I	C_5	C_{100}
I3	0.00	0.00	0.00	9.51	0.00	9.51	B	2	0.08	0.35	100	0.90	0.96	90.00	0.73	0.81	11	0.17	0.42	7	0.14	0.39	11.0	0.17	0.42
I4	2.07	0.27	0.00	0.00	0.00	2.34	B	2	0.08	0.35	100	0.90	0.96	90.00	0.73	0.81	11	0.17	0.42	7	0.14	0.39	13.3	0.17	0.42
I5	16.89	3.51	0.00	0.00	0.00	20.40	B	2	0.08	0.35	100	0.90	0.96	90.00	0.73	0.81	11	0.17	0.42	7	0.14	0.39	18.9	0.22	0.45
I6	1.69	0.00	0.00	0.00	0.00	1.69	B	2	0.08	0.35	100	0.90	0.96	90.00	0.73	0.81	11	0.17	0.42	7	0.14	0.39	2.0	0.08	0.35
I7	23.02	0.00	0.00	0.00	0.00	23.02	B	2	0.08	0.35	100	0.90	0.96	90.00	0.73	0.81	11	0.17	0.42	7	0.14	0.39	2.0	0.08	0.35
I8	6.38	0.00	0.00	0.00	0.00	6.38	B	2	0.08	0.35	100	0.90	0.96	90.00	0.73	0.81	11	0.17	0.42	7	0.14	0.39	2.0	0.08	0.35
I9	0.54	0.00	0.00	0.00	0.00	0.54	B	2	0.08	0.35	100	0.90	0.96	90.00	0.73	0.81	11	0.17	0.42	7	0.14	0.39	2.0	0.08	0.35
J3	8.51	0.00	0.00	3.15	18.44	30.10	B	2	0.08	0.35	100	0.90	0.96	90.00	0.73	0.81	11	0.17	0.42	7	0.14	0.39	6.0	0.12	0.38
J4	92.88	0.00	0.00	0.00	0.00	92.88	B	2	0.08	0.35	100	0.90	0.96	90.00	0.73	0.81	11	0.17	0.42	7	0.14	0.39	2.0	0.08	0.35
J5	42.11	0.18	0.00	0.00	0.00	42.29	B	2	0.08	0.35	100	0.90	0.96	90.00	0.73	0.81	11	0.17	0.42	7	0.14	0.39	2.4	0.08	0.35
OS-1	20.03	0.00	0.00	3.47	0.00	23.50	B	2	0.08	0.35	100	0.90	0.96	90.00	0.73	0.81	11	0.17	0.42	7	0.14	0.39	3.3	0.09	0.36
OS-2	1.55	0.00	0.00	0.00	0.00	1.55	B	2	0.08	0.35	100	0.90	0.96	90.00	0.73	0.81	11	0.17	0.42	7	0.14	0.39	2.0	0.08	0.35
GRAND TOTAL	**215.67**	**3.96**	**0.00**	**16.13**	**18.44**	**254.20**																	**4.46%**	**0.10**	**0.37**
POND SUMMARY																									
POND J LOCATION	**143.50**	**0.18**	**0.00**	**3.15**	**18.44**	**165.27**	**B**																**2.84%**	**0.09**	**0.36**
POND 13	**50.59**	**3.78**	**0.00**	**9.51**	**0.00**	**63.88**	**B**																**9.14%**	**0.14**	**0.40**

HRGreen	FLYING HORSE NORTH FILING 8	Calc'd by:	CVW
	EXISTING CONDITIONS	Checked by:	RDL
	EL PASO COUNTY, COLORADO	Date:	4/1/2026

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)
I3	0.17	9.51	250	6.0	14.8	10	50	6.0	2.4	0.3	15.2	11.7	11.7
I4	0.17	2.34	300	4.2	18.2	10	430	2.9	1.7	4.2	22.4	14.1	14.1
I5	0.22	20.40	300	3.7	18.0	10	970	5.5	2.3	6.9	24.9	17.1	17.1
I6	0.08	1.69	173	6.9	12.9	10	197	3.5	1.9	1.8	14.7	12.1	12.1
I7	0.08	23.02	300	5.7	18.1	10	1100	8.4	2.9	6.3	24.5	17.8	17.8
I8	0.08	6.38	300	4.2	20.1	10	420	2.9	1.7	4.1	24.2	14.0	14.0
I9	0.08	0.54	105	14.0	8.0	10	78	6.0	2.4	0.5	8.5	11.0	8.5
J3	0.12	30.10	300	5.2	17.9	10	1586	4.6	2.1	12.3	30.2	20.5	20.5
J4	0.08	92.88	300	6.0	17.8	10	2830	1.1	1.0	45.0	62.8	27.4	27.4
J5	0.08	42.29	300	9.3	15.3	10	2060	2.1	1.4	23.7	39.0	23.1	23.1
OS-1	0.09	23.50	300	7.7	16.2	10	841	7.7	2.8	5.1	21.3	16.3	16.3
OS-2	0.08	1.55	300	7.7	16.4	10	268	7.7	2.8	1.6	18.0	13.2	13.2

HRGreen	**FLYING HORSE NORTH FILING 8**	**Calc'd by:**	**CVW**
	EXISTING CONDITIONS	**Checked by:**	**RDL**
	DESIGN STORM: 5-YEAR	**Date:**	**4/1/2026**

		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)	
I3	I3	9.51	0.17	11.7	1.62	3.90	**6.3**					BASIN FLOW TO DP I3
I4	I4	2.34	0.17	14.1	0.41	3.62	**1.5**					BASIN FLOW TO DP I4
I5	I5	20.40	0.22	17.1	4.51	3.33	**15.0**					BASIN FLOW TO DP I5
								17.1	4.92	3.33	**16.4**	COMBINED BASIN FLOW FROM BASINS I4 - I5
I6	I6	1.69	0.08	12.1	0.14	3.85	**0.5**					BASIN FLOW TO DP I6
I7	I7	23.02	0.08	17.8	1.84	3.27	**6.0**					BASIN FLOW TO DP I6
I8	I8	6.38	0.08	14.0	0.51	3.62	**1.8**					BASIN FLOW TO DP I8
I9	I9	0.54	0.08	8.5	0.04	4.38	**0.2**					BASIN FLOW TO DP I9
								17.8	8.56	3.27	**27.9**	COMBINED BASIN FLOW FROM BASINS I3 - I7, I9
J3	J3	30.10	0.12	20.5	3.75	3.05	**11.5**					BASIN FLOW TO DP J3
J4	J4	92.88	0.08	27.4	7.43	2.62	**19.5**					BASIN FLOW TO DP J4
J5	J5	42.29	0.08	23.1	3.53	2.87	**10.1**					BASIN FLOW TO DP J5
								27.4	14.71	2.62	**38.5**	COMBINED DP FLOW FROM DP'S J3-J5 AT PR. POND J LOCATION
OS-1	OS-1	23.50	0.09	16.3	2.19	3.39	**7.4**					BASIN FLOW TO DP OS-1
OS-2	OS-2	1.55	0.08	13.2	0.12	3.72	**0.5**					BASIN FLOW OFFSITE TO OS-2

HRGreen

FLYING HORSE NORTH FILING 8	Calc'd by:	CVW
EXISTING CONDITIONS	Checked by:	RDL
DESIGN STORM: 100-YEAR	Date:	4/1/2026

		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)	
I3	I3	9.51	0.42	11.7	3.97	6.54	**26.0**					BASIN FLOW TO DP I3
I4	I4	2.34	0.42	14.1	0.98	6.07	**6.0**					BASIN FLOW TO DP I4
I5	I5	20.40	0.45	17.1	9.28	5.59	**51.9**					BASIN FLOW TO DP I5
								17.1	10.26	5.59	**57.4**	COMBINED BASIN FLOW FROM BASINS I4 - I5
I6	I6	1.69	0.35	12.1	0.59	6.46	**3.8**					BASIN FLOW TO DP I6
I7	I7	23.02	0.35	17.8	8.06	5.48	**44.2**					BASIN FLOW TO DP I6
I8	I8	6.38	0.35	14.0	2.23	6.08	**13.6**					BASIN FLOW TO DP I8
I9	I9	0.54	0.35	8.5	0.19	7.35	**1.4**					BASIN FLOW TO DP I9
								17.8	23.07	5.48	**126.5**	COMBINED BASIN FLOW FROM BASINS I3 - I7, I9
J3	J3	30.10	0.38	20.5	11.53	5.13	**59.1**					BASIN FLOW TO DP J3
J4	J4	92.88	0.35	27.4	32.51	4.39	**142.8**					BASIN FLOW TO DP J4
J5	J5	42.29	0.35	23.1	14.91	4.82	**71.9**					BASIN FLOW TO DP J5
								27.4	58.95	4.39	**259.0**	COMBINED DP FLOW FROM DP'S J3-J5 AT PR. POND J LOCATION
OS-1	OS-1	23.50	0.36	16.3	8.46	5.70	**48.2**					BASIN FLOW TO DP OS-1
OS-2	OS-2	1.55	0.35	13.2	0.54	6.24	**3.4**					BASIN FLOW OFFSITE TO OS-2

FLYING HORSE NORTH FILING 8
PROPOSED CONDITIONS
EL PASO COUNTY, COLORADO

Calc'd by:	CVW
Checked by:	RDL
Date:	4/1/2026

SUMMARY RUNOFF TABLE

BASIN	AREA (ac)	% IMP.	C_5	C_{100}	Q_5 (cfs)	Q_{100} (cfs)
I3	9.51	11.0	0.17	0.42	6.3	26.0
I4	2.94	11.0	0.17	0.42	1.8	7.4
I5	20.40	18.9	0.22	0.45	15.0	51.9
I6	1.69	11.0	0.17	0.42	1.1	4.6
I7	18.90	11.0	0.17	0.42	10.5	43.2
I8	5.82	11.0	0.17	0.42	3.6	14.8
I9	0.54	2.0	0.08	0.35	0.2	1.4
J1	25.63	8.6	0.15	0.40	13.7	61.6
J2	25.08	9.1	0.15	0.41	13.2	58.4
J3	34.37	8.1	0.14	0.40	15.2	70.2
J4	1.22	11.0	0.17	0.42	0.9	3.5
J5	2.53	11.0	0.17	0.42	1.6	6.4
J6	33.02	11.0	0.17	0.42	18.5	76.2
J7	1.83	11.0	0.17	0.42	1.1	4.7
J8	2.05	11.0	0.17	0.42	1.3	5.5
J9	26.36	11.0	0.17	0.42	13.8	56.9
J10	2.25	11.0	0.17	0.42	1.4	5.9
J11	3.25	11.0	0.17	0.42	1.7	7.1
J12	4.94	11.0	0.17	0.42	3.3	13.4
J13	6.79	2.0	0.08	0.35	1.9	14.2
OS-1	23.46	6.9	0.13	0.39	10.7	53.7
OS-2	1.55	2.0	0.08	0.35	0.5	3.4
GRAND TOTAL	254.1	10.1%	0.16	0.41	137.4	590.2

CUMULATIVE DESIGN POINT SUMMARY TABLE

DESIGN POINT	CONTRIBUTING BASINS	ΣQ_5 (cfs)	ΣQ_{100} (cfs)	Tributary Area (ac.)	Weighted % Impervious
I3	I3	6.3	26.0	9.5	11.0
I4	I4	1.8	7.4	2.9	11.0
I5	I4, I5	16.7	58.7	23.3	17.9
I6	I6	1.1	4.6	1.7	11.0
I7	I7	10.5	43.2	18.9	11.0
I8	I8	3.6	14.8	5.8	11.0
I9	I3, I4, I5, I6, I7, I9	33.2	127.5	0.5	2.0
J1	J1	13.7	61.6	25.6	8.6
J2	J2	13.2	58.4	25.1	9.1
J3	J3	15.2	70.2	34.4	8.1
J4	J4	0.9	3.5	1.2	11.0
J5	J5	1.6	6.4	2.5	11.0
J6	J1, J2, J4, J5, J6, J7	47.1	202.3	89.3	9.8
J7	J7	1.1	4.7	1.8	11.0
J8	J8	1.3	5.5	2.1	11.0
J9	J3, J9	28.9	126.5	60.7	9.3
J10	J10	1.4	5.9	2.3	11.0
J11	J10, J11	2.9	12.1	5.5	11.0
J12	J12	3.3	13.4	4.9	11.0
J13	J6, J8, J9, J11, J12, J13	64.9	280.4	76.4	10.2
OS-1	OS-1	10.7	53.7	23.5	6.9
OS-2	OS-2	0.5	3.4	1.6	2.0

POND SUMMARY

POND ID	TRIBUTARY AREA (ac)	EFFECTIVE % IMPERVIOUS	C5	C100	PREDEV. PEAK INFLOW (UD-DET.) (cfs)	PEAK OUTFLOW (UD-DET.) (cfs)
POND J	169.3	9.39%	0.16	0.41	254.3	200.4
POND 13	60.8	13.41%	0.18	0.43		

HRGreen	FLYING HORSE NORTH FILING 8		Calc'd by:	CVW
	PROPOSED CONDITIONS		Checked by:	RDL
	EL PASO COUNTY, COLORADO		Date:	4/1/2026

COMPOSITE 'C' FACTORS

BASIN	GOLF COURSE / UNDEVELOPED	ROADWAY	ROOF	RESIDENTIAL (2.5 AC LOT)	RESIDENTIAL (5.0 AC LOT)	TOTAL	SOIL TYPE	GOLF COURSE / UNDEVELOPED			ROADWAY			ROOF			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}**	%I	C_5	C_{100}
I3	0.00	0.00	0.00	9.51	0.00	9.51	B	2	0.08	0.35	100	0.90	0.96	90.00	0.73	0.81	11	0.17	0.42	7	0.14	0.39	11.0	0.17	0.42
I4	0.00	0.00	0.00	2.94	0.00	2.94	B	2	0.08	0.35	100	0.90	0.96	90.00	0.73	0.81	11	0.17	0.42	7	0.14	0.39	11.0	0.17	0.42
I5	16.89	3.51	0.00	0.00	0.00	20.40	B	2	0.08	0.35	100	0.90	0.96	90.00	0.73	0.81	11	0.17	0.42	7	0.14	0.39	18.9	0.22	0.45
I6	0.00	0.00	0.00	1.69	0.00	1.69	B	2	0.08	0.35	100	0.90	0.96	90.00	0.73	0.81	11	0.17	0.42	7	0.14	0.39	11.0	0.17	0.42
I7	0.00	0.00	0.00	18.90	0.00	18.90	B	2	0.08	0.35	100	0.90	0.96	90.00	0.73	0.81	11	0.17	0.42	7	0.14	0.39	11.0	0.17	0.42
I8	0.00	0.00	0.00	5.82	0.00	5.82	B	2	0.08	0.35	100	0.90	0.96	90.00	0.73	0.81	11	0.17	0.42	7	0.14	0.39	11.0	0.17	0.42
I9	0.54	0.00	0.00	0.00	0.00	0.54	B	2	0.08	0.35	100	0.90	0.96	90.00	0.73	0.81	11	0.17	0.42	7	0.14	0.39	2.0	0.08	0.35
J1	0.00	0.00	0.00	10.01	15.62	25.63	B	2	0.08	0.35	100	0.90	0.96	90.00	0.73	0.81	11	0.17	0.42	7	0.14	0.39	8.6	0.15	0.40
J2	0.00	0.00	0.00	12.98	12.10	25.08	B	2	0.08	0.35	100	0.90	0.96	90.00	0.73	0.81	11	0.17	0.42	7	0.14	0.39	9.1	0.15	0.41
J3	2.97	0.00	0.00	12.96	18.44	34.37	B	2	0.08	0.35	100	0.90	0.96	90.00	0.73	0.81	11	0.17	0.42	7	0.14	0.39	8.1	0.14	0.40
J4	0.00	0.00	0.00	1.22	0.00	1.22	B	2	0.08	0.35	100	0.90	0.96	90.00	0.73	0.81	11	0.17	0.42	7	0.14	0.39	11.0	0.17	0.42
J5	0.00	0.00	0.00	2.53	0.00	2.53	B	2	0.08	0.35	100	0.90	0.96	90.00	0.73	0.81	11	0.17	0.42	7	0.14	0.39	11.0	0.17	0.42
J6	0.00	0.00	0.00	33.02	0.00	33.02	B	2	0.08	0.35	100	0.90	0.96	90.00	0.73	0.81	11	0.17	0.42	7	0.14	0.39	11.0	0.17	0.42
J7	0.00	0.00	0.00	1.83	0.00	1.83	B	2	0.08	0.35	100	0.90	0.96	90.00	0.73	0.81	11	0.17	0.42	7	0.14	0.39	11.0	0.17	0.42
J8	0.00	0.00	0.00	2.05	0.00	2.05	B	2	0.08	0.35	100	0.90	0.96	90.00	0.73	0.81	11	0.17	0.42	7	0.14	0.39	11.0	0.17	0.42
J9	0.00	0.00	0.00	26.36	0.00	26.36	B	2	0.08	0.35	100	0.90	0.96	90.00	0.73	0.81	11	0.17	0.42	7	0.14	0.39	11.0	0.17	0.42
J10	0.00	0.00	0.00	2.25	0.00	2.25	B	2	0.08	0.35	100	0.90	0.96	90.00	0.73	0.81	11	0.17	0.42	7	0.14	0.39	11.0	0.17	0.42
J11	0.00	0.00	0.00	3.25	0.00	3.25	B	2	0.08	0.35	100	0.90	0.96	90.00	0.73	0.81	11	0.17	0.42	7	0.14	0.39	11.0	0.17	0.42
J12	0.00	0.00	0.00	4.94	0.00	4.94	B	2	0.08	0.35	100	0.90	0.96	90.00	0.73	0.81	11	0.17	0.42	7	0.14	0.39	11.0	0.17	0.42
J13	6.79	0.00	0.00	0.00	0.00	6.79	B	2	0.08	0.35	100	0.90	0.96	90.00	0.73	0.81	11	0.17	0.42	7	0.14	0.39	2.0	0.08	0.35
OS-1	10.66	0.00	0.00	12.80	0.00	23.46	B	2	0.08	0.35	100	0.90	0.96	90.00	0.73	0.81	11	0.17	0.42	7	0.14	0.39	6.9	0.13	0.39
OS-2	1.55	0.00	0.00	0.00	0.00	1.55	B	2	0.08	0.35	100	0.90	0.96	90.00	0.73	0.81	11	0.17	0.42	7	0.14	0.39	2.0	0.08	0.35
GRAND TOTAL	**39.40**	**3.51**	**0.00**	**165.07**	**46.15**	**254.13**																	**10.11%**	**0.16**	**0.41**
POND SUMMARY																									
POND J	**9.76**	**0.00**	**0.00**	**113.41**	**46.15**	**169.32**	**B**																**9.39%**	**0.16**	**0.41**
POND 13	**18.44**	**3.51**	**0.00**	**38.86**	**0.00**	**60.81**	**B**																**13.41%**	**0.18**	**0.43**

HRGreen	FLYING HORSE NORTH FILING 8	Calc'd by:	CVW
	PROPOSED CONDITIONS	Checked by:	RDL
	EL PASO COUNTY, COLORADO	Date:	4/1/2026

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)*
I3	0.17	9.51	250	6.0	14.8	10	50	6.0	2.4	0.3	15.2	11.7	11.7
I4	0.17	2.94	300	4.2	18.3	10	430	2.9	1.7	4.2	22.5	14.1	14.1
I5	0.22	20.40	300	3.7	18.0	10	970	5.5	2.3	6.9	24.9	17.1	17.1
I6	0.17	1.69	173	6.9	11.8	10	197	3.5	1.9	1.8	13.5	12.1	12.1
I7	0.17	18.90	300	5.7	16.5	10	1100	8.4	2.9	6.3	22.9	17.8	17.8
I8	0.17	5.82	300	8.4	14.5	10	420	7.8	2.8	2.5	17.0	14.0	14.0
I9	0.08	0.54	105	14.0	8.0	10	78	6.0	2.4	0.5	8.5	11.0	8.5
J1	0.15	25.63	300	5.6	17.0	10	530	3.5	1.9	4.7	21.7	14.6	14.6
J2	0.15	25.08	300	5.7	16.8	10	788	5.3	2.3	5.7	22.5	16.0	16.0
J3	0.14	34.37	300	5.2	17.5	10	1586	4.6	2.1	12.3	29.8	20.5	20.5
J4	0.17	1.22	100	7.3	8.8	10	125	2.6	1.6	1.3	10.1	11.3	10.1
J5	0.17	2.53	100	7.3	8.8	10	701	4.9	2.2	5.3	14.1	14.5	14.1
J6	0.17	33.02	100	7.3	8.8	10	1240	4.5	2.1	9.7	18.5	17.4	17.4
J7	0.17	1.83	95	3.3	11.2	10	580	3.3	1.8	5.3	16.5	13.8	13.8
J8	0.17	2.05	100	3.6	11.1	10	320	3.6	1.9	2.8	13.9	12.3	12.3
J9	0.17	26.36	100	6.7	9.0	10	1720	4.1	2.0	14.2	23.3	20.1	20.1
J10	0.17	2.25	100	3.3	11.5	10	465	3.3	1.8	4.3	15.7	13.1	13.1
J11	0.17	3.25	100	0.8	18.4	10	1581	2.0	1.4	18.8	37.2	19.3	19.3
J12	0.17	4.94	100	6.7	9.0	10	440	6.7	2.6	2.8	11.9	13.0	11.9
J13	0.08	6.79	50	25.0	4.5	10	770	0.5	0.7	18.1	22.7	14.6	14.6
OS-1	0.13	23.46	300	7.7	15.6	10	584	7.7	2.8	3.5	19.1	14.9	14.9
OS-2	0.08	1.55	300	15.0	13.1	10	268	7.7	2.8	1.6	14.7	13.2	13.2

HRGreen	**FLYING HORSE NORTH FILING 8**	**Calc'd by:**	**CVW**
	PROPOSED CONDITIONS	**Checked by:**	**RDL**
	DESIGN STORM: 5-YEAR	**Date:**	**4/1/2026**

		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)	
I3	I3	9.51	0.17	11.7	1.62	3.90	**6.3**					BASIN FLOW TO DP I3
												NO CHANGE FROM PDR AMENDMENT (PUDSP252)
I4	I4	2.94	0.17	14.1	0.50	3.62	**1.8**					BASIN FLOW TO DP I4
												NO CHANGE FROM PDR AMENDMENT (PUDSP252)
I5	I5	20.40	0.22	17.1	4.51	3.33	**15.0**					BASIN FLOW TO DP I5, NO CHANGE FROM PDR AMENDMENT (PUDSP252)
								17.1	5.01	3.33	**16.7**	COMBINED BASIN FLOW FROM BASINS I4 - I5
I6	I6	1.69	0.17	12.1	0.29	3.85	**1.1**					BASIN FLOW TO DP I6
												NO CHANGE FROM PDR AMENDMENT (PUDSP252)
I7	I7	18.90	0.17	17.8	3.22	3.27	**10.5**					BASIN FLOW TO DP I6, NO CHANGE FROM PDR AMENDMENT (PUDSP252)
I8	I8	5.82	0.17	14.0	0.99	3.62	**3.6**					BASIN FLOW TO DP I8
												SLIGHT DECREASE FROM PDR AMENDMENT (PUDSP252)
I9	I9	0.54	0.08	8.5	0.04	4.38	**0.2**					BASIN FLOW TO DP I9
								17.8	10.18	3.27	**33.2**	COMBINED FLOW BASINS I3-I7, I9, SLIGHT INCREASE FROM PDR AMENDMENT (PUDSP252)
J1	J1	25.63	0.15	14.6	3.85	3.56	**13.7**					BASIN FLOW TO DP J1
												SLIGHT INCREASE FROM PDR AMENDMENT (PUDSP252)
J2	J2	25.08	0.15	16.0	3.87	3.42	**13.2**					BASIN FLOW TO DP J2
												NO CHANGE FROM PDR AMENDMENT (PUDSP252)
J3	J3	34.37	0.14	20.5	4.98	3.05	**15.2**					BASIN FLOW TO DP J3
												NO CHANGE FROM PDR AMENDMENT (PUDSP252)
J4	J4	1.22	0.17	10.1	0.21	4.12	**0.9**					BASIN FLOW TO DP J4
												BASIN GEOMETRY CHANGE FROM PDR AMENDMENT (PUDSP252)
J5	J5	2.53	0.17	14.1	0.43	3.62	**1.6**					BASIN FLOW TO DP J5
J6	J6	33.02	0.17	17.4	5.62	3.29	**18.5**					BASIN FLOW TO DP J6
								17.4	14.29	3.29	**47.1**	COMBINED FLOW BASINS J1, J2, J4, J5, J6
J7	J7	1.83	0.17	13.8	0.31	3.65	**1.1**					BASIN FLOW TO DP J7
J8	J8	2.05	0.17	12.3	0.35	3.81	**1.3**					BASIN FLOW TO DP J8

HRGreen	**FLYING HORSE NORTH FILING 8**	**Calc'd by:**	**CVW**
	PROPOSED CONDITIONS	**Checked by:**	**RDL**
	DESIGN STORM: 5-YEAR	**Date:**	**4/1/2026**

		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)	
J9	J9	26.36	0.17	20.1	4.49	3.08	**13.8**					BASIN FLOW TO DP J9
								20.5	9.46	3.05	**28.9**	COMBINED BASIN FLOW FROM BASINS J3 AND J9
J10	J10	2.25	0.17	13.1	0.38	3.72	**1.4**					BASIN FLOW TO DP J10
J11	J11	3.25	0.17	19.3	0.55	3.14	**1.7**					BASIN FLOW TO DP J11
								19.3	0.94	3.14	**2.9**	COMBINED BASIN FLOW FROM BASINS J10 AND J11
J12	J12	4.94	0.17	11.9	0.84	3.87	**3.3**					BASIN FLOW TO DP J12
J13	J13	6.79	0.08	14.6	0.54	3.57	**1.9**					BASIN FLOW TO PR. FSD POND J
								20.1	21.06	3.08	**64.9**	COMBINED FLOW DP'S J6, J8, J9, J11, J12, J13
OS-1	OS-1	23.46	0.13	14.9	3.03	3.53	**10.7**					BASIN FLOW TO OS-1
OS-2	OS-2	1.55	0.08	13.2	0.12	3.72	**0.5**					BASIN FLOW OFFSITE TO OS-2

HRGreen

FLYING HORSE NORTH FILING 8	Calc'd by:	CVW
PROPOSED CONDITIONS	Checked by:	RDL
DESIGN STORM: 100-YEAR	Date:	4/1/2026

		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)	
I3	I3	9.51	0.42	11.7	3.97	6.54	**26.0**					BASIN FLOW TO DP I3
												NO CHANGE FROM PDR AMENDMENT (PUDSP252)
I4	I4	2.94	0.42	14.1	1.23	6.07	**7.4**					BASIN FLOW TO DP I4
												NO CHANGE FROM PDR AMENDMENT (PUDSP252)
I5	I5	20.40	0.45	17.1	9.28	5.59	**51.9**					BASIN FLOW TO DP I5, NO CHANGE FROM PDR AMENDMENT (PUDSP252)
								17.1	10.51	5.59	**58.7**	COMBINED BASIN FLOW FROM BASINS I4 - I5
I6	I6	1.69	0.42	12.1	0.70	6.46	**4.6**					BASIN FLOW TO DP I6
												NO CHANGE FROM PDR AMENDMENT (PUDSP252)
I7	I7	18.90	0.42	17.8	7.88	5.48	**43.2**					BASIN FLOW TO DP I6, NO CHANGE FROM PDR AMENDMENT (PUDSP252)
I8	I8	5.82	0.42	14.0	2.43	6.08	**14.8**					BASIN FLOW TO DP I8
												SLIGHT DECREASE FROM PDR AMENDMENT (PUDSP252)
I9	I9	0.54	0.35	8.5	0.19	7.35	**1.4**					BASIN FLOW TO DP I9
								17.8	23.25	5.48	**127.5**	COMBINED FLOW BASINS I3-I7, I9, SLIGHT INCREASE FROM PDR AMENDMENT (PUDSP252)
J1	J1	25.63	0.40	14.6	10.31	5.98	**61.6**					BASIN FLOW TO DP J1
												SLIGHT INCREASE FROM PDR AMENDMENT (PUDSP252)
J2	J2	25.08	0.41	16.0	10.17	5.74	**58.4**					BASIN FLOW TO DP J2
												NO CHANGE FROM PDR AMENDMENT (PUDSP252)
J3	J3	34.37	0.40	20.5	13.69	5.13	**70.2**					BASIN FLOW TO DP J3
												NO CHANGE FROM PDR AMENDMENT (PUDSP252)
J4	J4	1.22	0.42	10.1	0.51	6.91	**3.5**					BASIN FLOW TO DP J4
												BASIN GEOMETRY CHANGE FROM PDR AMENDMENT (PUDSP252)
J5	J5	2.53	0.42	14.1	1.06	6.07	**6.4**					BASIN FLOW TO DP J5
J6	J6	33.02	0.42	17.4	13.77	5.53	**76.2**					BASIN FLOW TO DP J6
								17.4	36.58	5.53	**202.3**	COMBINED FLOW BASINS J1, J2, J4, J5, J6
J7	J7	1.83	0.42	13.8	0.76	6.13	**4.7**					BASIN FLOW TO DP J7
J8	J8	2.05	0.42	12.3	0.86	6.40	**5.5**					BASIN FLOW TO DP J8

HRGreen	**FLYING HORSE NORTH FILING 8**	**Calc'd by:**	**CVW**
	PROPOSED CONDITIONS	**Checked by:**	**RDL**
	DESIGN STORM: 100-YEAR	**Date:**	**4/1/2026**

		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)	
J9	J9	26.36	0.42	20.1	10.99	5.17	**56.9**					BASIN FLOW TO DP J9
								20.5	24.68	5.13	**126.5**	COMBINED BASIN FLOW FROM BASINS J3 AND J9
J10	J10	2.25	0.42	13.1	0.94	6.24	**5.9**					BASIN FLOW TO DP J10
J11	J11	3.25	0.42	19.3	1.36	5.27	**7.1**					BASIN FLOW TO DP J11
								19.3	2.29	5.27	**12.1**	COMBINED BASIN FLOW FROM BASINS J10 AND J11
J12	J12	4.94	0.42	11.9	2.06	6.50	**13.4**					BASIN FLOW TO DP J12
J13	J13	6.79	0.35	14.6	2.38	5.99	**14.2**					BASIN FLOW TO PR. FSD POND J
								20.1	54.22	5.17	**280.4**	COMBINED FLOW DP'S J6, J8, J9, J11, J12, J13
OS-1	OS-1	23.46	0.39	14.9	9.07	5.93	**53.7**					BASIN FLOW TO OS-1
OS-2	OS-2	1.55	0.35	13.2	0.54	6.24	**3.4**					BASIN FLOW OFFSITE TO OS-2

HRGreen

APPENDIX C

HYDRAULIC CALCULATIONS

Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, Oct 7 2025

Channel Section HH - 5Yr Storm

User-defined

Invert Elev (ft)	= 7566.24
Slope (%)	= 4.90
N-Value	= 0.030

Calculations

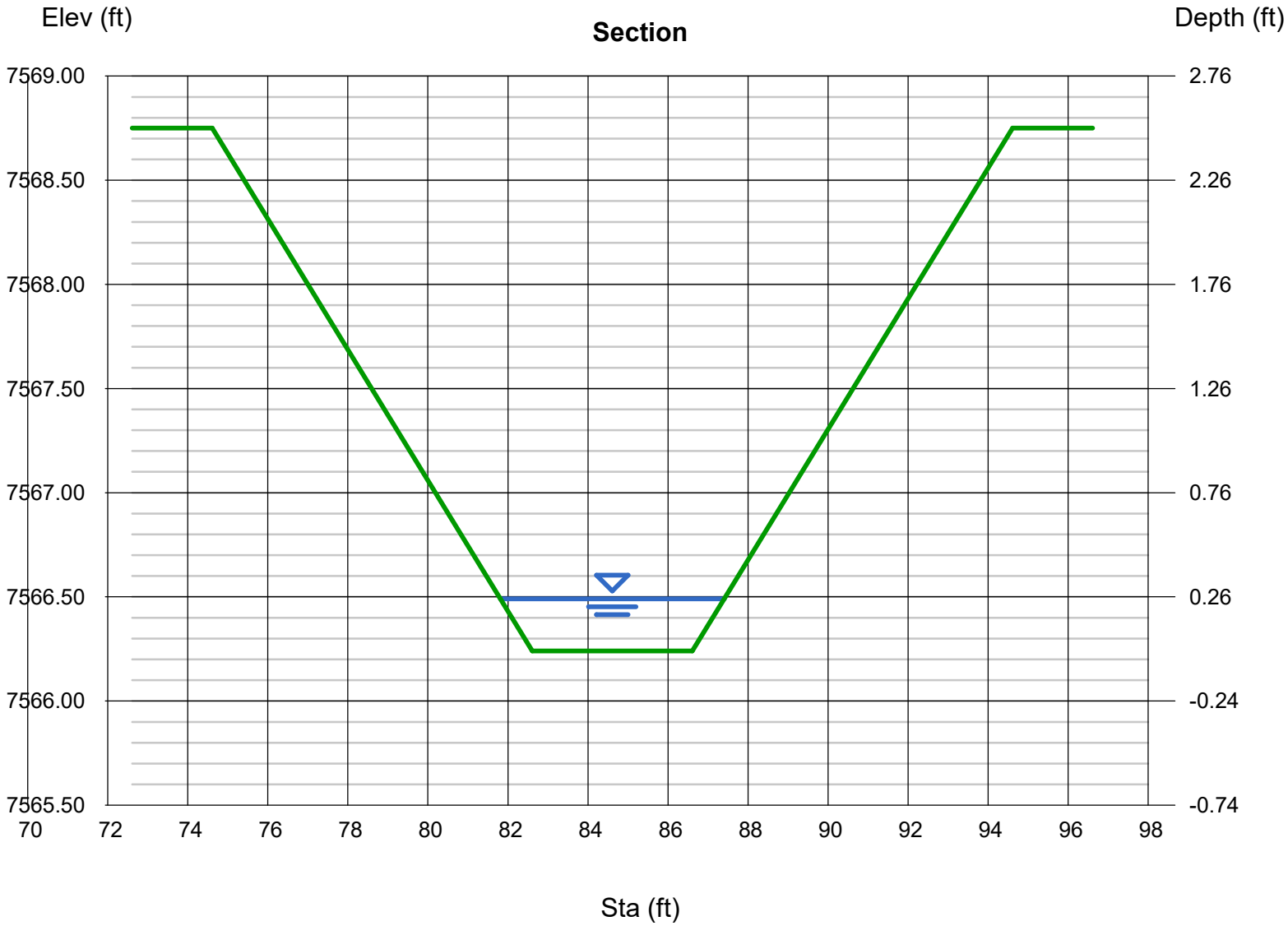
Compute by:	Known Q
Known Q (cfs)	= 4.55

Highlighted

Depth (ft)	= 0.25
Q (cfs)	= 4.550
Area (sqft)	= 1.20
Velocity (ft/s)	= 3.79
Wetted Perim (ft)	= 5.67
Crit Depth, Yc (ft)	= 0.32
Top Width (ft)	= 5.59
EGL (ft)	= 0.47

(Sta, El, n)-(Sta, El, n)...

(74.61, 7568.75)-(82.61, 7566.24, 0.030)-(86.61, 7566.24, 0.030)-(94.61, 7568.75, 0.030)



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, Oct 7 2025

Channel Section HH - 100Yr Storm

User-defined

Invert Elev (ft)	= 7566.24
Slope (%)	= 4.90
N-Value	= 0.030

Calculations

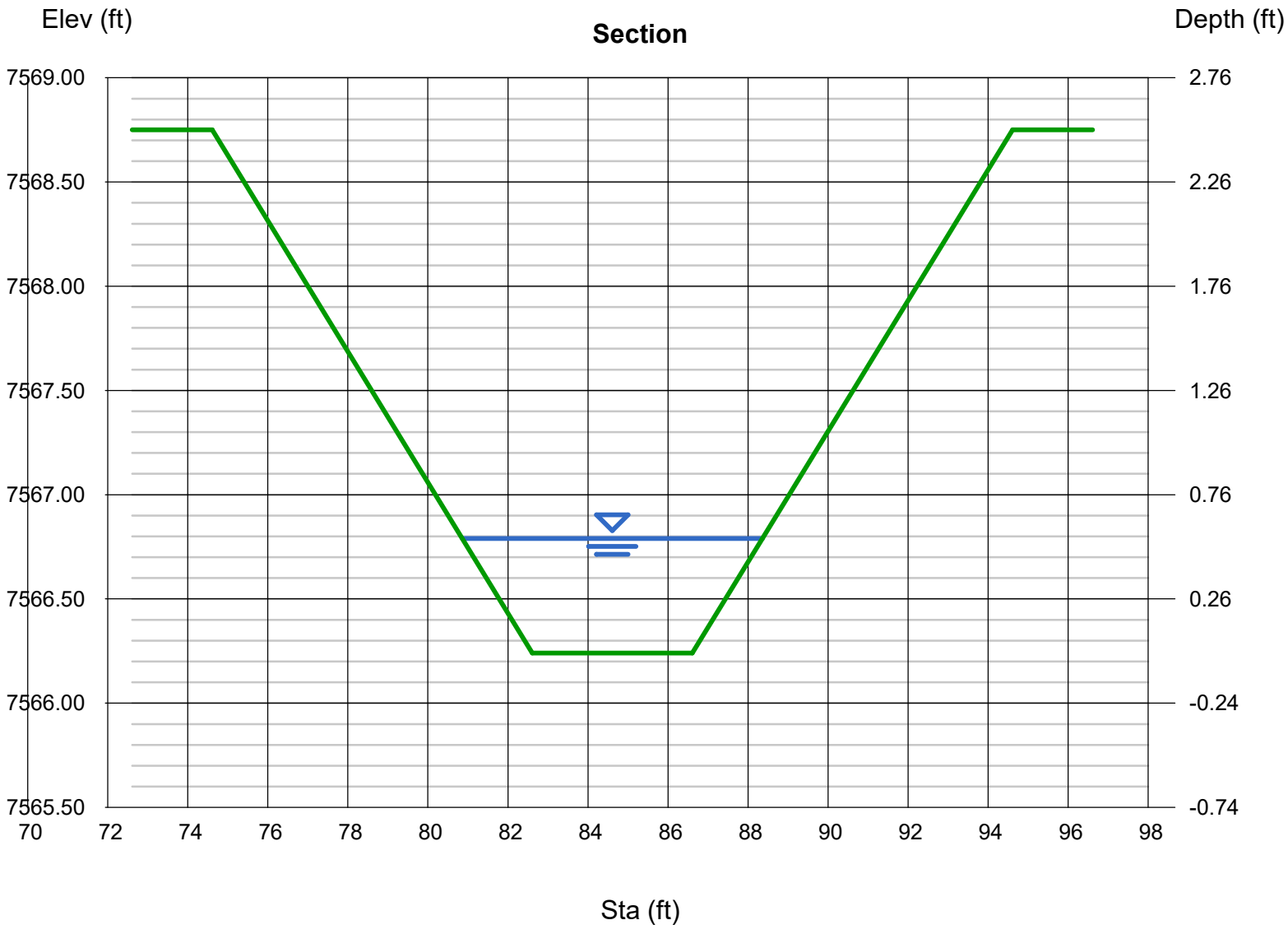
Compute by:	Known Q
Known Q (cfs)	= 18.80

Highlighted

Depth (ft)	= 0.55
Q (cfs)	= 18.80
Area (sqft)	= 3.16
Velocity (ft/s)	= 5.94
Wetted Perim (ft)	= 7.67
Crit Depth, Yc (ft)	= 0.73
Top Width (ft)	= 7.51
EGL (ft)	= 1.10

(Sta, El, n)-(Sta, El, n)...

(74.61, 7568.75)-(82.61, 7566.24, 0.030)-(86.61, 7566.24, 0.030)-(94.61, 7568.75, 0.030)



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Friday, Mar 27 2026

Channel Section II - 5Yr Storm

User-defined

Invert Elev (ft)	= 7592.00
Slope (%)	= 2.70
N-Value	= 0.030

Calculations

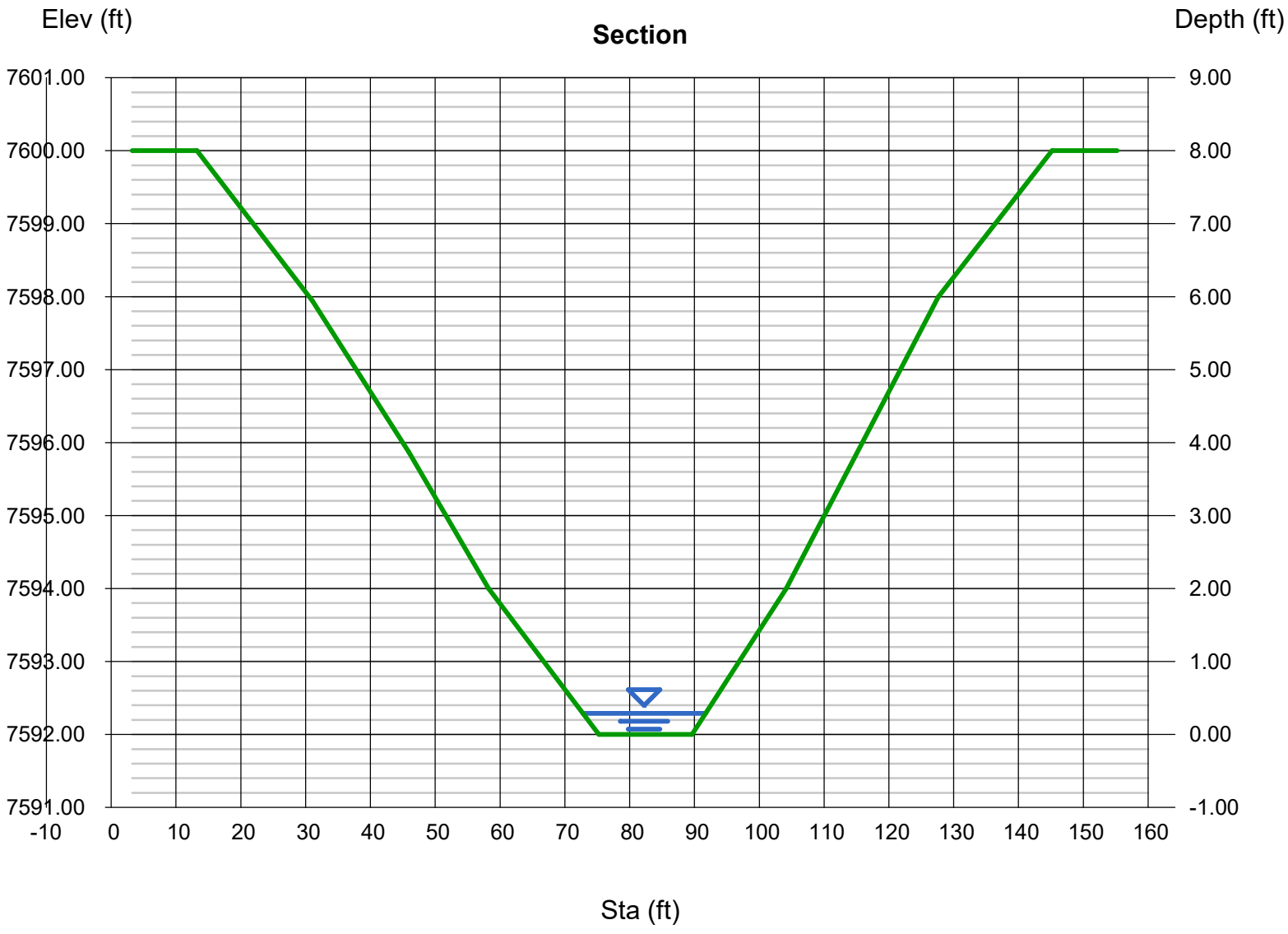
Compute by:	Known Q
Known Q (cfs)	= 15.20

Highlighted

Depth (ft)	= 0.29
Q (cfs)	= 15.20
Area (sqft)	= 4.84
Velocity (ft/s)	= 3.14
Wetted Perim (ft)	= 19.00
Crit Depth, Yc (ft)	= 0.31
Top Width (ft)	= 18.96
EGL (ft)	= 0.44

(Sta, El, n)-(Sta, El, n)...

(13.24, 7600.00)-(31.05, 7597.94, 0.030)-(45.93, 7595.87, 0.030)-(58.22, 7594.00, 0.030)-(75.23, 7592.00, 0.030)-(89.62, 7592.00, 0.030)-(104.15, 7594.00, 0.030)-(127.62, 7598.00, 0.030)-(145.20, 7600.00, 0.030)



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Friday, Mar 27 2026

Channel Section II - 100Yr Storm

User-defined

Invert Elev (ft)	= 7592.00
Slope (%)	= 2.70
N-Value	= 0.030

Calculations

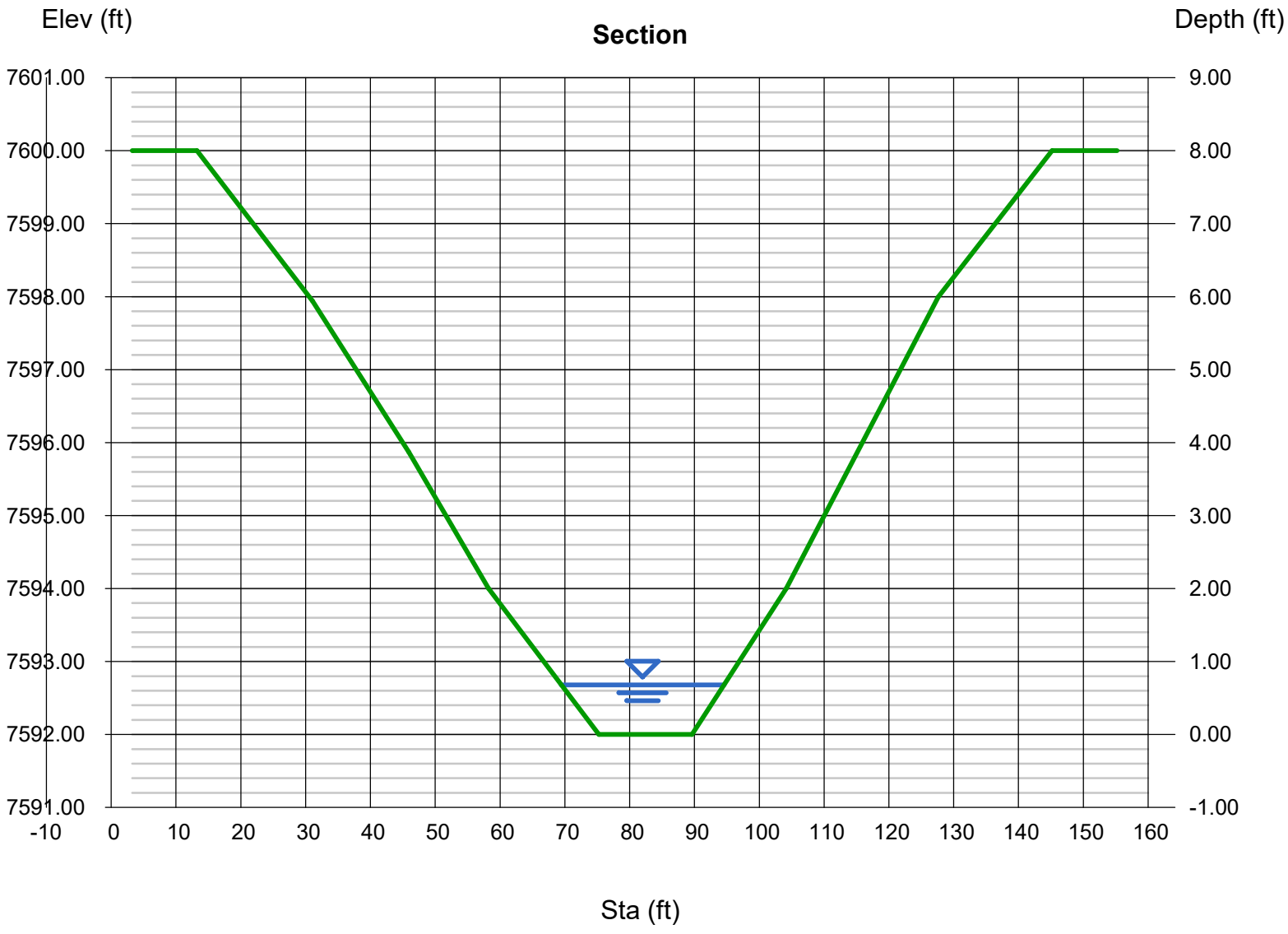
Compute by:	Known Q
Known Q (cfs)	= 70.20

Highlighted

Depth (ft)	= 0.68
Q (cfs)	= 70.20
Area (sqft)	= 13.44
Velocity (ft/s)	= 5.22
Wetted Perim (ft)	= 25.20
Crit Depth, Yc (ft)	= 0.78
Top Width (ft)	= 25.12
EGL (ft)	= 1.10

(Sta, El, n)-(Sta, El, n)...

(13.24, 7600.00)-(31.05, 7597.94, 0.030)-(45.93, 7595.87, 0.030)-(58.22, 7594.00, 0.030)-(75.23, 7592.00, 0.030)-(89.62, 7592.00, 0.030)-(104.15, 7594.00, 0.030)-(127.62, 7598.00, 0.030)-(145.20, 7600.00, 0.030)



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Friday, Mar 27 2026

Channel Section KK - 5Yr Storm

User-defined

Invert Elev (ft)	= 7578.04
Slope (%)	= 1.00
N-Value	= 0.030

Calculations

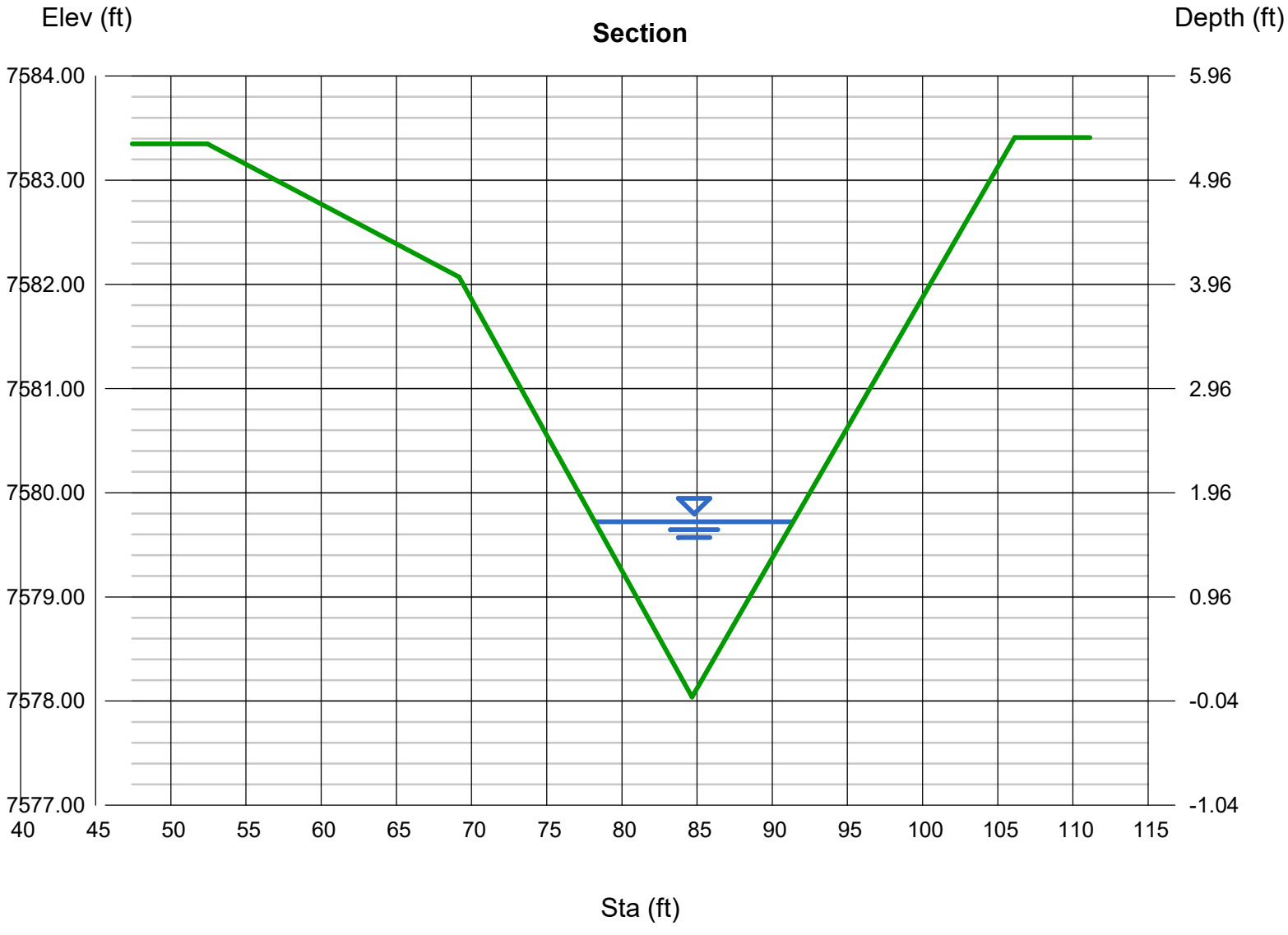
Compute by:	Known Q
Known Q (cfs)	= 47.10

Highlighted

Depth (ft)	= 1.68
Q (cfs)	= 47.10
Area (sqft)	= 11.07
Velocity (ft/s)	= 4.26
Wetted Perim (ft)	= 13.59
Crit Depth, Yc (ft)	= 1.56
Top Width (ft)	= 13.17
EGL (ft)	= 1.96

(Sta, El, n)-(Sta, El, n)...

(52.43, 7583.35)-(69.18, 7582.07, 0.030)-(84.67, 7578.04, 0.030)-(106.13, 7583.41, 0.030)



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Friday, Mar 27 2026

Channel Section KK - 100Yr Storm

User-defined

Invert Elev (ft)	= 7578.04
Slope (%)	= 1.00
N-Value	= 0.030

Calculations

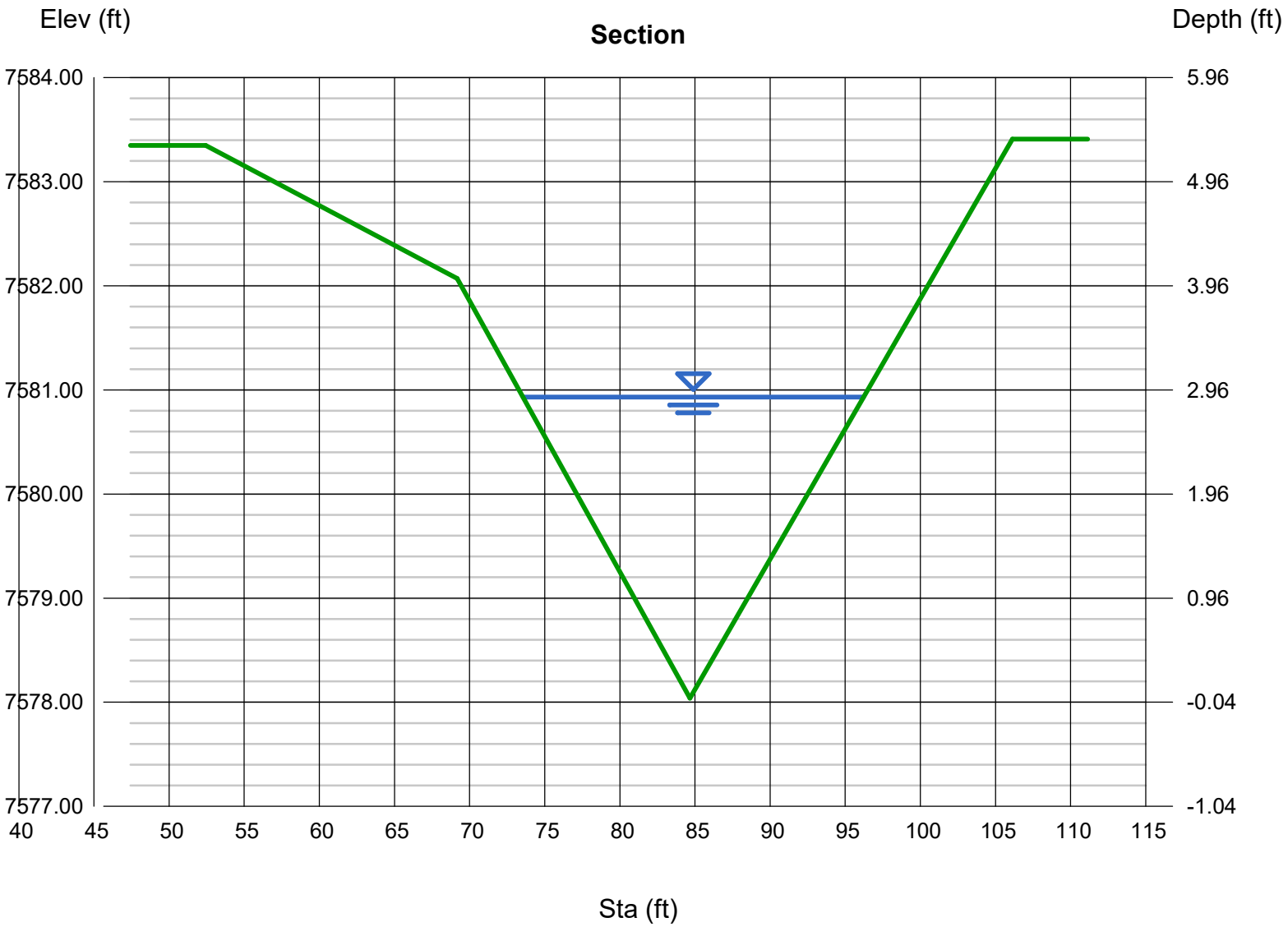
Compute by:	Known Q
Known Q (cfs)	= 202.30

Highlighted

Depth (ft)	= 2.89
Q (cfs)	= 202.30
Area (sqft)	= 32.74
Velocity (ft/s)	= 6.18
Wetted Perim (ft)	= 23.38
Crit Depth, Yc (ft)	= 2.78
Top Width (ft)	= 22.66
EGL (ft)	= 3.48

(Sta, El, n)-(Sta, El, n)...

(52.43, 7583.35)-(69.18, 7582.07, 0.030)-(84.67, 7578.04, 0.030)-(106.13, 7583.41, 0.030)



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Friday, Mar 27 2026

Channel Section I1 - Proposed 5-Yr

User-defined

Invert Elev (ft)	= 7586.00
Slope (%)	= 4.00
N-Value	= 0.030

Calculations

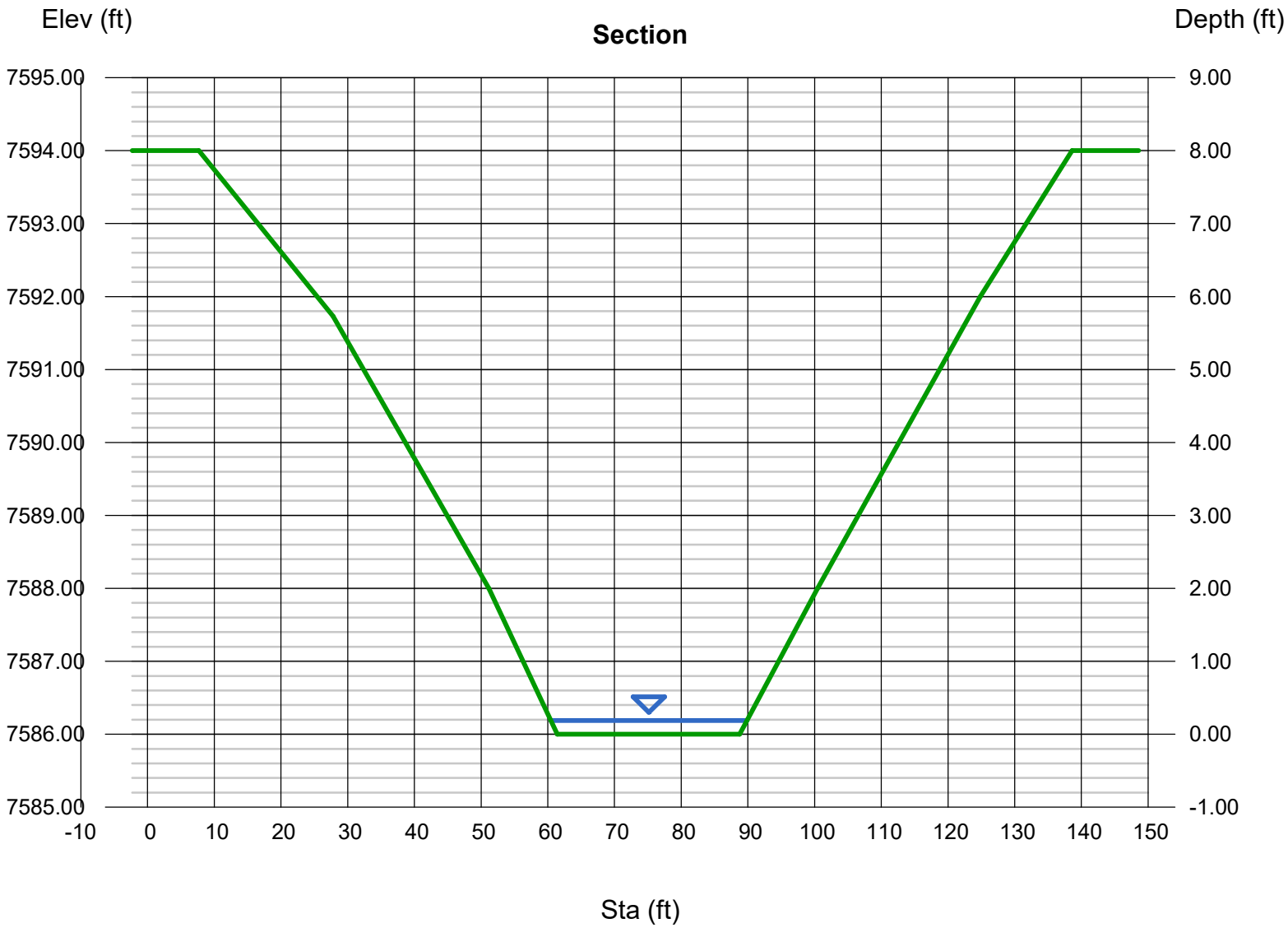
Compute by:	Known Q
Known Q (cfs)	= 16.70

Highlighted

Depth (ft)	= 0.19
Q (cfs)	= 16.70
Area (sqft)	= 5.39
Velocity (ft/s)	= 3.10
Wetted Perim (ft)	= 29.47
Crit Depth, Yc (ft)	= 0.23
Top Width (ft)	= 29.43
EGL (ft)	= 0.34

(Sta, El, n)-(Sta, El, n)...

(7.70, 7594.00)-(27.80, 7591.73, 0.030)-(51.15, 7588.00, 0.030)-(61.43, 7586.00, 0.030)-(88.78, 7586.00, 0.030)-(100.44, 7588.00, 0.030)-(124.84, 7592.00, 0.030)-(138.60, 7594.00, 0.030)



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Friday, Mar 27 2026

Channel Section I1 - Proposed 100-Yr

User-defined

Invert Elev (ft)	= 7586.00
Slope (%)	= 4.00
N-Value	= 0.030

Calculations

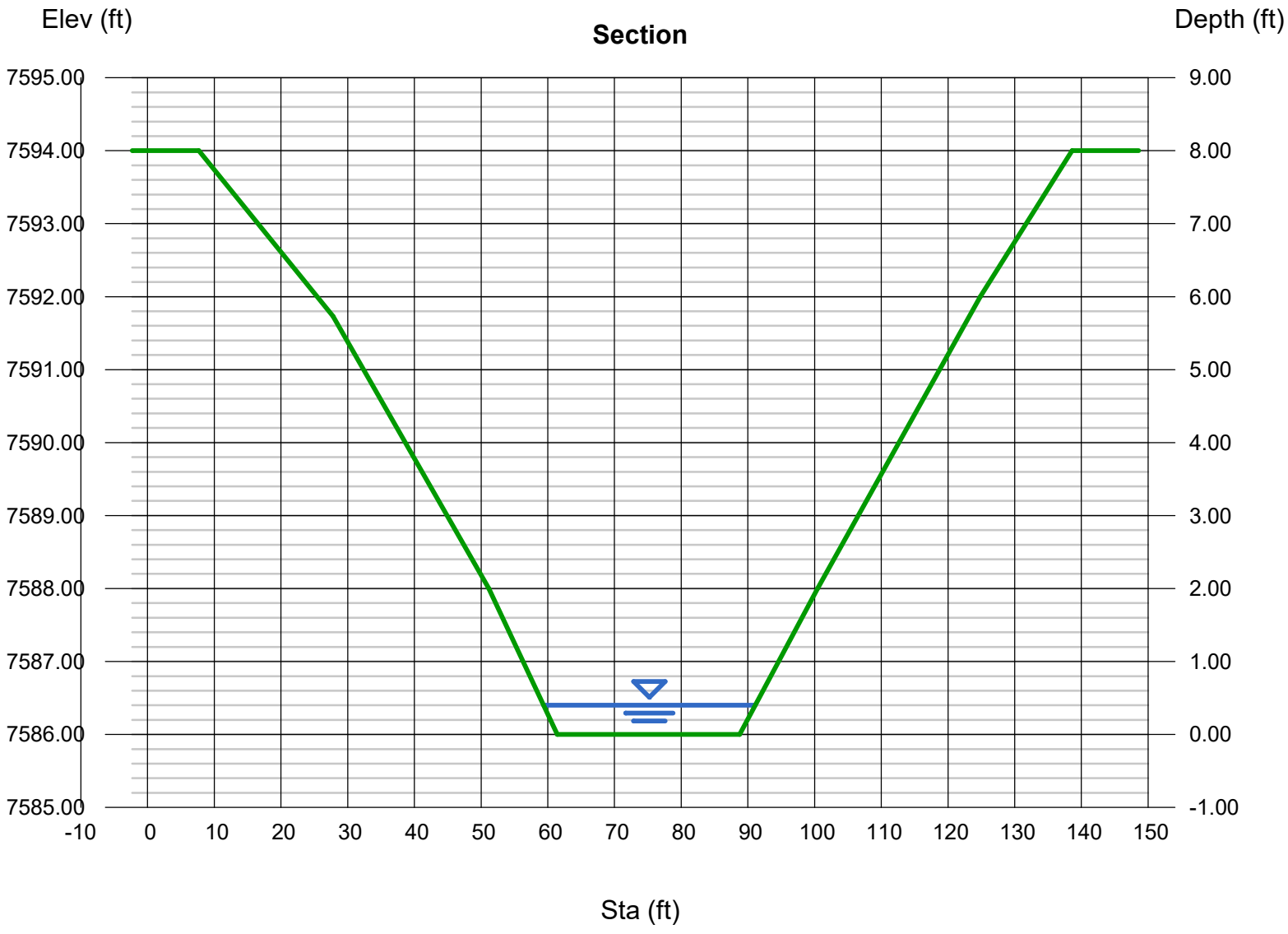
Compute by:	Known Q
Known Q (cfs)	= 58.70

Highlighted

Depth (ft)	= 0.40
Q (cfs)	= 58.70
Area (sqft)	= 11.81
Velocity (ft/s)	= 4.97
Wetted Perim (ft)	= 31.81
Crit Depth, Yc (ft)	= 0.51
Top Width (ft)	= 31.74
EGL (ft)	= 0.78

(Sta, El, n)-(Sta, El, n)...

(7.70, 7594.00)-(27.80, 7591.73, 0.030)-(51.15, 7588.00, 0.030)-(61.43, 7586.00, 0.030)-(88.78, 7586.00, 0.030)-(100.44, 7588.00, 0.030)-(124.84, 7592.00, 0.030)-(138.60, 7594.00, 0.030)



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, Oct 7 2025

Channel Section J1 5Yr - Left Side (Basin J11)

Triangular

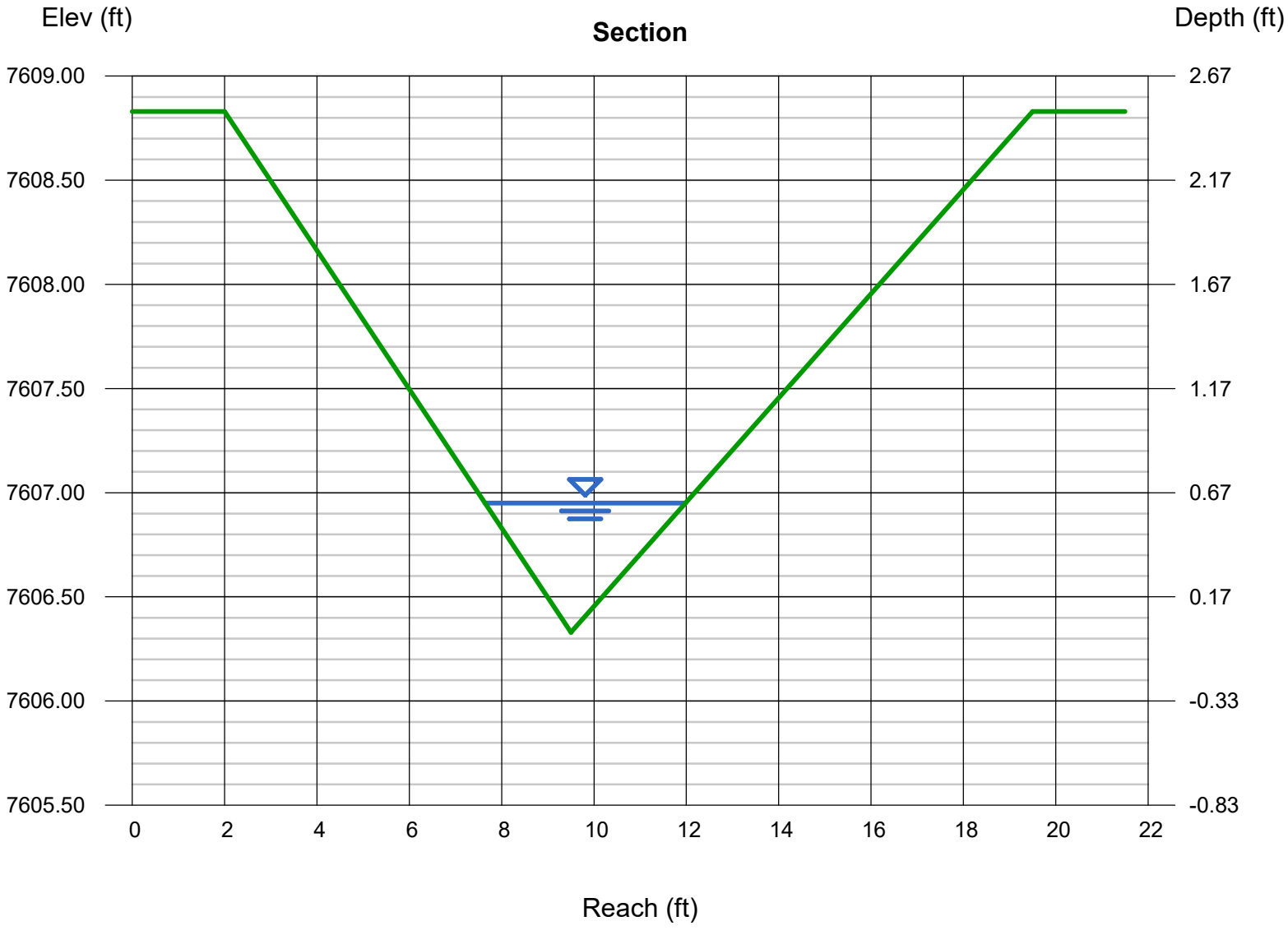
Side Slopes (z:1)	= 3.00, 4.00
Total Depth (ft)	= 2.50
Invert Elev (ft)	= 7606.33
Slope (%)	= 1.00
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 2.90

Highlighted

Depth (ft)	= 0.62
Q (cfs)	= 2.900
Area (sqft)	= 1.35
Velocity (ft/s)	= 2.16
Wetted Perim (ft)	= 4.52
Crit Depth, Yc (ft)	= 0.54
Top Width (ft)	= 4.34
EGL (ft)	= 0.69



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, Oct 7 2025

Channel Section J1 100Yr - Left Side (Basin J11)

Triangular

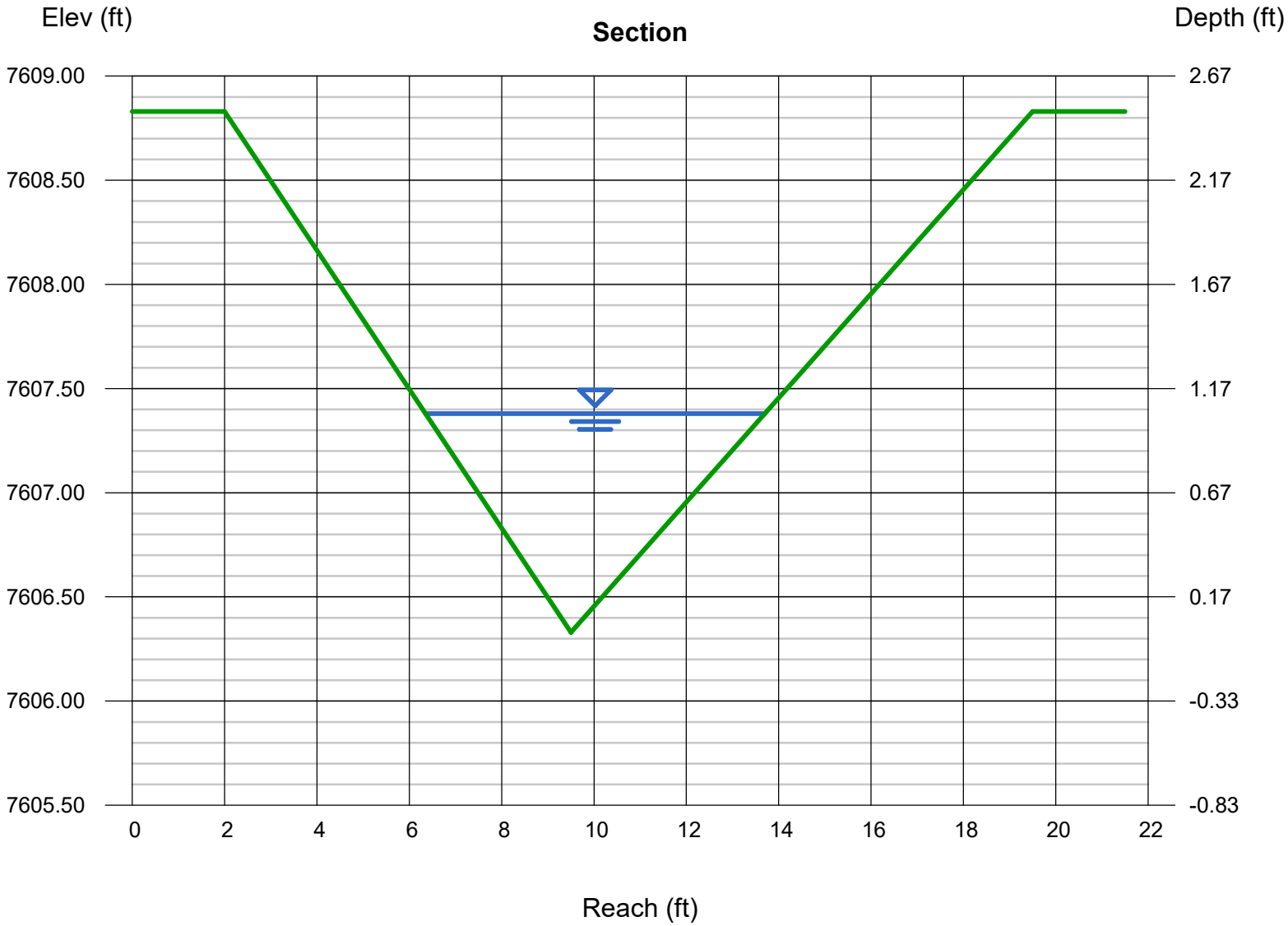
Side Slopes (z:1)	= 3.00, 4.00
Total Depth (ft)	= 2.50
Invert Elev (ft)	= 7606.33
Slope (%)	= 1.00
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 12.10

Highlighted

Depth (ft)	= 1.05
Q (cfs)	= 12.10
Area (sqft)	= 3.86
Velocity (ft/s)	= 3.14
Wetted Perim (ft)	= 7.65
Crit Depth, Yc (ft)	= 0.95
Top Width (ft)	= 7.35
EGL (ft)	= 1.20



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, Oct 7 2025

Channel Section J1 5Yr - Right Side (Basin J11)

Triangular

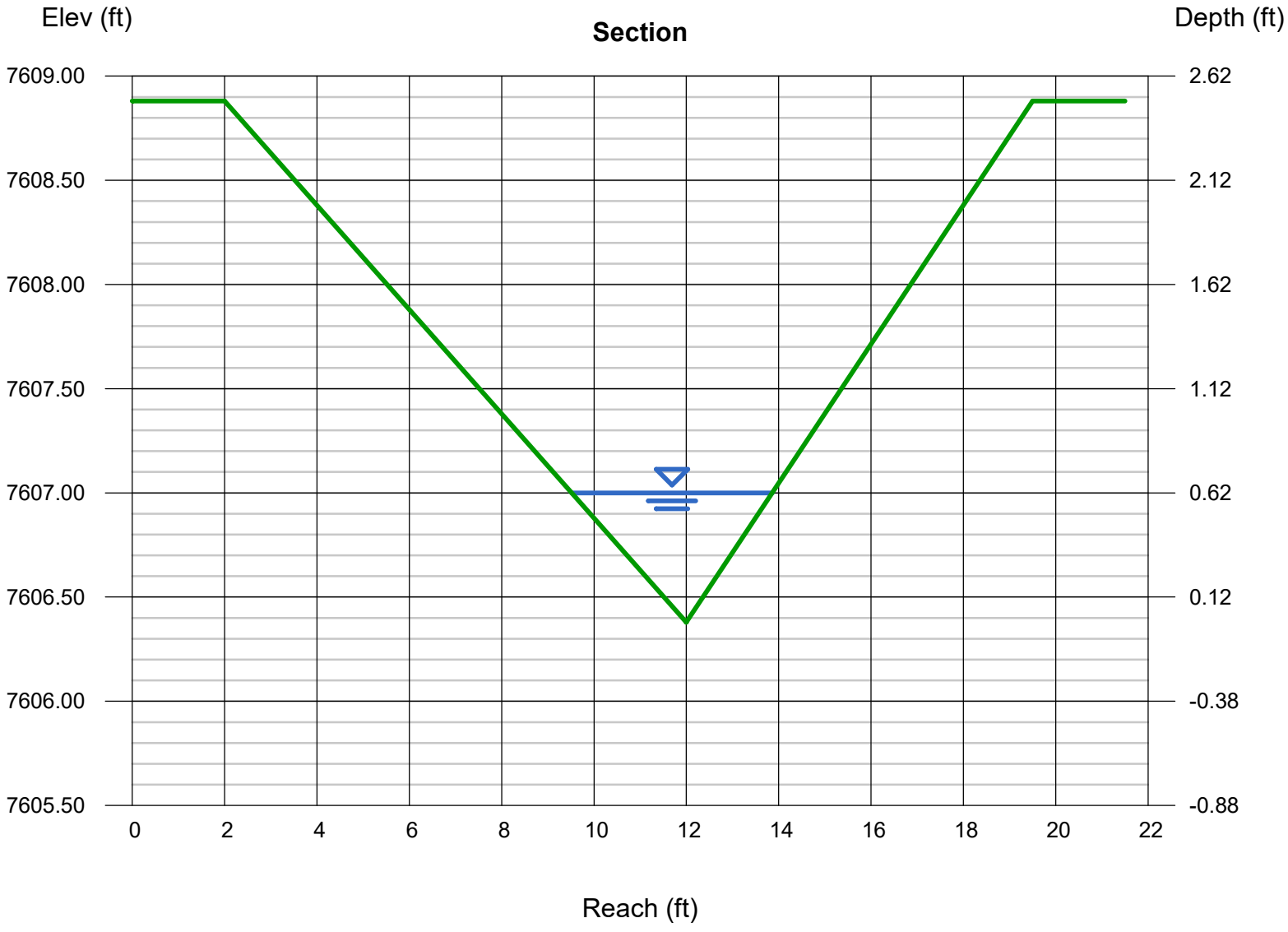
Side Slopes (z:1)	= 4.00, 3.00
Total Depth (ft)	= 2.50
Invert Elev (ft)	= 7606.38
Slope (%)	= 1.00
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 2.90

Highlighted

Depth (ft)	= 0.62
Q (cfs)	= 2.900
Area (sqft)	= 1.35
Velocity (ft/s)	= 2.16
Wetted Perim (ft)	= 4.52
Crit Depth, Yc (ft)	= 0.54
Top Width (ft)	= 4.34
EGL (ft)	= 0.69



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, Oct 7 2025

Channel Section J1 100Yr - Right Side (Basin J11)

Triangular

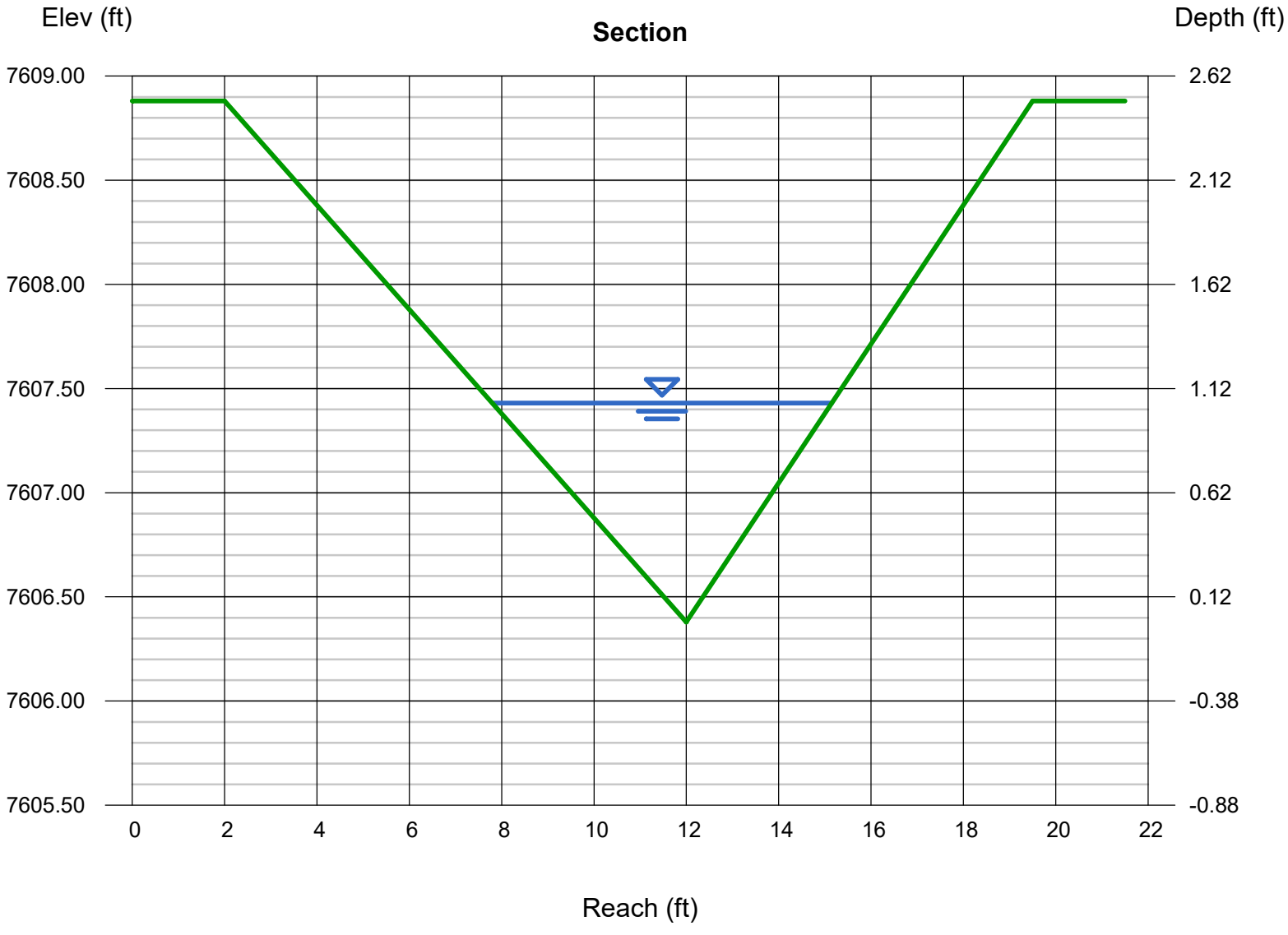
Side Slopes (z:1)	= 4.00, 3.00
Total Depth (ft)	= 2.50
Invert Elev (ft)	= 7606.38
Slope (%)	= 1.00
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 12.10

Highlighted

Depth (ft)	= 1.05
Q (cfs)	= 12.10
Area (sqft)	= 3.86
Velocity (ft/s)	= 3.14
Wetted Perim (ft)	= 7.65
Crit Depth, Yc (ft)	= 0.95
Top Width (ft)	= 7.35
EGL (ft)	= 1.20



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Friday, Mar 27 2026

Channel Section J5 - 5Yr Storm

User-defined

Invert Elev (ft)	= 7575.84
Slope (%)	= 3.00
N-Value	= 0.030

Calculations

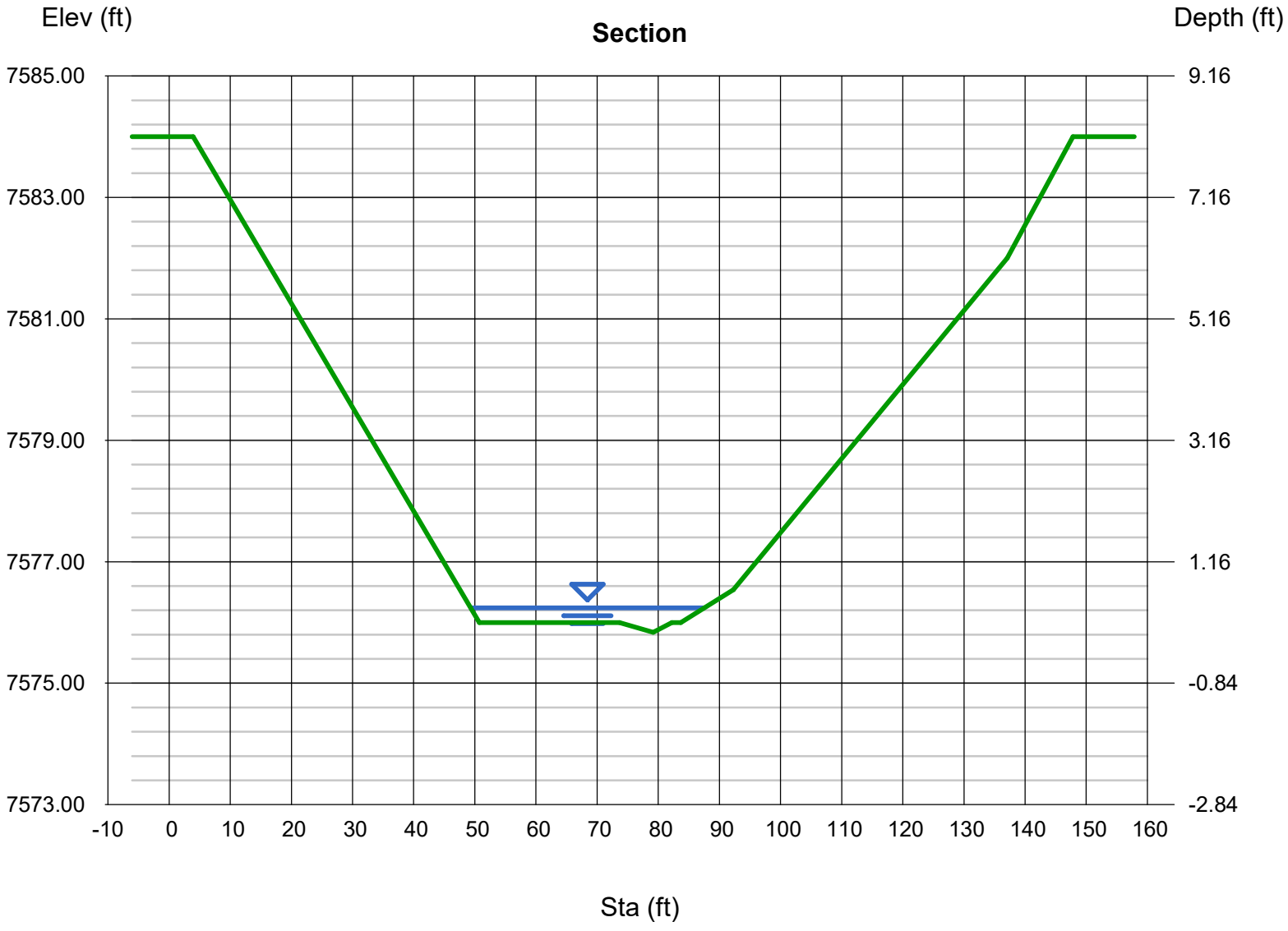
Compute by:	Known Q
Known Q (cfs)	= 28.90

Highlighted

Depth (ft)	= 0.40
Q (cfs)	= 28.90
Area (sqft)	= 9.21
Velocity (ft/s)	= 3.14
Wetted Perim (ft)	= 38.21
Crit Depth, Yc (ft)	= 0.43
Top Width (ft)	= 38.18
EGL (ft)	= 0.55

(Sta, El, n)-(Sta, El, n)...

(3.95, 7584.00)-(50.74, 7576.00, 0.030)-(73.66, 7576.00, 0.030)-(79.15, 7575.84, 0.030)-(82.24, 7576.00, 0.030)-(83.70, 7576.00, 0.030)-(92.30, 7576.54, 0.030)-(137.09, 7582.00, 0.030)-(147.84, 7584.00, 0.030)



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Friday, Mar 27 2026

Channel Section J5 - 100Yr Storm

User-defined

Invert Elev (ft)	= 7575.84
Slope (%)	= 3.00
N-Value	= 0.030

Calculations

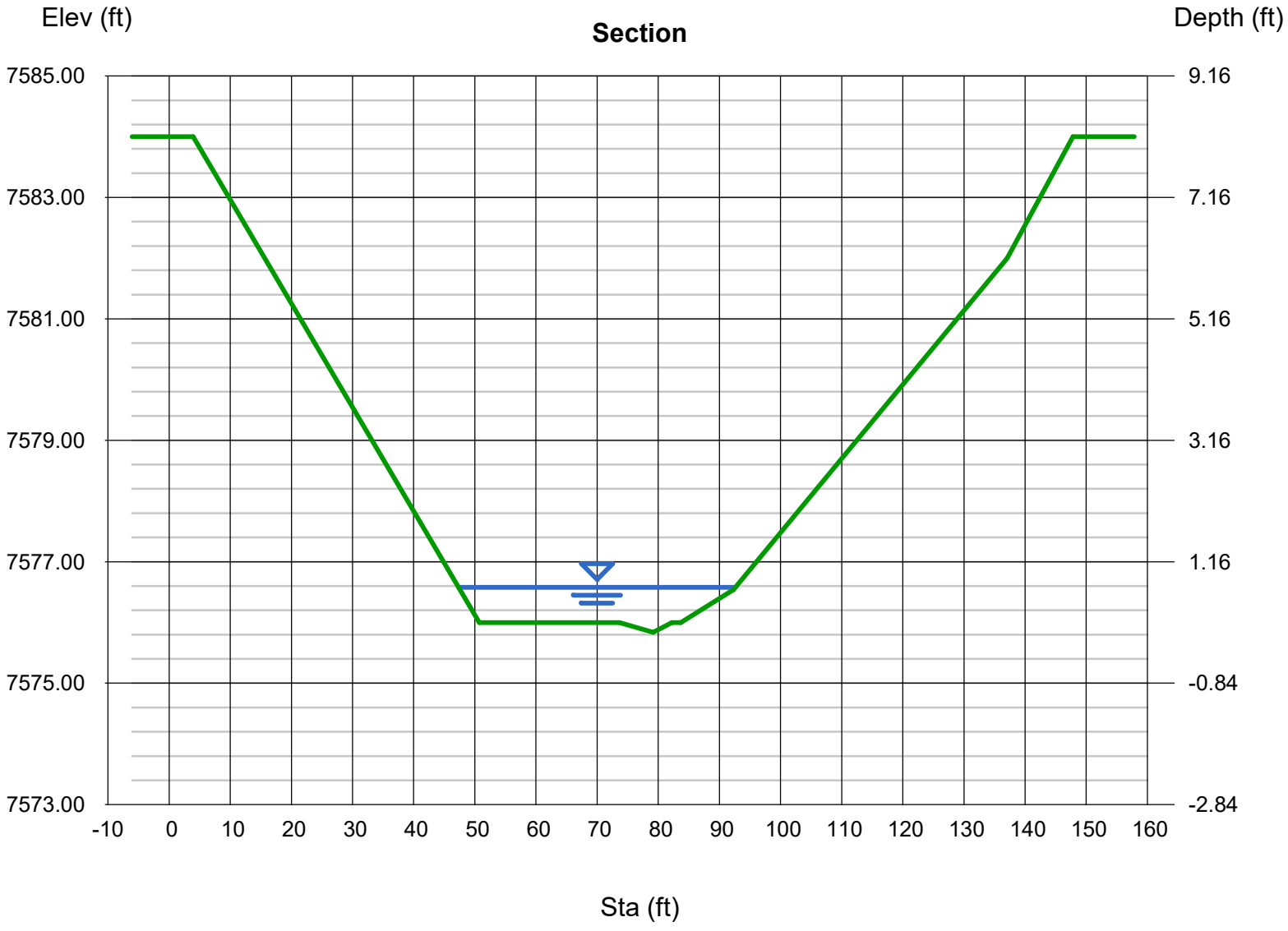
Compute by:	Known Q
Known Q (cfs)	= 126.50

Highlighted

Depth (ft)	= 0.74
Q (cfs)	= 126.50
Area (sqft)	= 23.46
Velocity (ft/s)	= 5.39
Wetted Perim (ft)	= 45.36
Crit Depth, Yc (ft)	= 0.86
Top Width (ft)	= 45.28
EGL (ft)	= 1.19

(Sta, El, n)-(Sta, El, n)...

(3.95, 7584.00)-(50.74, 7576.00, 0.030)-(73.66, 7576.00, 0.030)-(79.15, 7575.84, 0.030)-(82.24, 7576.00, 0.030)-(83.70, 7576.00, 0.030)-(92.30, 7576.54, 0.030)-(137.09, 7582.00, 0.030)-(147.84, 7584.00, 0.030)



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Mar 25 2026

Channel Section S1 - 5Yr Storm

Trapezoidal

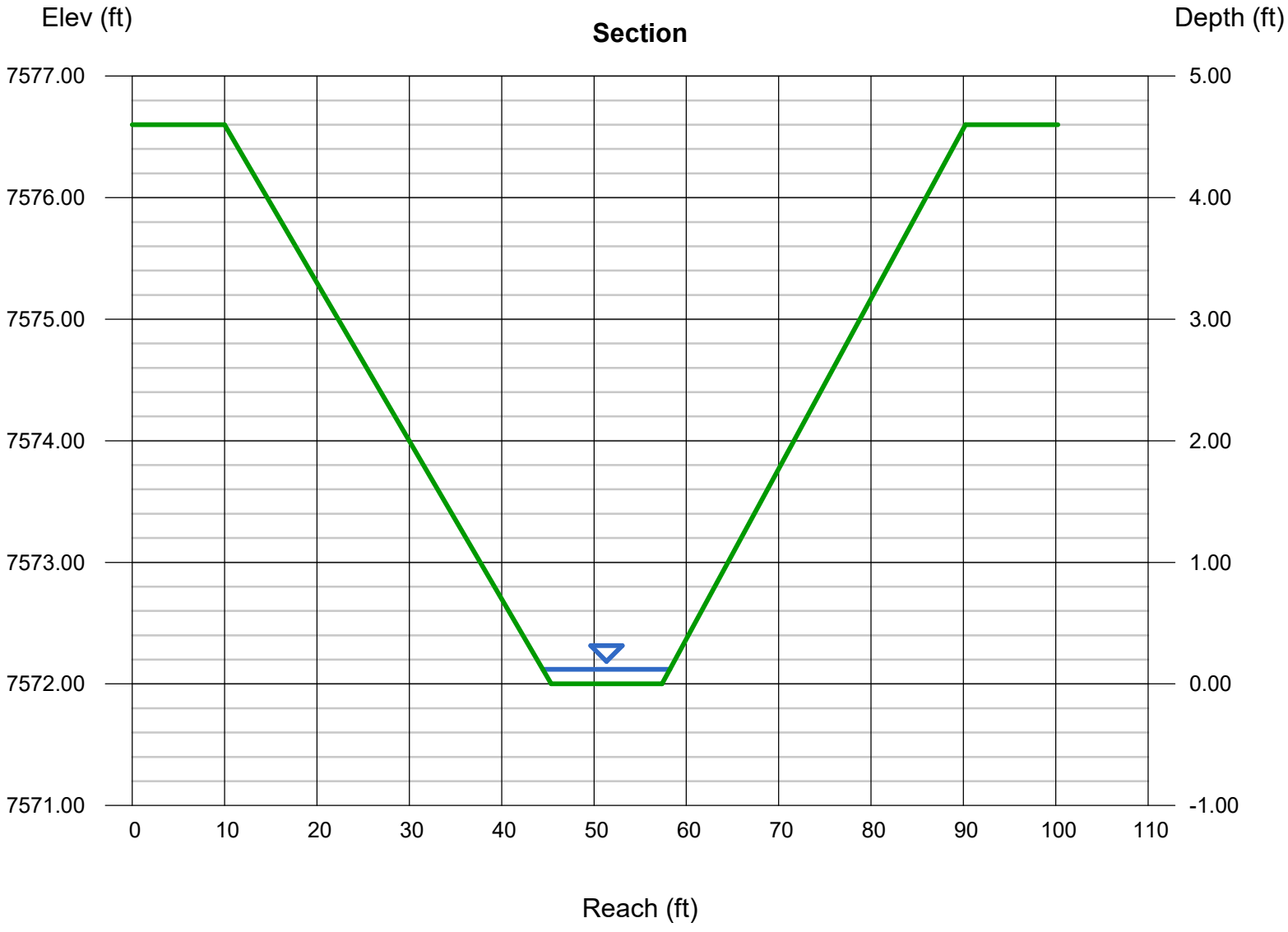
Bottom Width (ft)	= 12.00
Side Slopes (z:1)	= 7.69, 7.14
Total Depth (ft)	= 4.60
Invert Elev (ft)	= 7572.00
Slope (%)	= 8.00
N-Value	= 0.035

Calculations

Compute by:	Known Q
Known Q (cfs)	= 4.06

Highlighted

Depth (ft)	= 0.12
Q (cfs)	= 4.060
Area (sqft)	= 1.55
Velocity (ft/s)	= 2.62
Wetted Perim (ft)	= 13.80
Crit Depth, Yc (ft)	= 0.15
Top Width (ft)	= 13.78
EGL (ft)	= 0.23



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Mar 25 2026

Channel Section S1 - 100Yr Storm

Trapezoidal

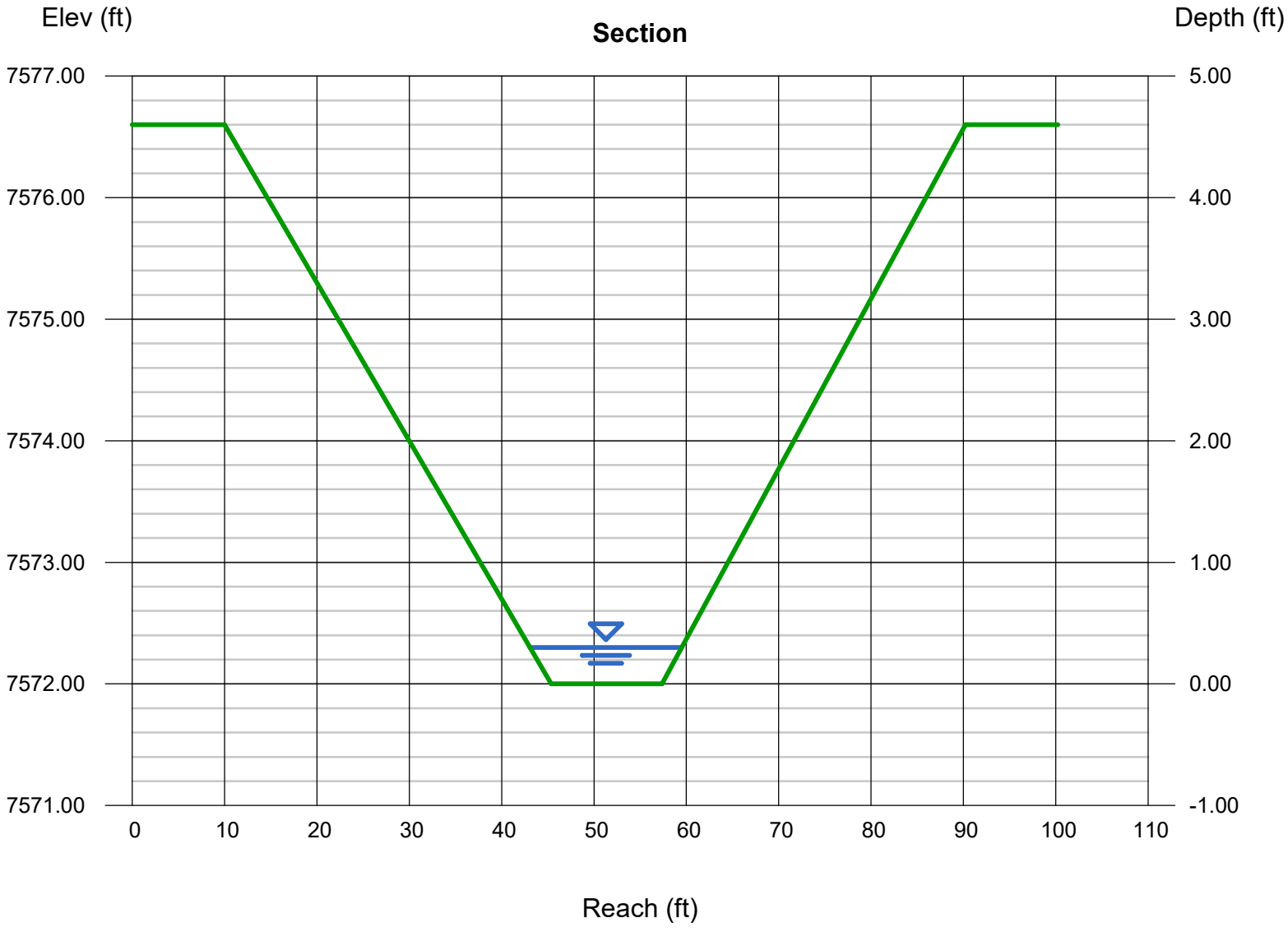
Bottom Width (ft)	= 12.00
Side Slopes (z:1)	= 7.69, 7.14
Total Depth (ft)	= 4.60
Invert Elev (ft)	= 7572.00
Slope (%)	= 8.00
N-Value	= 0.035

Calculations

Compute by:	Known Q
Known Q (cfs)	= 20.37

Highlighted

Depth (ft)	= 0.30
Q (cfs)	= 20.37
Area (sqft)	= 4.27
Velocity (ft/s)	= 4.77
Wetted Perim (ft)	= 16.49
Crit Depth, Yc (ft)	= 0.41
Top Width (ft)	= 16.45
EGL (ft)	= 0.65



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Apr 1 2026

Side Trickle Channel Sizing - 2Yr Flow

Rectangular

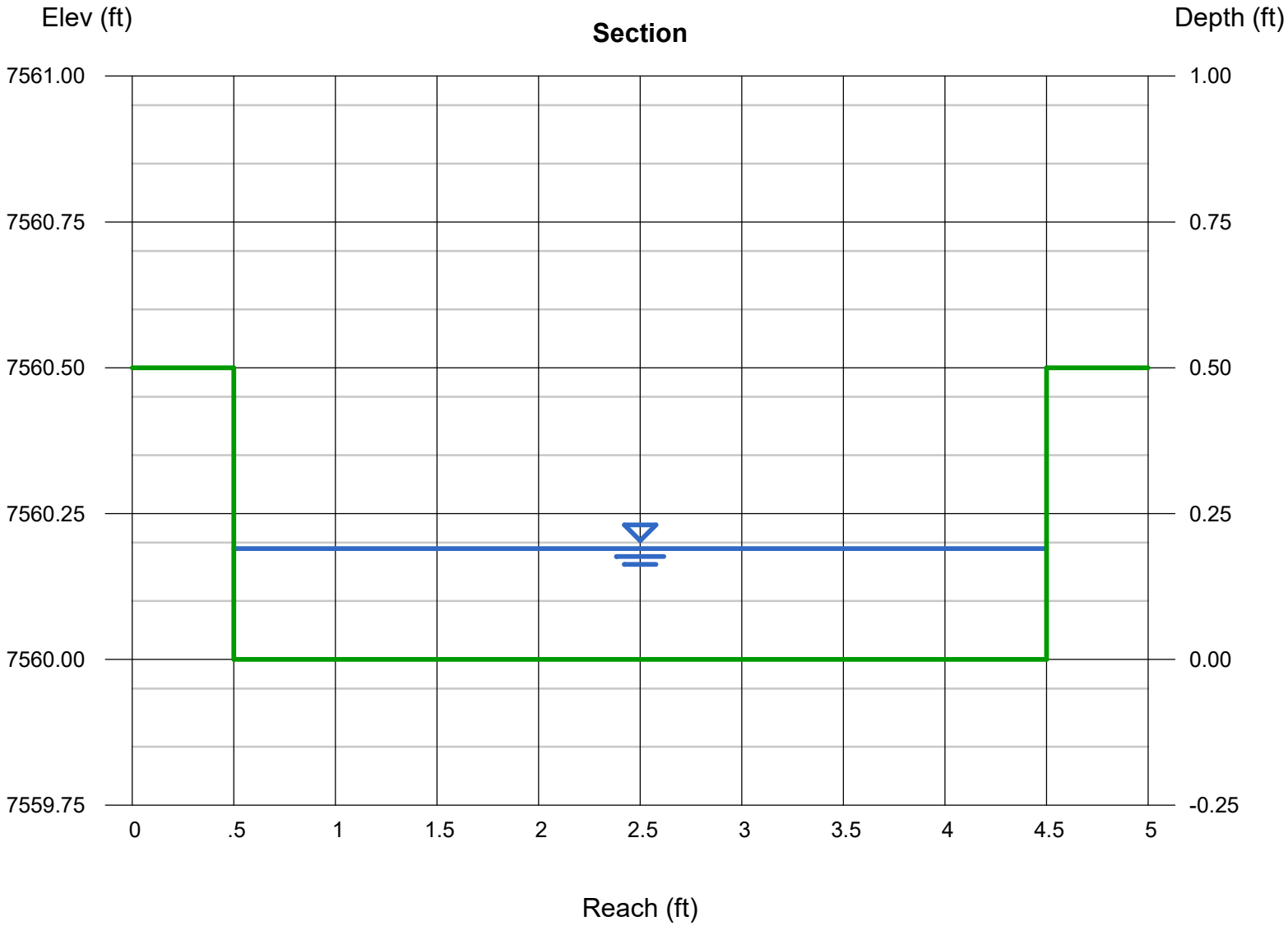
Bottom Width (ft)	= 4.00
Total Depth (ft)	= 0.50
Invert Elev (ft)	= 7560.00
Slope (%)	= 0.50
N-Value	= 0.011

Calculations

Compute by:	Known Q
Known Q (cfs)	= 2.13

Highlighted

Depth (ft)	= 0.19
Q (cfs)	= 2.126
Area (sqft)	= 0.76
Velocity (ft/s)	= 2.80
Wetted Perim (ft)	= 4.38
Crit Depth, Yc (ft)	= 0.21
Top Width (ft)	= 4.00
EGL (ft)	= 0.31



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Apr 1 2026

Main Trickle Channel Sizing - 2Yr Flow

Rectangular

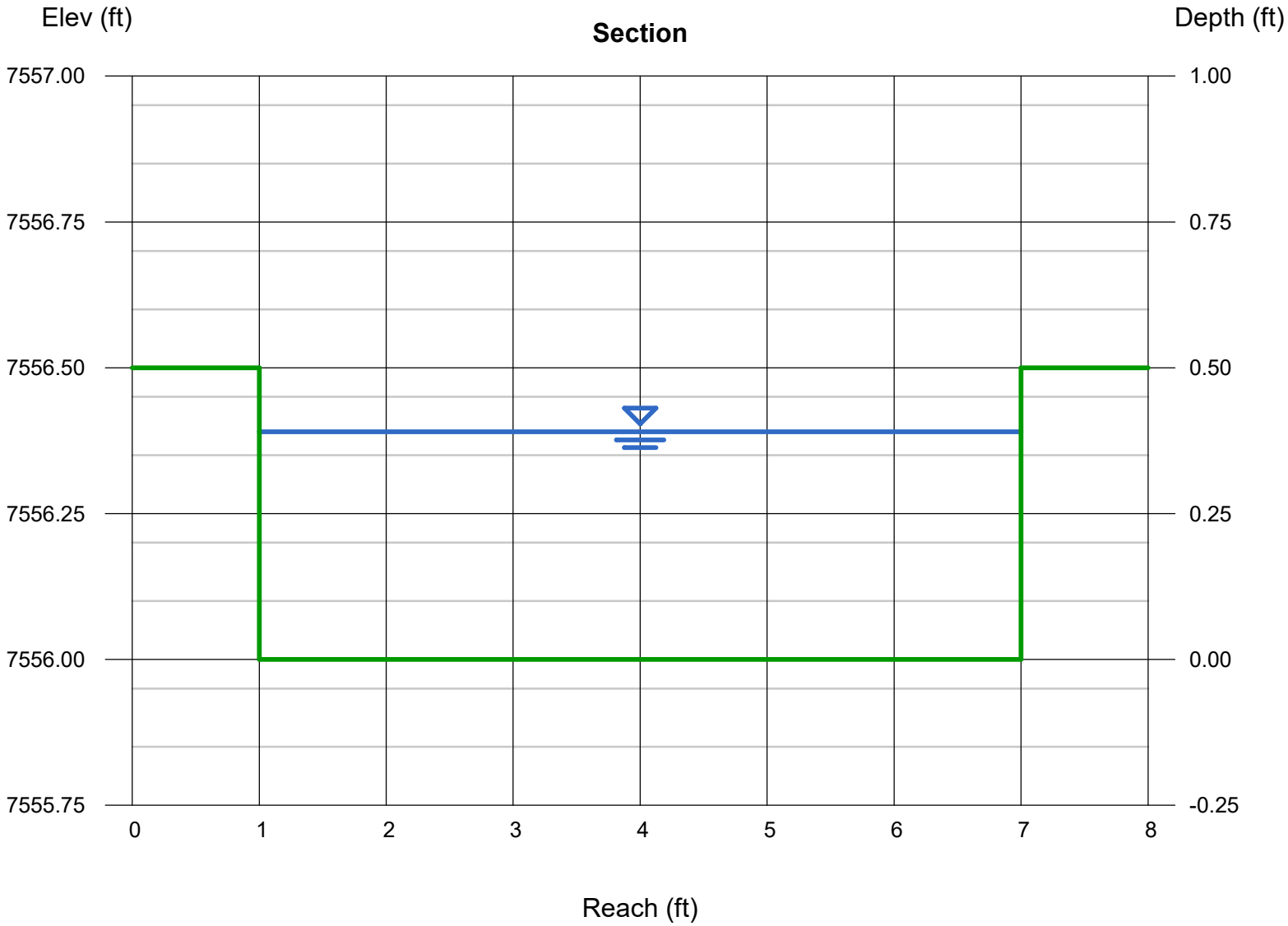
Bottom Width (ft)	= 6.00
Total Depth (ft)	= 0.50
Invert Elev (ft)	= 7556.00
Slope (%)	= 0.50
N-Value	= 0.011

Calculations

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

Highlighted

Depth (ft)	= 0.39
Q (cfs)	= 10.90
Area (sqft)	= 2.34
Velocity (ft/s)	= 4.66
Wetted Perim (ft)	= 6.78
Crit Depth, Yc (ft)	= 0.47
Top Width (ft)	= 6.00
EGL (ft)	= 0.73



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Oct 8 2025

CULVERT 1 5 YR

Invert Elev Dn (ft)	=	7579.62
Pipe Length (ft)	=	60.38
Slope (%)	=	2.73
Invert Elev Up (ft)	=	7581.27
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

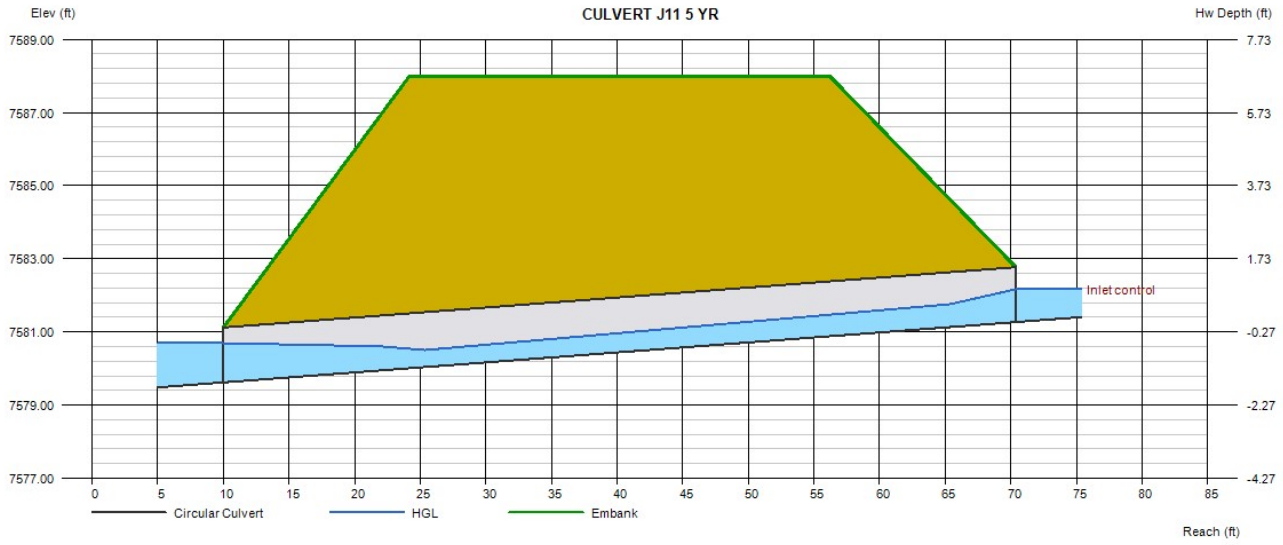
Top Elevation (ft)	=	7588.00
Top Width (ft)	=	32.00
Crest Width (ft)	=	0.00

Calculations

Qmin (cfs)	=	2.90
Qmax (cfs)	=	2.90
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	2.90
Qpipe (cfs)	=	2.90
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	2.14
Veloc Up (ft/s)	=	3.98
HGL Dn (ft)	=	7580.69
HGL Up (ft)	=	7581.92
Hw Elev (ft)	=	7582.17
Hw/D (ft)	=	0.60
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Oct 8 2025

CULVERT 1 100 YR

Invert Elev Dn (ft)	=	7579.62
Pipe Length (ft)	=	60.38
Slope (%)	=	2.73
Invert Elev Up (ft)	=	7581.27
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

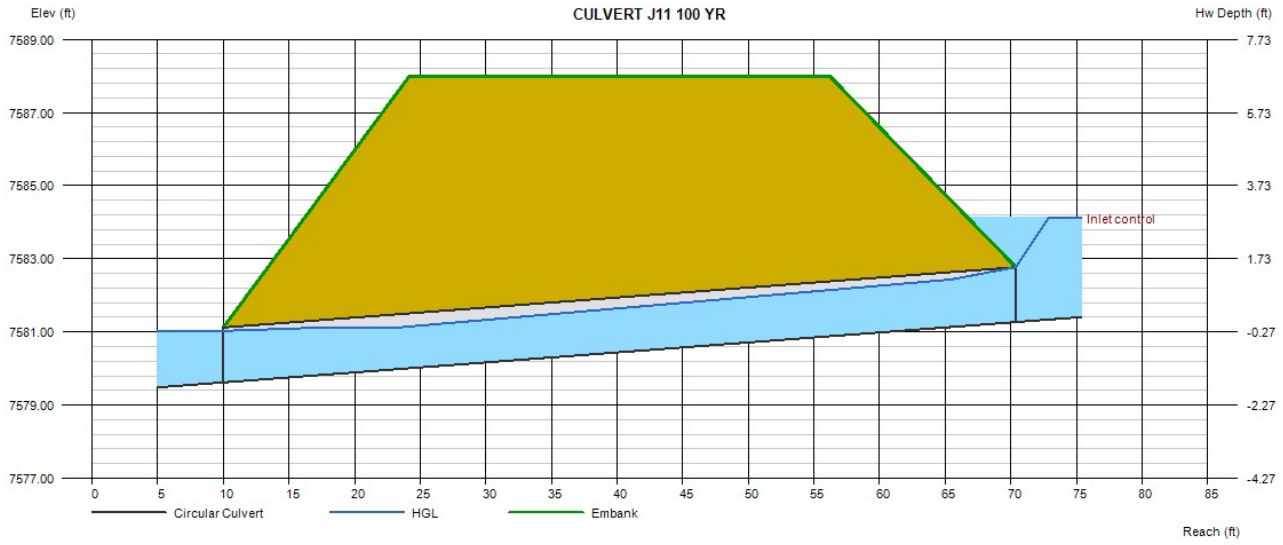
Top Elevation (ft)	=	7588.00
Top Width (ft)	=	32.00
Crest Width (ft)	=	0.00

Calculations

Qmin (cfs)	=	12.10
Qmax (cfs)	=	12.10
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	12.10
Qpipe (cfs)	=	12.10
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	7.02
Veloc Up (ft/s)	=	7.36
HGL Dn (ft)	=	7581.03
HGL Up (ft)	=	7582.59
Hw Elev (ft)	=	7584.12
Hw/D (ft)	=	1.90
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Apr 1 2026

CULVERT 2 5 YR

Invert Elev Dn (ft)	=	7596.00
Pipe Length (ft)	=	180.51
Slope (%)	=	2.22
Invert Elev Up (ft)	=	7600.00
Rise (in)	=	42.0
Shape	=	Circular
Span (in)	=	42.0
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

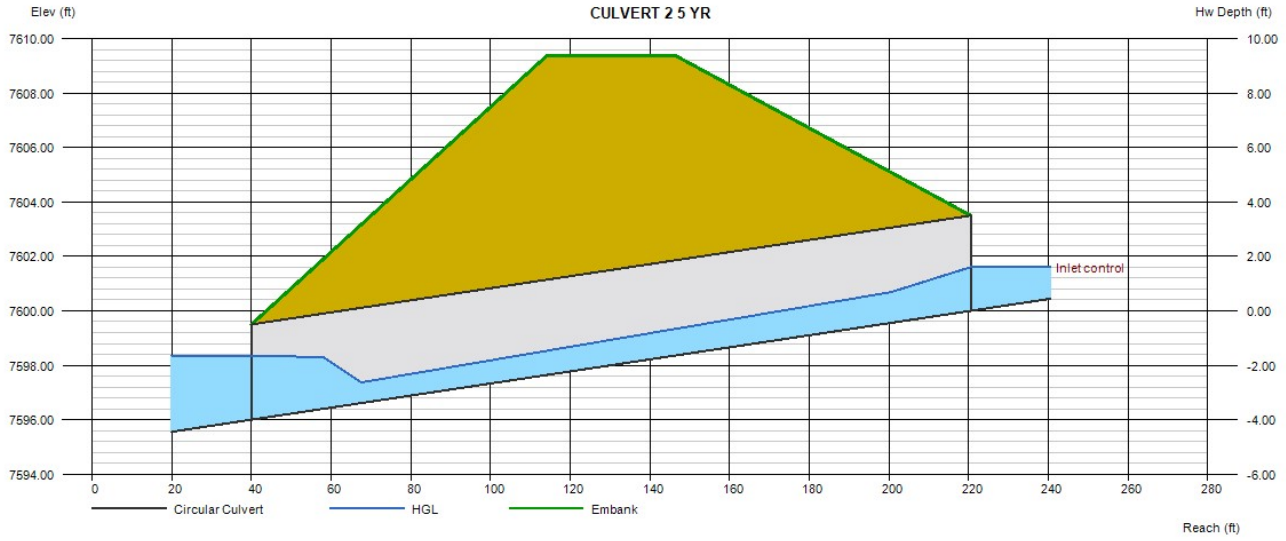
Top Elevation (ft)	=	7609.39
Top Width (ft)	=	32.00
Crest Width (ft)	=	0.00

Calculations

Qmin (cfs)	=	15.20
Qmax (cfs)	=	15.20
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	15.20
Qpipe (cfs)	=	15.20
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	2.22
Veloc Up (ft/s)	=	5.29
HGL Dn (ft)	=	7598.34
HGL Up (ft)	=	7601.19
Hw Elev (ft)	=	7601.61
Hw/D (ft)	=	0.46
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Apr 1 2026

CULVERT 2 100 YR

Invert Elev Dn (ft)	=	7596.00
Pipe Length (ft)	=	180.51
Slope (%)	=	2.22
Invert Elev Up (ft)	=	7600.00
Rise (in)	=	42.0
Shape	=	Circular
Span (in)	=	42.0
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

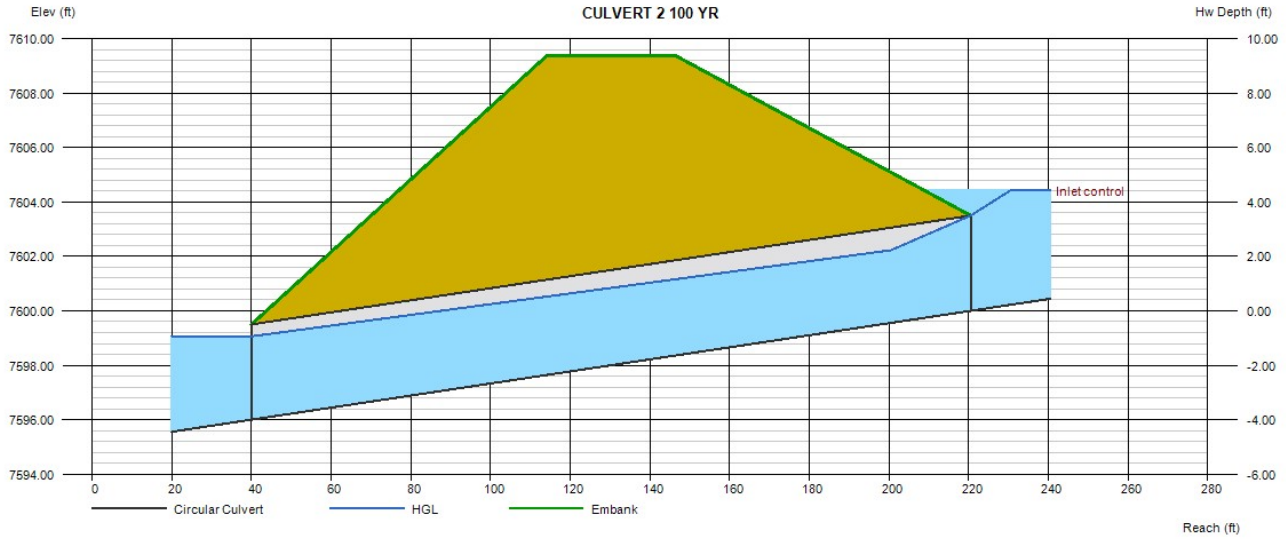
Top Elevation (ft)	=	7609.39
Top Width (ft)	=	32.00
Crest Width (ft)	=	0.00

Calculations

Qmin (cfs)	=	70.20
Qmax (cfs)	=	70.20
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	70.20
Qpipe (cfs)	=	70.20
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	7.86
Veloc Up (ft/s)	=	9.07
HGL Dn (ft)	=	7599.06
HGL Up (ft)	=	7602.62
Hw Elev (ft)	=	7604.43
Hw/D (ft)	=	1.26
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Monday, Oct 6 2025

CULVERT 3 5 YR

Invert Elev Dn (ft)	=	7598.00
Pipe Length (ft)	=	177.92
Slope (%)	=	2.31
Invert Elev Up (ft)	=	7602.11
Rise (in)	=	42.0
Shape	=	Circular
Span (in)	=	42.0
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

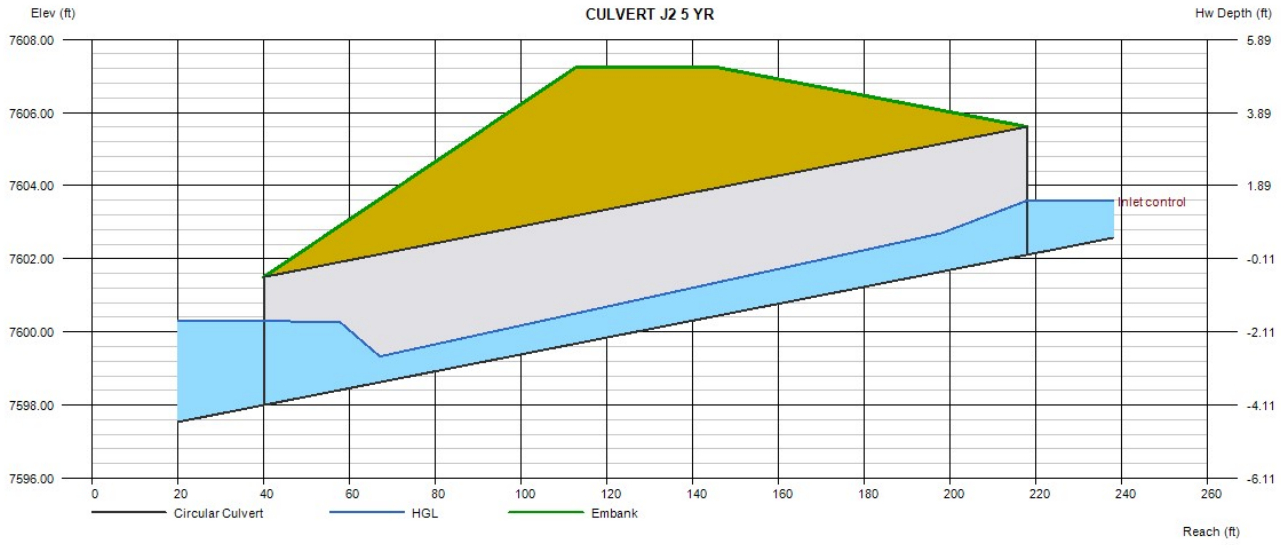
Top Elevation (ft)	=	7607.25
Top Width (ft)	=	32.00
Crest Width (ft)	=	0.00

Calculations

Qmin (cfs)	=	13.20
Qmax (cfs)	=	13.20
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	13.20
Qpipe (cfs)	=	13.20
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	1.97
Veloc Up (ft/s)	=	5.08
HGL Dn (ft)	=	7600.30
HGL Up (ft)	=	7603.21
Hw Elev (ft)	=	7603.59
Hw/D (ft)	=	0.42
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Monday, Oct 6 2025

CULVERT 3 100 YR

Invert Elev Dn (ft)	=	7598.00
Pipe Length (ft)	=	177.92
Slope (%)	=	2.31
Invert Elev Up (ft)	=	7602.11
Rise (in)	=	42.0
Shape	=	Circular
Span (in)	=	42.0
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

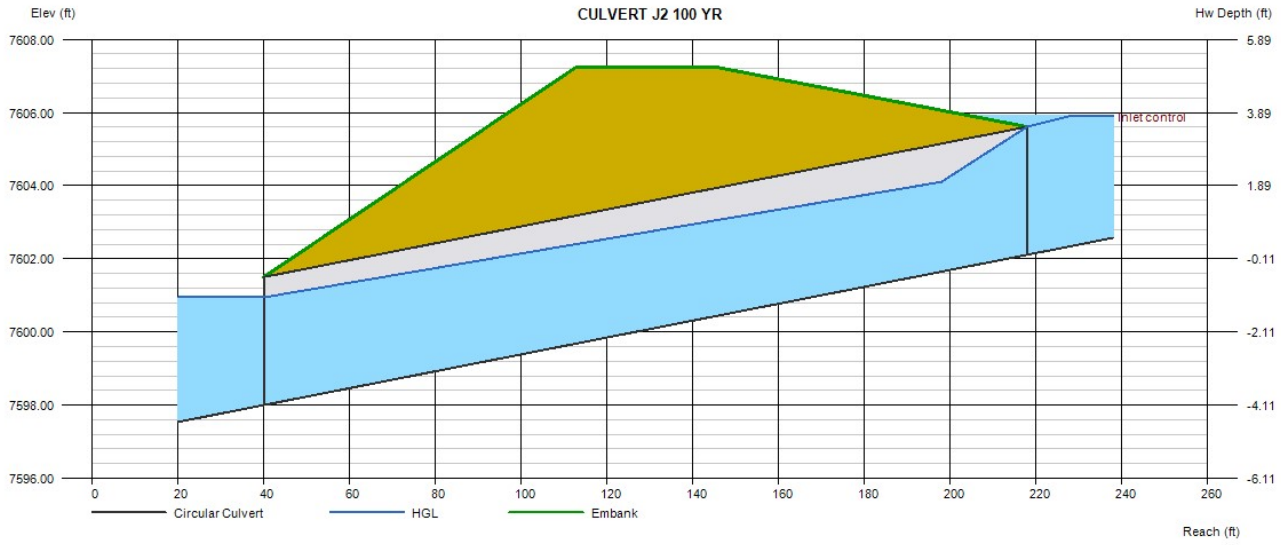
Top Elevation (ft)	=	7607.25
Top Width (ft)	=	32.00
Crest Width (ft)	=	0.00

Calculations

Qmin (cfs)	=	58.40
Qmax (cfs)	=	58.40
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	58.40
Qpipe (cfs)	=	58.40
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	6.76
Veloc Up (ft/s)	=	8.34
HGL Dn (ft)	=	7600.95
HGL Up (ft)	=	7604.50
Hw Elev (ft)	=	7605.90
Hw/D (ft)	=	1.08
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Monday, Oct 6 2025

CULVERT 4 5 YR

Invert Elev Dn (ft)	=	7594.04
Pipe Length (ft)	=	150.30
Slope (%)	=	3.48
Invert Elev Up (ft)	=	7599.27
Rise (in)	=	36.0
Shape	=	Circular
Span (in)	=	36.0
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

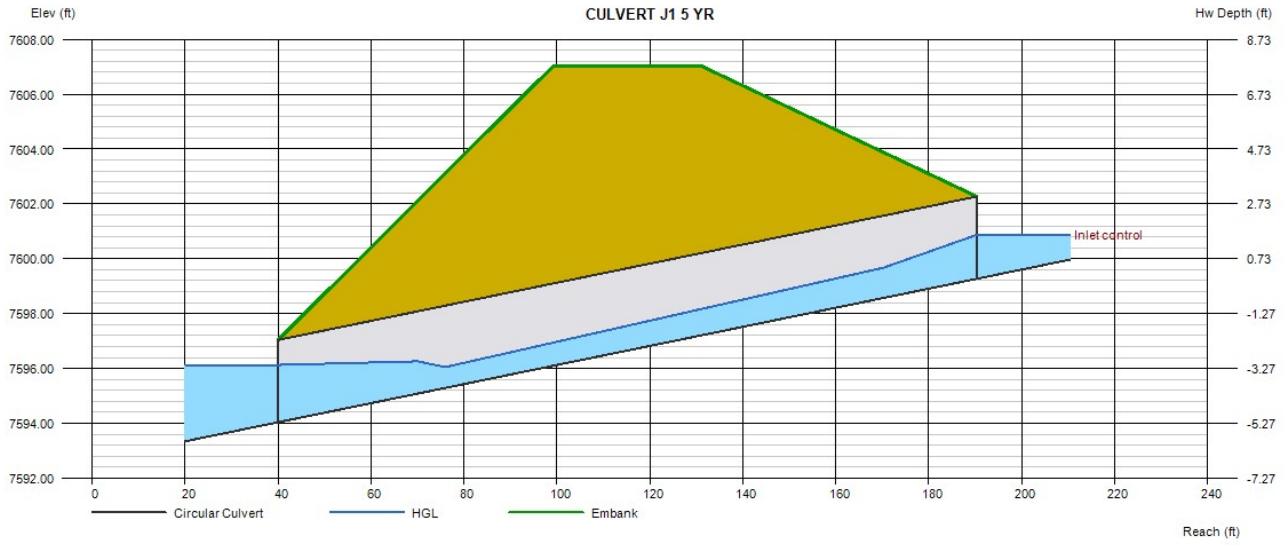
Top Elevation (ft)	=	7607.02
Top Width (ft)	=	32.00
Crest Width (ft)	=	0.00

Calculations

Qmin (cfs)	=	13.70
Qmax (cfs)	=	13.70
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	13.70
Qpipe (cfs)	=	13.70
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	2.61
Veloc Up (ft/s)	=	5.32
HGL Dn (ft)	=	7596.13
HGL Up (ft)	=	7600.45
Hw Elev (ft)	=	7600.87
Hw/D (ft)	=	0.53
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Monday, Oct 6 2025

CULVERT 4 100 YR

Invert Elev Dn (ft)	=	7594.04
Pipe Length (ft)	=	150.30
Slope (%)	=	3.48
Invert Elev Up (ft)	=	7599.27
Rise (in)	=	36.0
Shape	=	Circular
Span (in)	=	36.0
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

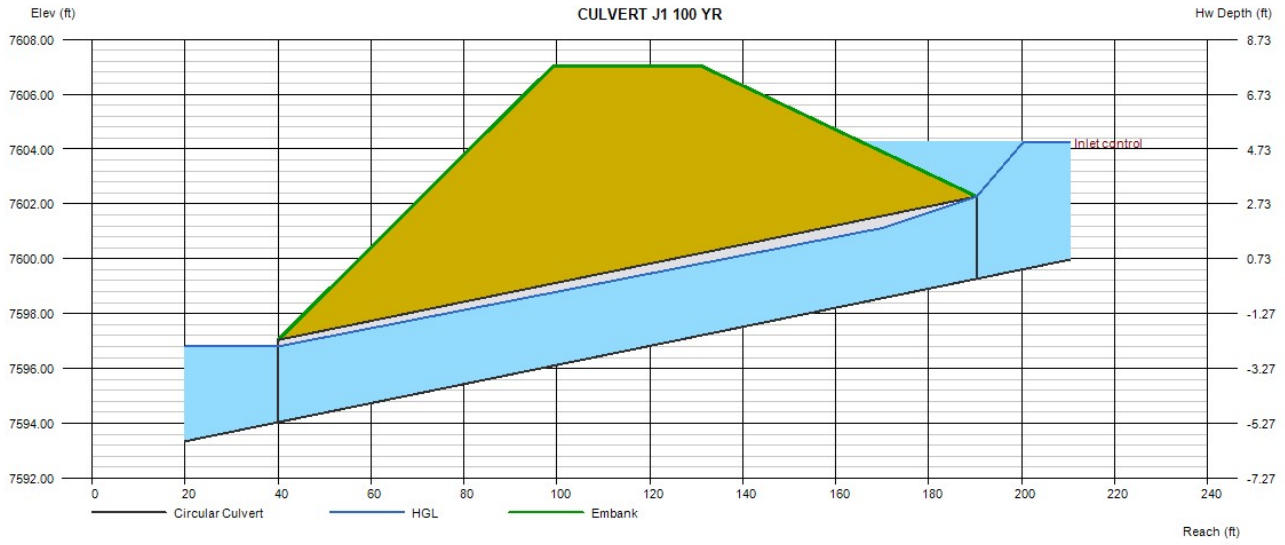
Top Elevation (ft)	=	7607.02
Top Width (ft)	=	32.00
Crest Width (ft)	=	0.00

Calculations

Qmin (cfs)	=	61.60
Qmax (cfs)	=	61.60
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	61.60
Qpipe (cfs)	=	61.60
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	9.05
Veloc Up (ft/s)	=	9.69
HGL Dn (ft)	=	7596.80
HGL Up (ft)	=	7601.80
Hw Elev (ft)	=	7604.25
Hw/D (ft)	=	1.66
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, Mar 31 2026

CULVERT 5 5 YR

Invert Elev Dn (ft)	=	7613.78
Pipe Length (ft)	=	85.92
Slope (%)	=	2.96
Invert Elev Up (ft)	=	7616.32
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

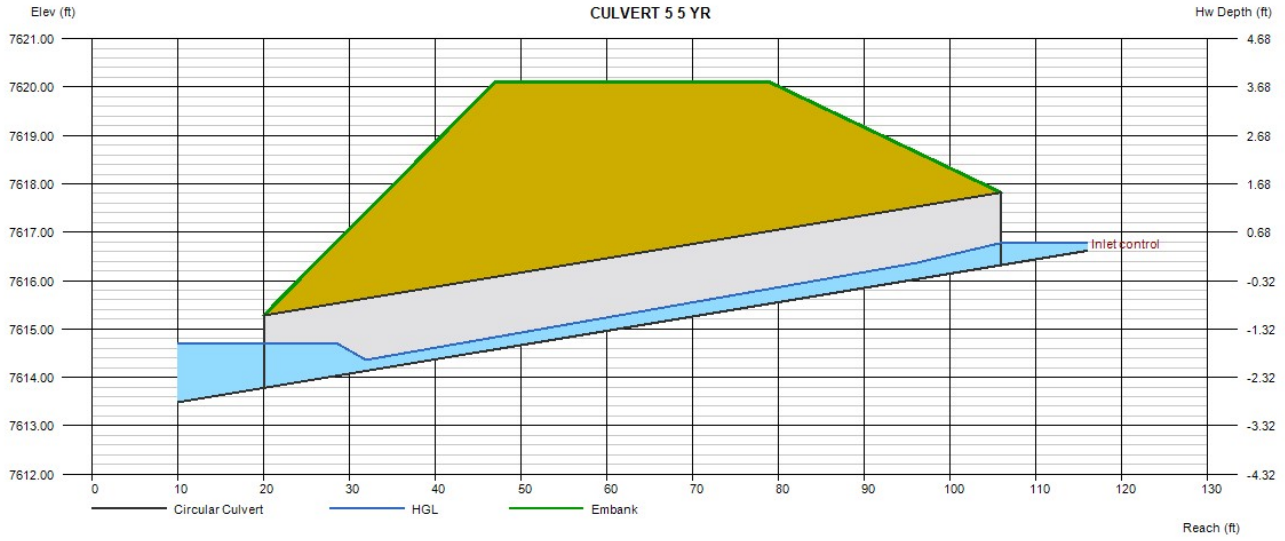
Top Elevation (ft)	=	7620.10
Top Width (ft)	=	32.00
Crest Width (ft)	=	0.00

Calculations

Qmin (cfs)	=	0.90
Qmax (cfs)	=	0.90
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	0.90
Qpipe (cfs)	=	0.90
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	0.79
Veloc Up (ft/s)	=	2.84
HGL Dn (ft)	=	7614.71
HGL Up (ft)	=	7616.67
Hw Elev (ft)	=	7616.78
Hw/D (ft)	=	0.31
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, Mar 31 2026

CULVERT 5 100 YR

Invert Elev Dn (ft)	=	7613.78
Pipe Length (ft)	=	85.92
Slope (%)	=	2.96
Invert Elev Up (ft)	=	7616.32
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

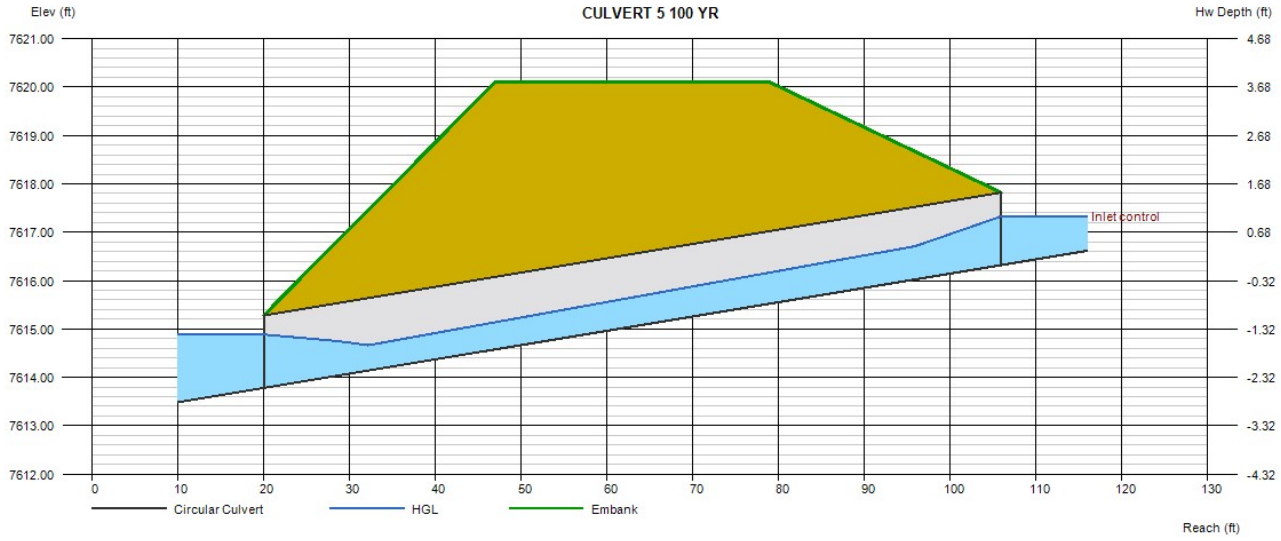
Top Elevation (ft)	=	7620.10
Top Width (ft)	=	32.00
Crest Width (ft)	=	0.00

Calculations

Qmin (cfs)	=	3.50
Qmax (cfs)	=	3.50
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	3.50
Qpipe (cfs)	=	3.50
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	2.50
Veloc Up (ft/s)	=	4.23
HGL Dn (ft)	=	7614.89
HGL Up (ft)	=	7617.03
Hw Elev (ft)	=	7617.33
Hw/D (ft)	=	0.67
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, Dec 11 2025

CULVERT 6 5 YEAR

Invert Elev Dn (ft)	=	7556.02
Pipe Length (ft)	=	59.71
Slope (%)	=	6.67
Invert Elev Up (ft)	=	7560.00
Rise (in)	=	24.0
Shape	=	Circular
Span (in)	=	24.0
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

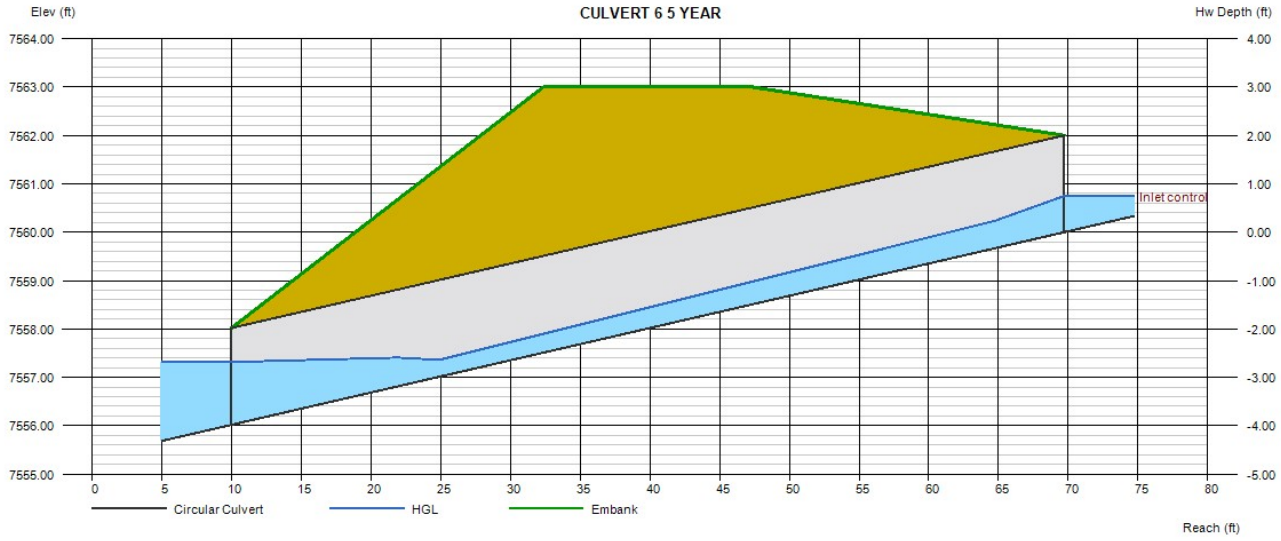
Top Elevation (ft)	=	7563.00
Top Width (ft)	=	15.00
Crest Width (ft)	=	0.00

Calculations

Qmin (cfs)	=	2.90
Qmax (cfs)	=	2.90
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	2.90
Qpipe (cfs)	=	2.90
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	1.35
Veloc Up (ft/s)	=	3.72
HGL Dn (ft)	=	7557.32
HGL Up (ft)	=	7560.59
Hw Elev (ft)	=	7560.75
Hw/D (ft)	=	0.37
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, Dec 11 2025

CULVERT 6 100 YEAR

Invert Elev Dn (ft)	=	7556.02
Pipe Length (ft)	=	59.71
Slope (%)	=	6.67
Invert Elev Up (ft)	=	7560.00
Rise (in)	=	24.0
Shape	=	Circular
Span (in)	=	24.0
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

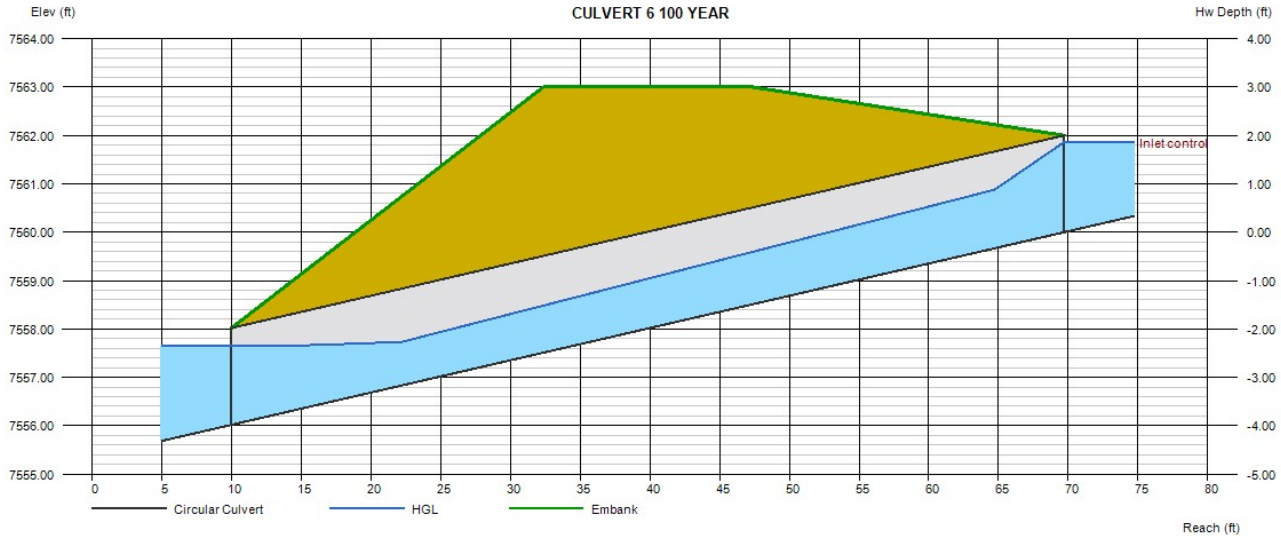
Top Elevation (ft)	=	7563.00
Top Width (ft)	=	15.00
Crest Width (ft)	=	0.00

Calculations

Qmin (cfs)	=	12.10
Qmax (cfs)	=	12.10
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	12.10
Qpipe (cfs)	=	12.10
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	4.43
Veloc Up (ft/s)	=	5.87
HGL Dn (ft)	=	7557.64
HGL Up (ft)	=	7561.25
Hw Elev (ft)	=	7561.86
Hw/D (ft)	=	0.93
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Apr 1 2026

CULVERT 7 5 YEAR

Invert Elev Dn (ft)	=	7559.18
Pipe Length (ft)	=	39.91
Slope (%)	=	0.50
Invert Elev Up (ft)	=	7559.38
Rise (in)	=	60.0
Shape	=	Circular
Span (in)	=	60.0
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

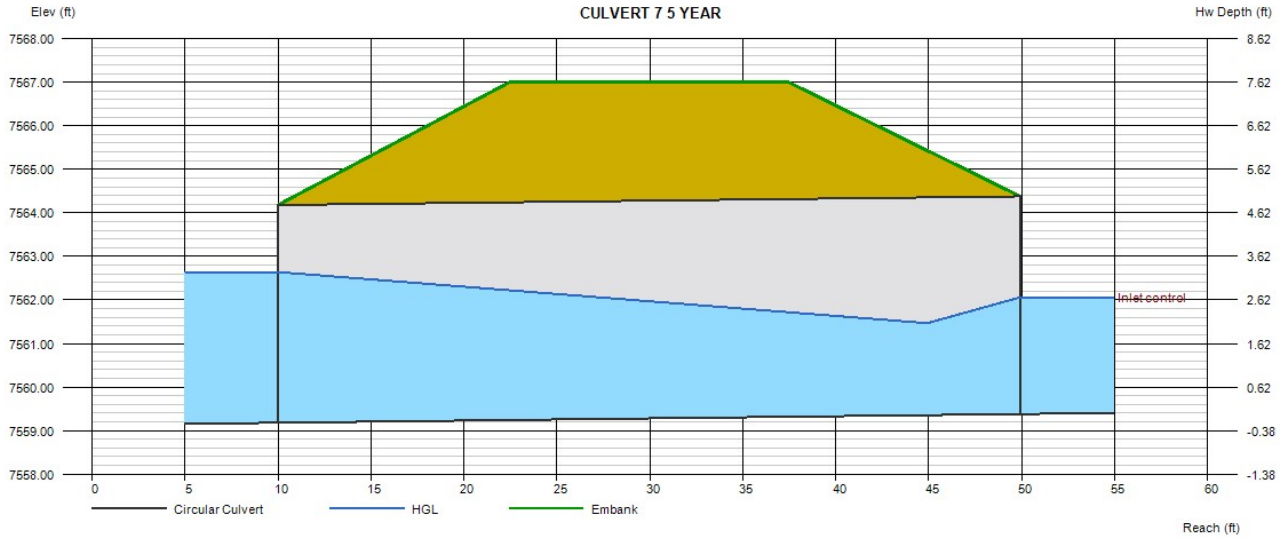
Top Elevation (ft)	=	7567.00
Top Width (ft)	=	15.00
Crest Width (ft)	=	100.00

Calculations

Qmin (cfs)	=	47.10
Qmax (cfs)	=	47.10
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	47.10
Qpipe (cfs)	=	47.10
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	3.25
Veloc Up (ft/s)	=	6.79
HGL Dn (ft)	=	7562.64
HGL Up (ft)	=	7561.30
Hw Elev (ft)	=	7562.06
Hw/D (ft)	=	0.54
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Apr 1 2026

CULVERT 7 100 YEAR

Invert Elev Dn (ft)	=	7559.18
Pipe Length (ft)	=	39.91
Slope (%)	=	0.50
Invert Elev Up (ft)	=	7559.38
Rise (in)	=	60.0
Shape	=	Circular
Span (in)	=	60.0
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

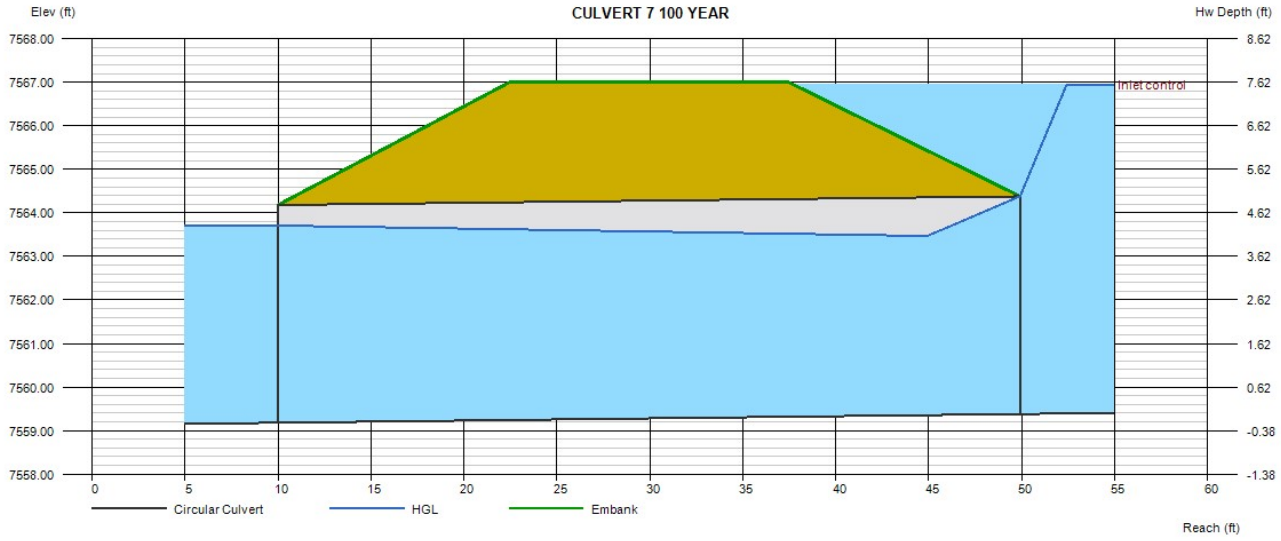
Top Elevation (ft)	=	7567.00
Top Width (ft)	=	15.00
Crest Width (ft)	=	100.00

Calculations

Qmin (cfs)	=	202.30
Qmax (cfs)	=	202.30
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	202.30
Qpipe (cfs)	=	202.30
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	10.82
Veloc Up (ft/s)	=	11.86
HGL Dn (ft)	=	7563.71
HGL Up (ft)	=	7563.44
Hw Elev (ft)	=	7566.94
Hw/D (ft)	=	1.51
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Apr 1 2026

CULVERT 8 5 YEAR

Invert Elev Dn (ft)	=	7558.32
Pipe Length (ft)	=	36.30
Slope (%)	=	8.07
Invert Elev Up (ft)	=	7561.25
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

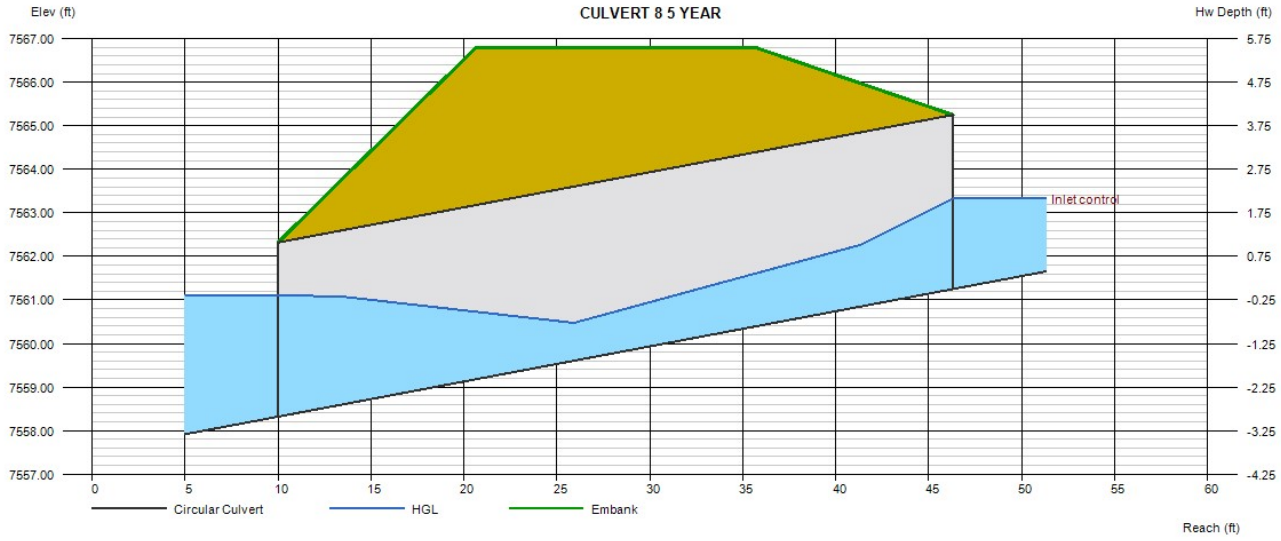
Top Elevation (ft)	=	7566.80
Top Width (ft)	=	15.00
Crest Width (ft)	=	100.00

Calculations

Qmin (cfs)	=	28.90
Qmax (cfs)	=	28.90
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	28.90
Qpipe (cfs)	=	28.90
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	3.08
Veloc Up (ft/s)	=	6.20
HGL Dn (ft)	=	7561.12
HGL Up (ft)	=	7562.84
Hw Elev (ft)	=	7563.33
Hw/D (ft)	=	0.52
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Apr 1 2026

CULVERT 8 100 YEAR

Invert Elev Dn (ft)	=	7558.32
Pipe Length (ft)	=	36.30
Slope (%)	=	8.07
Invert Elev Up (ft)	=	7561.25
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

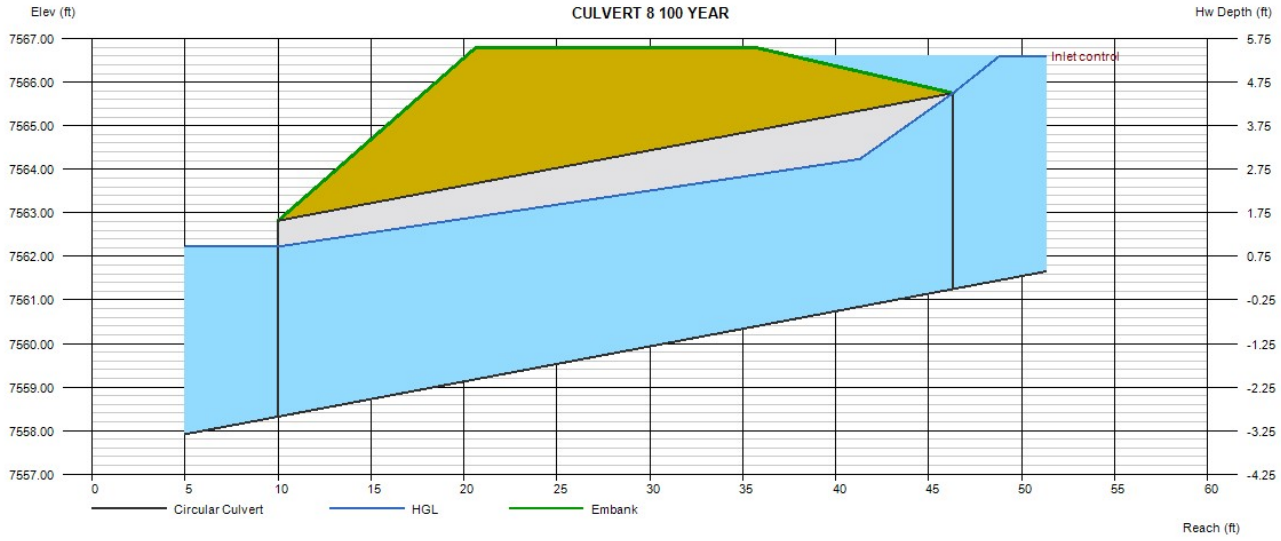
Top Elevation (ft)	=	7566.80
Top Width (ft)	=	15.00
Crest Width (ft)	=	100.00

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)	=	7562.22
HGL Up (ft)	=	7564.56
Hw Elev (ft)	=	7566.60
Hw/D (ft)	=	1.19
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Apr 1 2026

CULVERT 9 5 YEAR

Invert Elev Dn (ft)	=	7626.39
Pipe Length (ft)	=	86.32
Slope (%)	=	3.16
Invert Elev Up (ft)	=	7629.12
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

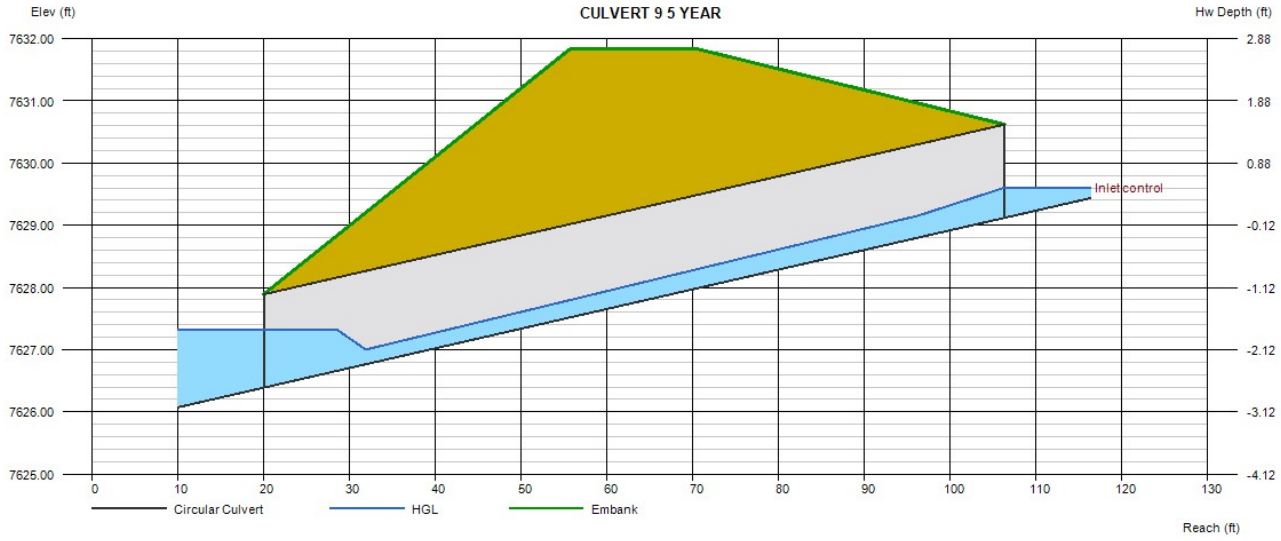
Top Elevation (ft)	=	7631.83
Top Width (ft)	=	15.00
Crest Width (ft)	=	0.00

Calculations

Qmin (cfs)	=	1.00
Qmax (cfs)	=	1.00
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	1.00
Qpipe (cfs)	=	1.00
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	0.86
Veloc Up (ft/s)	=	2.92
HGL Dn (ft)	=	7627.33
HGL Up (ft)	=	7629.49
Hw Elev (ft)	=	7629.61
Hw/D (ft)	=	0.32
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Apr 1 2026

CULVERT 9 100 YEAR

Invert Elev Dn (ft)	=	7626.39
Pipe Length (ft)	=	86.32
Slope (%)	=	3.16
Invert Elev Up (ft)	=	7629.12
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

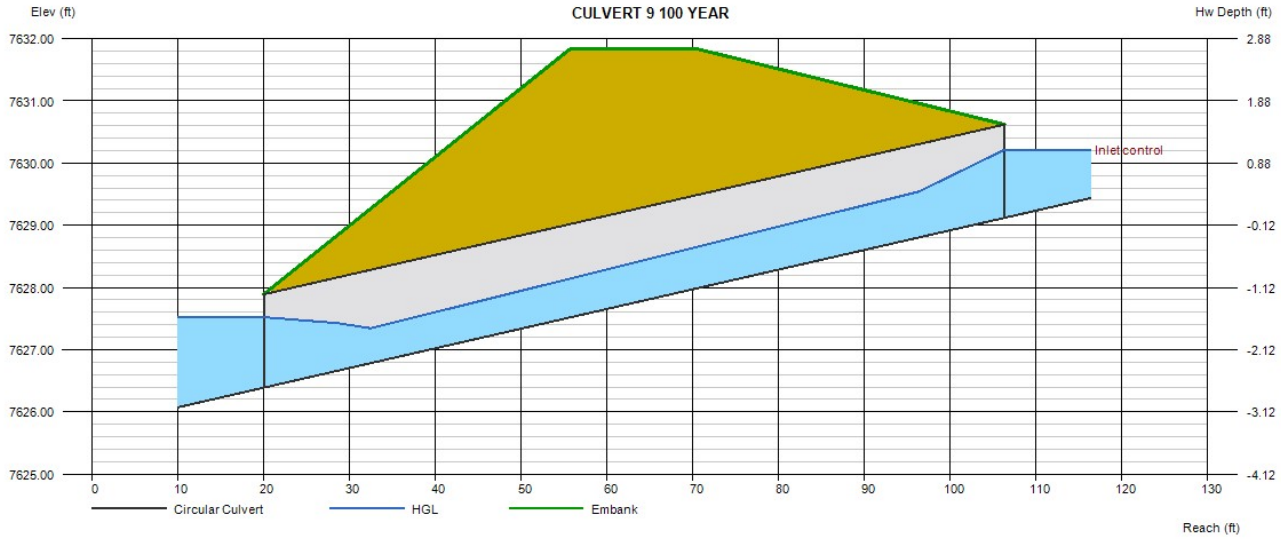
Top Elevation (ft)	=	7631.83
Top Width (ft)	=	15.00
Crest Width (ft)	=	0.00

Calculations

Qmin (cfs)	=	4.00
Qmax (cfs)	=	4.00
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	4.00
Qpipe (cfs)	=	4.00
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	2.79
Veloc Up (ft/s)	=	4.42
HGL Dn (ft)	=	7627.52
HGL Up (ft)	=	7629.89
Hw Elev (ft)	=	7630.22
Hw/D (ft)	=	0.73
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Monday, Oct 6 2025

CULVERT I4 5 YR

Invert Elev Dn (ft)	=	7601.20
Pipe Length (ft)	=	105.00
Slope (%)	=	0.85
Invert Elev Up (ft)	=	7602.09
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

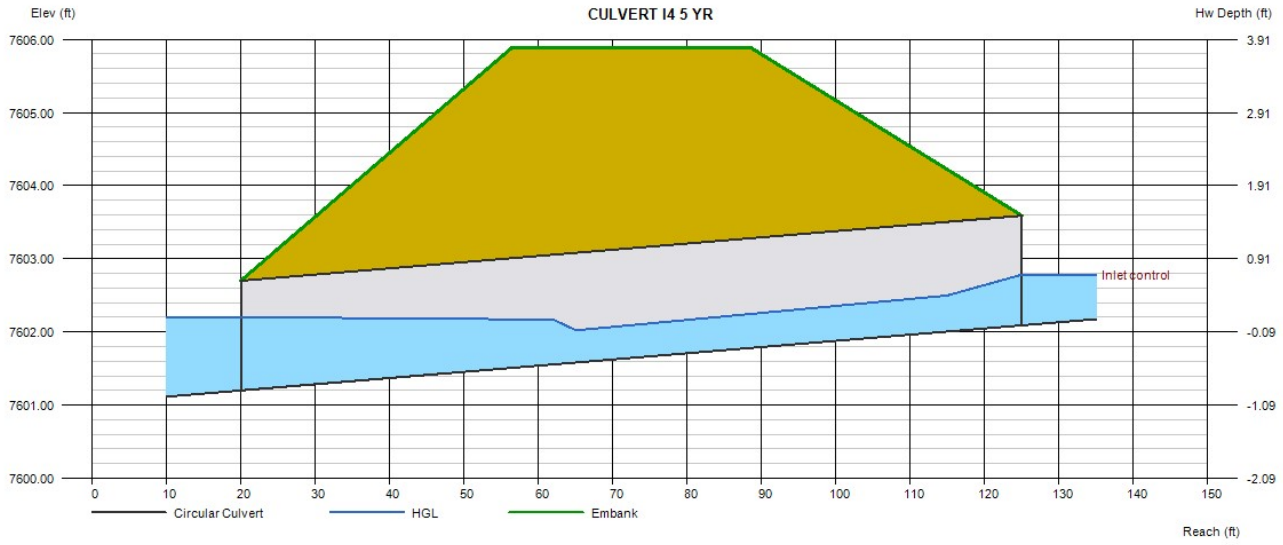
Top Elevation (ft)	=	7605.89
Top Width (ft)	=	32.00
Crest Width (ft)	=	0.00

Calculations

Qmin (cfs)	=	1.80
Qmax (cfs)	=	1.80
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	1.80
Qpipe (cfs)	=	1.80
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	1.43
Veloc Up (ft/s)	=	3.45
HGL Dn (ft)	=	7602.20
HGL Up (ft)	=	7602.59
Hw Elev (ft)	=	7602.78
Hw/D (ft)	=	0.46
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Monday, Oct 6 2025

CULVERT I4 100 YR

Invert Elev Dn (ft)	=	7601.20
Pipe Length (ft)	=	105.00
Slope (%)	=	0.85
Invert Elev Up (ft)	=	7602.09
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

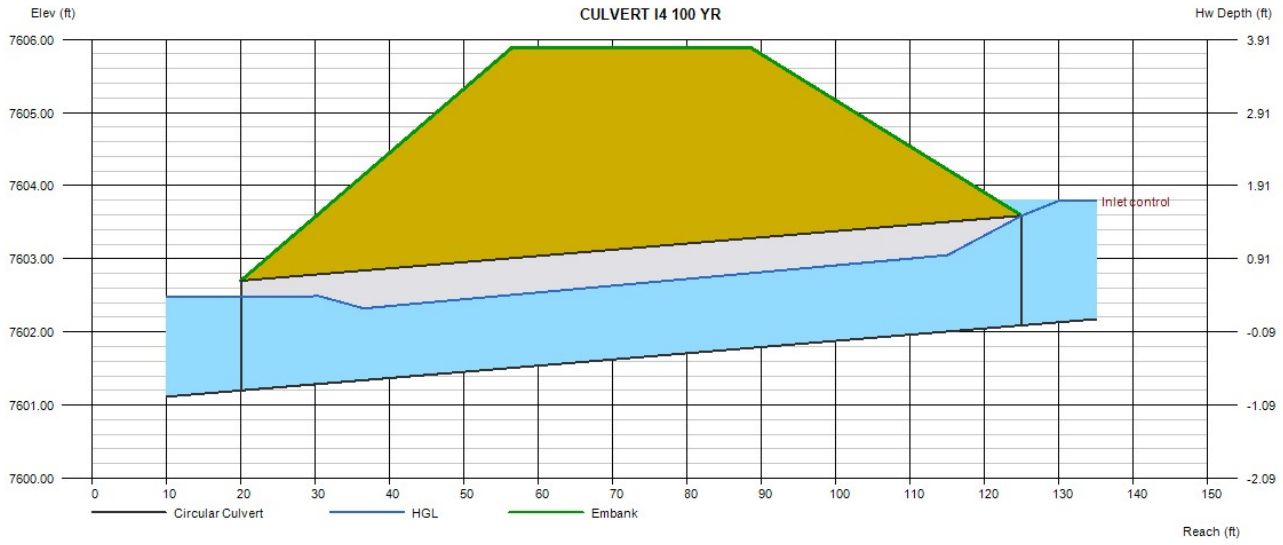
Top Elevation (ft)	=	7605.89
Top Width (ft)	=	32.00
Crest Width (ft)	=	0.00

Calculations

Qmin (cfs)	=	7.40
Qmax (cfs)	=	7.40
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	7.40
Qpipe (cfs)	=	7.40
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	4.62
Veloc Up (ft/s)	=	5.58
HGL Dn (ft)	=	7602.48
HGL Up (ft)	=	7603.14
Hw Elev (ft)	=	7603.79
Hw/D (ft)	=	1.14
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Monday, Nov 24 2025

CULVERT I5 5 YR

Invert Elev Dn (ft)	=	7592.54
Pipe Length (ft)	=	105.69
Slope (%)	=	8.05
Invert Elev Up (ft)	=	7601.05
Rise (in)	=	42.0
Shape	=	Circular
Span (in)	=	42.0
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

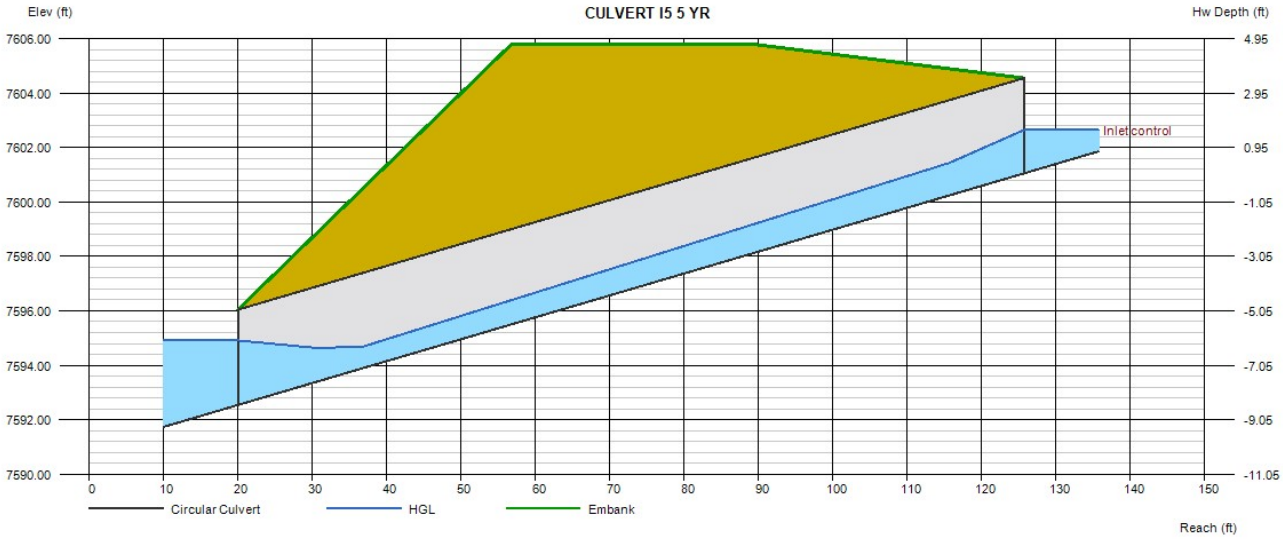
Top Elevation (ft)	=	7605.81
Top Width (ft)	=	32.00
Crest Width (ft)	=	0.00

Calculations

Qmin (cfs)	=	16.70
Qmax (cfs)	=	16.70
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	16.70
Qpipe (cfs)	=	16.70
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	2.40
Veloc Up (ft/s)	=	5.44
HGL Dn (ft)	=	7594.91
HGL Up (ft)	=	7602.30
Hw Elev (ft)	=	7602.64
Hw/D (ft)	=	0.46
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Monday, Mar 30 2026

CULVERT I5 100 YR

Invert Elev Dn (ft)	=	7592.54
Pipe Length (ft)	=	105.69
Slope (%)	=	8.05
Invert Elev Up (ft)	=	7601.05
Rise (in)	=	42.0
Shape	=	Circular
Span (in)	=	42.0
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

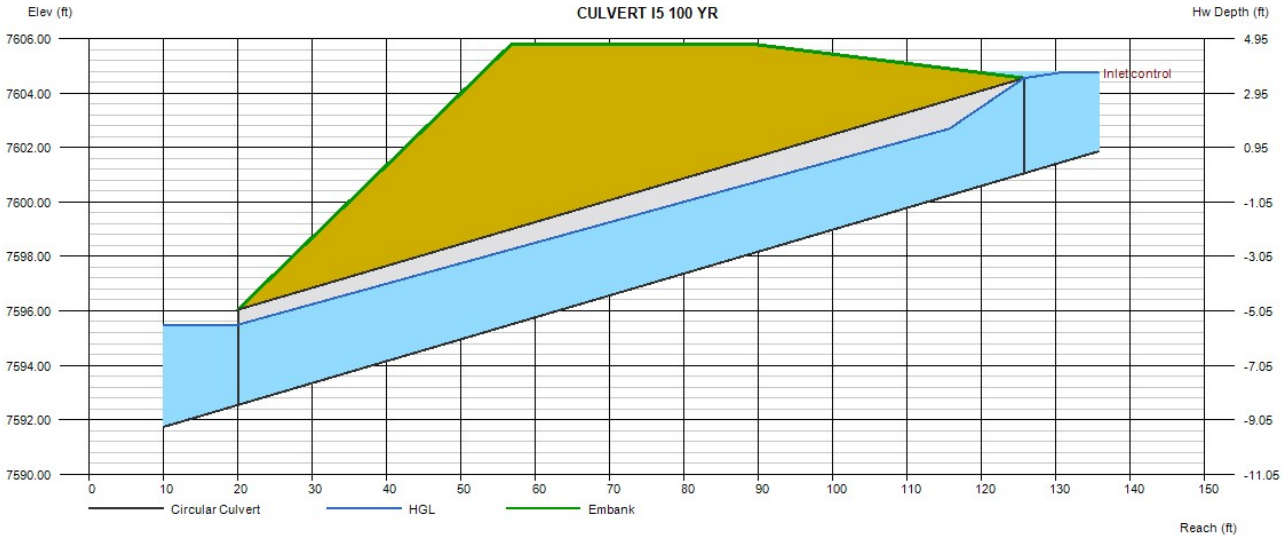
Top Elevation (ft)	=	7605.81
Top Width (ft)	=	32.00
Crest Width (ft)	=	0.00

Calculations

Qmin (cfs)	=	58.70
Qmax (cfs)	=	58.70
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	58.70
Qpipe (cfs)	=	58.70
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	6.79
Veloc Up (ft/s)	=	8.36
HGL Dn (ft)	=	7595.49
HGL Up (ft)	=	7603.45
Hw Elev (ft)	=	7604.76
Hw/D (ft)	=	1.06
Flow Regime	=	Inlet Control



HRGreen	FLYING HORSE NORTH FILING NO. 8	Calc'd by:	CMD
	211030	Checked by:	RDL
	CULVERT 1 RIPRAP	Date:	12/16/2025

Input Parameters		
Flow (Q)	12.1	cfs
Tailwater depth (Y_t)	0.60	ft
Conduit Diameter (D_c)	18	in
Expansion Factor (per Fig. 9-35)	3	
Soil Type	Non-Cohesive Soils	

Calculated Parameters		
Froude Parameter ($Q/D^{2.5}$)	4.39	
D_{50} =	5.46	in
UDFCD Riprap Type =	Type VL	
Design D_{50} =	6	in
Minimum Mantle Thickness =	12	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

HRGreen	FLYING HORSE NORTH FILING NO. 8	Calc'd by:	CMD
	211030	Checked by:	RDL
	CULVERT 2 RIPRAP	Date:	4/1/2026

Input Parameters		
Flow (Q)	70.2	cfs
Tailwater depth (Y_t)	1.40	ft
Conduit Diameter (D_c)	42	in
Expansion Factor (per Fig. 9-35)	4.5	
Soil Type	Non-Cohesive Soils	

Calculated Parameters		
Froude Parameter ($Q/D^{2.5}$)	3.06	
D_{50} =	8.89	in
UDFCD Riprap Type =	Type L	
Design D_{50} =	9	in
Minimum Mantle Thickness =	18	in
Minimum Length of Apron =	29.4	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

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. 8	Calc'd by:	CMD
	211030	Checked by:	RDL
	CULVERT 3 RIPRAP	Date:	12/16/2025

Input Parameters		
Flow (Q)	58.4	cfs
Tailwater depth (Y_t)	1.40	ft
Conduit Diameter (D_c)	42	in
Expansion Factor (per Fig. 9-35)	5	
Soil Type	Non-Cohesive Soils	

Calculated Parameters		
Froude Parameter ($Q/D^{2.5}$)	2.55	
D_{50} =	7.39	in
UDFCD Riprap Type =	Type L	
Design D_{50} =	9	in
Minimum Mantle Thickness =	18	in
Minimum Length of Apron =	24.2	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. 8	Calc'd by:	CMD
	211030	Checked by:	RDL
	CULVERT 4 RIPRAP	Date:	12/16/2025

Input Parameters		
Flow (Q)	61.6	cfs
Tailwater depth (Y_t)	1.20	ft
Conduit Diameter (D_c)	36	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} =	9.83	in
UDFCD Riprap Type =	Type M	
Design D_{50} =	12	in
Minimum Mantle Thickness =	24	in
Minimum Length of Apron =	41.8	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. 8	Calc'd by:	CMD
	211030	Checked by:	RDL
	CULVERT 5 RIPRAP	Date:	12/16/2025

Input Parameters		
Flow (Q)	3.5	cfs
Tailwater depth (Y_t)	0.60	ft
Conduit Diameter (D_c)	18	in
Expansion Factor (per Fig. 9-35)	6.5	
Soil Type	Non-Cohesive Soils	

Calculated Parameters		
Froude Parameter ($Q/D^{2.5}$)	1.27	
D_{50} =	1.58	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. 8	Calc'd by:	CMD
	211030	Checked by:	RDL
	(POND J OUTLET) RIPRAP	Date:	4/1/2026

Input Parameters		
Flow (Q)	197.9	cfs
Tailwater depth (Y_t)	2.00	ft
Conduit Diameter (D_c)	60	in
Expansion Factor (per Fig. 9-35)	5.75	
Soil Type	Non-Cohesive Soils	

Calculated Parameters		
Froude Parameter ($Q/D^{2.5}$)	4.00	
D_{50} =	14.67	in
UDFCD Riprap Type =	Type H	
Design D_{50} =	18	in
Minimum Mantle Thickness =	36	in
Minimum Length of Apron =	85.0	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

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. 8	Calc'd by:	CMD
	211030	Checked by:	RDL
	POND J SPILLWAY RIPRAP	Date:	12/16/2025

Input Parameters	
Q (cfs)	197.90
Spillway Width (ft)	100.00
q (cfs/ft)	1.98
S (ft/ft)	0.33
C_f	2
η	0

Calculated Parameters		
D_{50} =	8.30	in
UDFCD Riprap Type =	Type L	
Design D_{50} =	9	in
Minimum Mantle Thickness =	18	in

Calculated D_{50} for riprap was calculated using Equation 13-9 in the CCS DCM Vol 1.

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

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)

Note:

[1] Calculations follow criteria in the CCS DCM Vol. 1 Chapter 13

[2] Calculations assume buried soil riprap

HRGreen	FLYING HORSE NORTH FILING NO. 8	Calc'd by:	CMD
	211030	Checked by:	RDL
	CULVERT I4 RIPRAP	Date:	12/16/2025

Input Parameters		
Flow (Q)	7.4	cfs
Tailwater depth (Y_t)	0.60	ft
Conduit Diameter (D_c)	18	in
Expansion Factor (per Fig. 9-35)	4.9	
Soil Type	Non-Cohesive Soils	

Calculated Parameters		
Froude Parameter ($Q/D^{2.5}$)	2.69	
D_{50} =	3.34	in
UDFCD Riprap Type =	Type VL	
Design D_{50} =	6	in
Minimum Mantle Thickness =	12	in
Minimum Length of Apron =	4.7	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. 8	Calc'd by:	CMD
	211030	Checked by:	RDL
	CULVERT I5 RIPRAP	Date:	12/16/2025

Input Parameters		
Flow (Q)	58.7	cfs
Tailwater depth (Y_t)	1.40	ft
Conduit Diameter (D_c)	42	in
Expansion Factor (per Fig. 9-35)	5	
Soil Type	Non-Cohesive Soils	

Calculated Parameters		
Froude Parameter ($Q/D^{2.5}$)	2.56	
D_{50} =	7.43	in
UDFCD Riprap Type =	Type L	
Design D_{50} =	9	in
Minimum Mantle Thickness =	18	in
Minimum Length of Apron =	24.4	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

FROUDE NUMBER CALCULATIONS	CALCULATED BY:	EWB	DATE:	4/1/2026
PROJECT: 211030 FILING NO. 8	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
Channel Section HH	5.94	32.17	0.42	3.16	7.51	1.61
Channel Section II	5.22	32.17	0.54	13.44	25.12	1.26
Channel Section KK	6.18	32.17	1.44	32.74	22.66	0.91
Channel Section I1	4.97	32.17	0.37	11.81	31.74	1.44
Channel Section J1 (Left)	3.14	32.17	0.53	3.86	7.35	0.76
Channel Section J1 (Right)	3.14	32.17	0.53	3.86	7.35	0.76
Channel Section J5	5.39	32.17	0.52	23.46	45.28	1.32
Channel Section S1	4.77	32.17	0.26	4.27	16.45	1.65

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
Channel Section HH	63.43	0.55	0.049	1.71
Channel Section II	63.43	0.68	0.027	1.16
Channel Section KK	63.43	2.89	0.010	1.83
Channel Section I1	63.43	0.40	0.040	1.01
Channel Section J1 (Left)	63.43	1.05	0.010	0.67
Channel Section J1 (Right)	63.43	1.05	0.010	0.67
Channel Section J5	63.43	0.74	0.030	1.41
Channel Section S1	63.43	0.30	0.080	1.52

Channel Lining Determination						
Calculated Values			P300 Max Values			
Section	Shear Stress	Velocity	Shear Stress	Velocity	Lining Required	
Channel Section HH	1.71	5.94	3	9	P300	
Channel Section II	1.16	5.22	3	9	P300	
Channel Section KK	1.83	6.18	3	9	P300	
Channel Section I1	1.01	4.97	3	9	NONE	*USE GRASS
Channel Section J1 (Left)	0.67	3.14	3	9	NONE	*USE P300
Channel Section J1 (Right)	0.67	3.14	3	9	NONE	*USE P300
Channel Section J5	1.41	5.39	3	9	P300	
Channel Section S1	1.52	4.77	3	9	NONE	

Note: Permissible Shear Stress of 1.5lb/ft^2 and Permissible Velocity of 5ft/s assumed for existing channels (grassland)

Note: Permissible Shear Stress of 4lb/ft^2 and Permissible Velocity of 7ft/s assumed for Channel Section S1 (forested area - southwest)

HRGreen

APPENDIX D

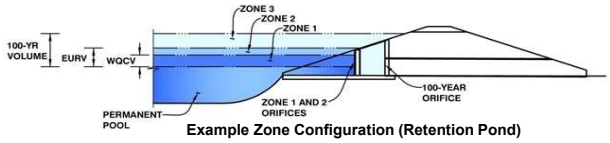
WATER QUALITY AND DETENTION CALCULATIONS

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.07 (June 2025)

Project: **Flying Horse North PUD Amendment**

Basin ID: **Pond J**



Example Zone Configuration (Retention Pond)

Watershed Information

Selected SCM Type =	**EDB**	
Watershed Area =	169.32	acres
Watershed Length =	3,525	ft
Watershed Length to Centroid =	1,822	ft
Watershed Slope =	0.050	ft/ft
Watershed Imperviousness =	9.39%	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) =	0.896	acre-feet	acre-feet
Excess Urban Runoff Volume (EURV) =	1.487	acre-feet	acre-feet
2-yr Runoff Volume (P1 = 0.92 in.) =	0.730	acre-feet	0.92 inches
5-yr Runoff Volume (P1 = 1.19 in.) =	1.827	acre-feet	1.19 inches
10-yr Runoff Volume (P1 = 1.44 in.) =	3.977	acre-feet	1.44 inches
25-yr Runoff Volume (P1 = 1.82 in.) =	10.192	acre-feet	1.82 inches
50-yr Runoff Volume (P1 = 2.14 in.) =	14.332	acre-feet	2.14 inches
100-yr Runoff Volume (P1 = 2.48 in.) =	20.051	acre-feet	2.48 inches
500-yr Runoff Volume (P1 = 3.37 in.) =	32.614	acre-feet	3.37 inches
Approximate 2-yr Detention Volume =	0.730	acre-feet	
Approximate 5-yr Detention Volume =	1.180	acre-feet	
Approximate 10-yr Detention Volume =	2.612	acre-feet	
Approximate 25-yr Detention Volume =	4.075	acre-feet	
Approximate 50-yr Detention Volume =	4.447	acre-feet	
Approximate 100-yr Detention Volume =	5.970	acre-feet	

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	0.896	acre-feet
Zone 2 Volume (EURV - Zone 1) =	0.591	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	4.483	acre-feet
Total Detention Basin Volume =	5.970	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)
7555.00 **Top of Micropool**	--	0.00	--	--	--	18	0.000		
7,555.50	--	0.50	--	--	--	662	0.015	170	0.004
7,556.00	--	1.00	--	--	--	3,233	0.074	1,144	0.026
7,556.50	--	1.50	--	--	--	8,047	0.185	3,964	0.091
7,557.00	--	2.00	--	--	--	14,991	0.344	9,723	0.223
7,557.50	--	2.50	--	--	--	24,656	0.566	19,635	0.451
7,558.00	--	3.00	--	--	--	36,409	0.836	34,901	0.801
7,558.50	--	3.50	--	--	--	50,317	1.155	56,583	1.299
7,559.00	--	4.00	--	--	--	65,616	1.506	85,566	1.964
7,559.50	--	4.50	--	--	--	81,528	1.872	122,352	2.809
7,560.00	--	5.00	--	--	--	97,123	2.230	167,014	3.834
7,560.50	--	5.50	--	--	--	110,939	2.547	219,030	5.028
7,561.00	--	6.00	--	--	--	123,153	2.827	277,553	6.372
7,561.50	--	6.50	--	--	--	131,842	3.027	341,302	7.835
7,562.00	--	7.00	--	--	--	137,871	3.165	408,730	9.383
7,562.50	--	7.50	--	--	--	142,645	3.275	478,859	10.993
7563.00	--	8.00	--	--	--	148,000	3.398	551,520	12.661
7563.50	--	8.50	--	--	--	154,000	3.535	627,020	14.394
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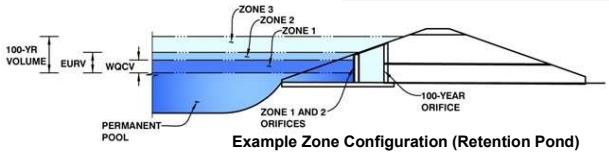
DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.07 (June 2025)

Project: **Flying Horse North PUD Amendment**

Basin ID: **Pond J**



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	3.11	0.896	Orifice Plate
Zone 2 (EURV)	3.66	0.591	Circular Orifice
Zone 3 (100-year)	5.86	4.483	Weir&Pipe (Restrict)
Total (all zones)		5.970	

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 =	N/A	ft^2
Depth at top of Zone using Orifice Plate =	3.50	ft (relative to basin bottom at Stage = 0 ft)	Elliptical Half-Width =	N/A	feet
Orifice Plate: Orifice Vertical Spacing =	N/A	inches	Elliptical Slot Centroid =	N/A	feet
Orifice Plate: Orifice Area per Row =	N/A	sq. inches	Elliptical Slot Area =	N/A	ft^2

Calculated Parameters for Plate

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

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	1.00	2.00					
Orifice Area (sq. inches)	3.14	1.48	1.48					

	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 =		N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Area =		N/A	ft^2
Depth at top of Zone using Vertical Orifice =		N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Centroid =		N/A	feet
Vertical Orifice Diameter =		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 =	4.00	N/A	ft (relative to basin bottom at Stage = 0 ft)	Height of Grate Upper Edge, H_t =	4.00	N/A	feet
Overflow Weir Front Edge Length =	25.00	N/A	feet	Overflow Weir Slope Length =	6.00	N/A	feet
Overflow Weir Grate Slope =	0.00	N/A	H:V	Grate Open Area / 100-yr Orifice Area =	6.20	N/A	
Horiz. Length of Weir Sides =	6.00	N/A	feet	Overflow Grate Open Area w/o Debris =	104.40	N/A	ft^2
Overflow Grate Type =	Type C Grate	N/A		Overflow Grate Open Area w/ Debris =	52.20	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 =	2.50	N/A	ft (distance below basin bottom at Stage = 0 ft)	Outlet Orifice Area =	16.84	N/A	ft^2
Outlet Pipe Diameter =	60.00	N/A	inches	Outlet Orifice Centroid =	2.18	N/A	feet
Restrictor Plate Height Above Pipe Invert =	48.00		inches	Half-Central Angle of Restrictor Plate on Pipe =	2.21	N/A	radians

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	6.50	ft (relative to basin bottom at Stage = 0 ft)	Spillway Design Flow Depth=	0.92	feet
Spillway Crest Length =	94.85	feet	Stage at Top of Freeboard =	8.42	feet
Spillway End Slopes =	4.00	H:V	Basin Area at Top of Freeboard =	3.51	acres
Freeboard above Max Water Surface =	1.00	feet	Basin Volume at Top of Freeboard =	14.11	acre-ft

Calculated Parameters for Spillway

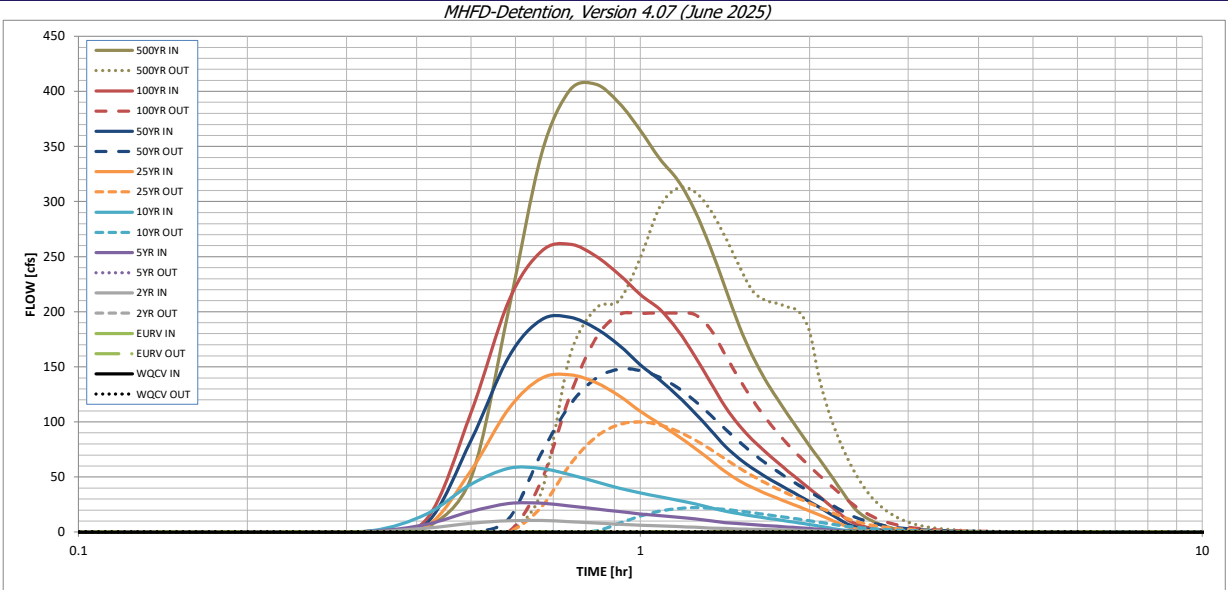
Routed Hydrograph Results

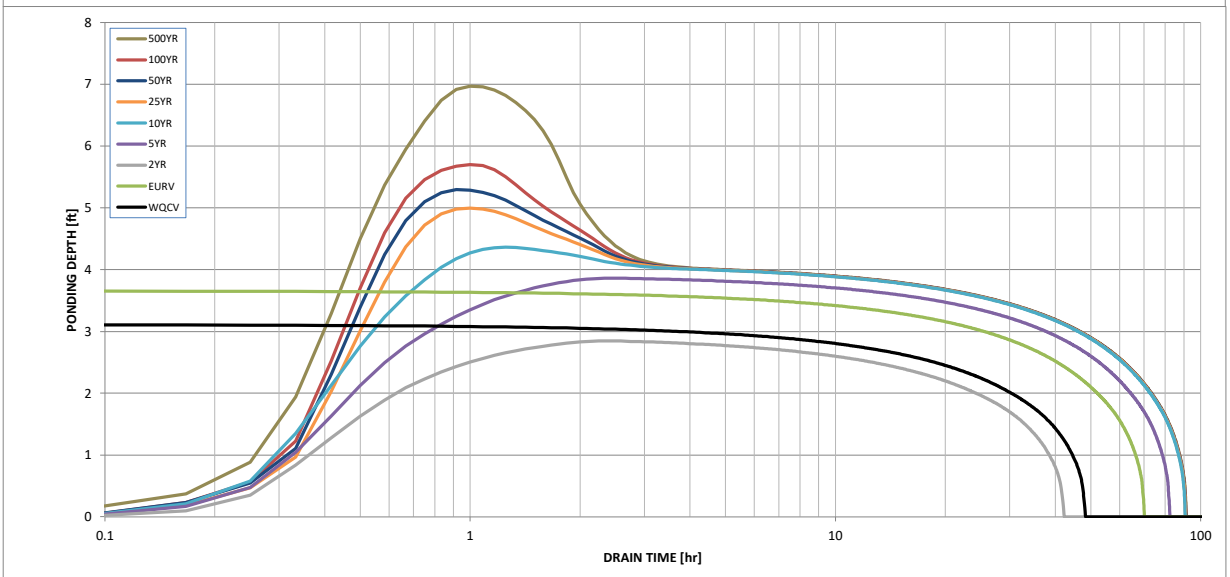
The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

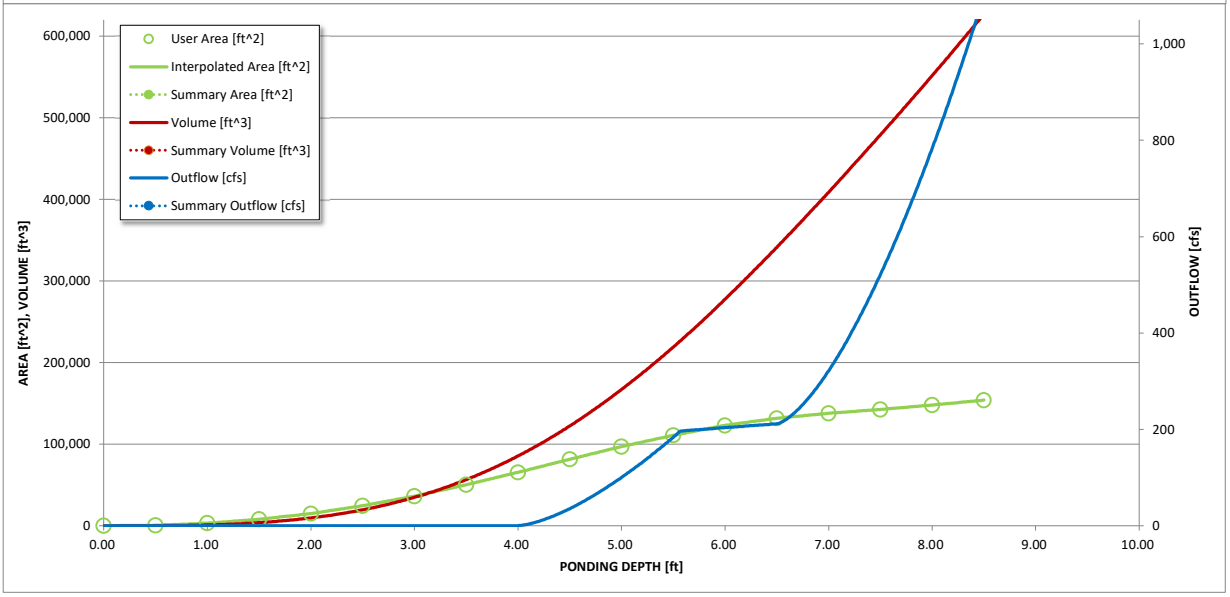
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	N/A	N/A	0.92	1.19	1.44	1.82	2.14	2.48	3.37
CUHP Runoff Volume (acre-ft) =	0.896	1.487	0.730	1.827	3.977	10.192	14.332	20.051	32.614
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	0.730	1.827	3.977	10.192	14.332	20.051	32.614
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	5.6	19.3	50.8	136.2	188.5	254.7	399.8
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.03	0.11	0.30	0.80	1.11	1.50	2.36
Peak Inflow Q (cfs) =	N/A	N/A	10.5	26.2	57.8	142.8	194.9	261.4	406.6
Peak Outflow Q (cfs) =	0.3	0.3	0.3	0.4	22.2	100.0	147.8	198.9	312.2
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.0	0.4	0.7	0.8	0.8	0.8
Structure Controlling Flow =	Plate	Plate	Plate	Plate	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Outlet Plate 1	Spillway
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	N/A	0.2	1.0	1.4	1.9	2.1
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) =	45	65	39	76	80	69	63	55	40
Time to Drain 99% of Inflow Volume (hours) =	**47**	68	41	80	86	81	78	75	68
Maximum Ponding Depth (ft) =	3.11	3.66	2.84	3.86	4.36	5.00	5.30	5.70	6.97
Area at Maximum Ponding Depth (acres) =	0.91	1.27	0.75	1.40	1.77	2.22	2.41	2.66	3.16
Maximum Volume Stored (acre-ft) =	0.897	1.493	0.674	1.746	2.554	3.812	4.507	5.549	9.288

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			

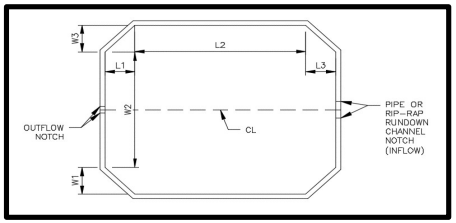
HR GREEN FOREBAY SIZING

PROJECT: FLYING HORSE NORTH FILING 8
DATE: 4/1/2026
DESIGNED BY: RDL
CHECKED BY: RDL
POND OR DP: POND J FOREBAY A

PIPE DIA. (FT) 2

	INNER DIMENSIONS		OUTER DIMENSIONS	
LENGTH				
L1	2	FT	2.83	FT
L2	8.000	FT	8.83	FT
L3	2	FT	2.83	FT
INNER L	12.00	FT	OUTER TOTAL L	13.666 FT
WIDTH				
W1	2	FT	2.83	FT
W2	4.00	FT (2*D)	4.83	FT
W3	2	FT	2.83	FT
INNER W	8.00	FT	OUTER TOTAL W	9.67 FT
BAFFLE	(W2 x 30.83' + 4' x 0.83')			
AREA	6.664	SF		

TRIANGLES	8	
RECTANGLE	32.0	
BAFFLE	6.664	
TOTAL SURFACE AREA	**33.3**	**SQ FT**



FOREBAY HT. **1.25** **FT**

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

Sub-Watershed Imperviousness	0.075	
Sub-Watershed Area	17.2	AC
Sub-Watershed WQCV	0.075	AC-FT
REQ'D VOL (1% SUB-WATERSHED WQCV)	0.001	AC-FT
(per UD-BMP calc)	33	CF
Notch Width per UD-BMP	0.9	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 8
DATE: 4/1/2026
DESIGNED BY: RDL
CHECKED BY: RDL
POND OR DP: POND J FOREBAY B

	INNER DIMENSIONS			OUTER DIMENSIONS	
LENGTH					
L1	5	FT		5.83	FT
L2	12.670	FT		13.50	FT
L3	5	FT		5.83	FT
INNER L	22.67	FT	OUTER TOTAL L	24.336	FT
WIDTH					
W1	5	FT		5.83	FT
W2	9.50	FT (75% of L2)		10.34	FT
W3	5	FT		5.83	FT
INNER W	19.50	FT	OUTER TOTAL W	21.17	FT
BAFFLE	(W2 x 30.83' + 4' x 0.83')				
AREA	11.24758	SF			

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:

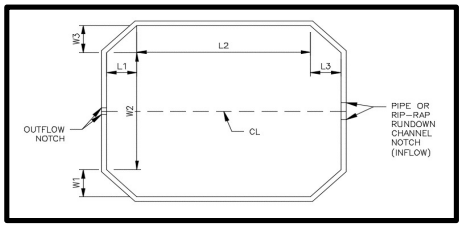
w = width of the rectangular vertical notch (inches)

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)

TRIANGLES	50	
RECTANGLE	120.4	
BAFFLE	11.2475825	
TOTAL SURFACE AREA	**159.1**	**SQ FT**



FOREBAY HT.	**2.5**	**FT**		
FOREBAY VOLUME	**398**	**CF**	SUFFICIENT VOLUME?	**YES**
	14.7	**CY**		
	0.009	**AC-FT**		

Sub-Watershed Imperviousness	0.098	
Sub-Watershed Area	90.14	AC
Sub-Watershed WQCV	0.495	AC-FT
REQ'D VOL (1% SUB-WATERSHED WQCV)	0.005	AC-FT
(per UD-BMP calc)	216	CF
Notch Width per UD-BMP	3.1	in

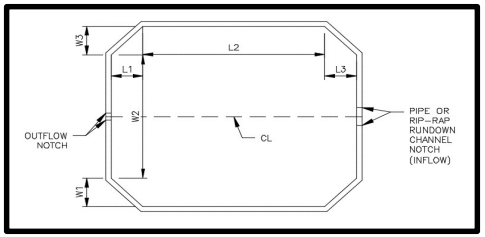
*t = 5 mins

HR GREEN FOREBAY SIZING

PROJECT: FLYING HORSE NORTH FILING 8
DATE: 4/1/2026
DESIGNED BY: RDL
CHECKED BY: RDL
POND OR DP: POND J FOREBAY C

	INNER DIMENSIONS			OUTER DIMENSIONS	
LENGTH					
L1	5	FT		5.83	FT
L2	13.000	FT		13.83	FT
L3	5	FT		5.83	FT
INNER L	23.00	FT	OUTER TOTAL L	24.666	FT
WIDTH					
W1	5	FT		5.83	FT
W2	9.75	FT (75% of L2)		10.58	FT
W3	5	FT		5.83	FT
INNER W	19.75	FT	OUTER TOTAL W	21.42	FT
BAFFLE	(W2 x 30.83' + 4' x 0.83')				
AREA	11.45375	SF			

TRIANGLES	50	
RECTANGLE	126.8	
BAFFLE	11.45375	
TOTAL SURFACE AREA	**165.3**	**SQ FT**



FOREBAY HT.	**2.5**	**FT**		
FOREBAY VOLUME	**413**	**CF**	SUFFICIENT VOLUME?	**YES**
	15.3	**CY**		
	0.009	**AC-FT**		

REQ'D VOL (1% WQCV)	0.009	AC-FT
(per UD-BMP calc)	402	CF
Notch Width per UD-BMP	3.2	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)

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.
7555.5	653								
7556.0	3001		842		842	0.019			
7557.0	16859		8,991		9,833	0.226			
7558.0	40406		27,788		37,622	0.864	47,449	1.0893	7,558.18
7559.0	71698		55,309		92,931	2.133	142,348	3.2679	7,559.56
7560.0	106874		88,703		181,634	4.170			
7561.0	133113		119,754		301,388	6.919			
7562.0	144613		138,823		440,211	10.106			
7563.0	151390		147,989		588,199	13.503			
7564.0									
7565.0									
7566.0									
7567.0									
7568.0									
7569.0									
7570.0									
7571.0									
7572.0									
7573.0									
7574.0									
7575.0									
7576.0									

COLUMN 1	COLUMN 2	CENTROID EL.
ORIFICE 1-1	ORIFICE 1-2	7,558.18
ORIFICE 2-1	ORIFICE 2-2	7,558.51
ORIFICE 3-1	ORIFICE 3-2	7,558.84
ORIFICE 4-1	ORIFICE 4-2	7,559.17
ORIFICE 5-1	ORIFICE 5-2	7,559.50

SED Basin riser pipe orifice calculations				
A_0 =	area per row of orifices spaved on 4" centers (in^2)			
V=	3.2679	design volume (acre feet)	*<15 ac.	
T_D=	72	time to drain the prescribed colume (hrs) (Typically 72 hours for EURV)		
H=	1.379	depth of volume (ft)		
S=	0.0001	Trickel channel slope (ft/ft) [Use 0.0001 for flat slope]		
		S=0%		
A_0 =	7.9361 in^2	7.9127 in^2		
Dia	3.17 in	*EXCEEDS 1", USE TWO COLUMNS @ A0 =		3.96
	3.17	Dia=/2	D=	1.59 in
	6.35	Dia=/4	use	1.50 in
	12.70	Dia=/8		
	25.39	Dia=/16		
	50.79	Dia=/32		

SEDIMENT VOLUME CALCULATIONS				
Disturbed area-acres	26.38	Acres		
Undisturbed area-acres	142.22	Acres		
Total Area-acres	168.60	Acres		
Sediment volume	142,348	cu-ft	3.2679	Acres-ft
Volume below lowest hole	47,449	cu-ft	1.0893	Acres-ft
Volume above lowest hole	142,348	cu-ft	3.2679	Acres-ft
Total Volume	189,749	cu-ft	4.3560	Acres-ft

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

Sediment Volume Calculation - MHFD Volume 3, Detail SC-7

Basin Storage Volume: Provide a storage volume of at least 3,600 cubic feet per acre of drainage area. To the extent practical, undisturbed and/or off-site areas should be diverted around sediment basins to prevent "clean" runoff from mixing with runoff from disturbed areas. For undisturbed areas (both on-site and off-site) that cannot be diverted around the sediment basin, provide a minimum of 500 ft^3/acre of storage for undeveloped (but stable) off-site areas in addition to the 3,600 ft^3/acre for disturbed areas. For stable, developed areas that cannot be diverted around the sediment basin, storage volume requirements are summarized in Table SB-1.

MHFD Orifice Sizing Techincal Memorandum

$$A_O = \frac{88 Vol^{(0.95/H^{0.085})}}{T_D S^{0.09} H^{2.6(S^{0.3})}}$$ *Equation 9*

Where:

- A_O is the required orifice area per row in square inches,
- S is slope in feet vertical / feet horizontal (substitute 0.0001 for zero),
- Vol is the storage volume in acre-feet,
- T_D is the prescribed drain time in hours, and
- H is the storage depth at the outlet above the lowest orifice, in feet.

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
7587.0	3415								
7588.0	4626		4,005		4,005	0.092	7,770	0.1784	7,588.71
7589.0	5998		5,297		9,302	0.214			
7590.0	7530		6,749		16,052	0.369	23,310	0.5351	7,590.87
7591.0	9222		8,362		24,414	0.560			
7592.0	11075		10,134		34,548	0.793			
7593.0									
7594.0									
7595.0									
7596.0									
7597.0									
7376.5									
7377.0									
7378.0									
7379.0									
7380.0									
7381.0									
7382.0									
7383.0									
7384.0									
7385.0									
7386.0									

COLUMN 1	COLUMN 2	CENTROID EL.
ORIFICE 1-1	ORIFICE 1-2	7,588.71
ORIFICE 2-1	ORIFICE 2-2	7,589.04
ORIFICE 3-1	ORIFICE 3-2	7,589.37
ORIFICE 3-1	ORIFICE 3-2	7,589.70

SED Basin riser pipe orifice calculations					
A_0 =	area per row of orifices spaved on 4" centers (in^2)				
V=	0.5351	design volume (acre feet)	*<15 ac.		
T_D=	72	time to drain the prescribed colume (hrs) (Typically 72 hours for EURV)			
H=	2.157	depth of volume (ft)			
S=	0.0001	Trickel channel slope (ft/ft) [Use 0.0001 for flat slope]			
		S=0%			
A_0 =	1.4149	in^2	**1.4108**	**in^2**	
Dia	1.34	in	***EXCEEDS 1", USE TWO COLUMNS @ A_0 =**	**0.71**	**in^2**
	1.90	Dia=/2	**D=**	**0.95**	**in**
	3.79	Dia=/4	**use**	**15/16**	**in**
	7.58	Dia=/8			
	15.16	Dia=/16			
	30.33	Dia=/32			

SEDIMENT VOLUME CALCULATIONS				
Disturbed area-acres	4.80	Acres		
Undisturbed area-acres	20.70	Acres		
Total Area-acres	25.50	Acres		
Sediment volume	23,310	cu-ft	0.5351	Acres-ft
Volume below lowest hole	7,770	cu-ft	0.1784	Acres-ft
Volume above lowest hole	23,310	cu-ft	0.5351	Acres-ft
Total Volume	31,072	cu-ft	0.7133	Acres-ft

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

Sediment Volume Calculation - MHFD Volume 3, Detail SC-7

Basin Storage Volume: Provide a storage volume of at least 3,600 cubic feet per acre of drainage area. To the extent practical, undisturbed and/or off-site areas should be diverted around sediment basins to prevent "clean" runoff from mixing with runoff from disturbed areas. For undisturbed areas (both on-site and off-site) that cannot be diverted around the sediment basin, provide a minimum of 500 ft^3/acre of storage for undeveloped (but stable) off-site areas in addition to the 3,600 ft^3/acre for disturbed areas. For stable, developed areas that cannot be diverted around the sediment basin, storage volume requirements are summarized in Table SB-1.

MHFD Orifice Sizing Techincal Memorandum

$$A_O = \frac{88 Vol^{(0.95/H^{0.085})}}{T_D S^{0.09} H^{2.6(S^{0.3})}}$$ *Equation 9*

Where:

- A_O is the required orifice area per row in square inches,
- S is slope in feet vertical / feet horizontal (substitute 0.0001 for zero),
- Vol is the storage volume in acre-feet,
- T_D is the prescribed drain time in hours, and
- H is the storage depth at the outlet above the lowest orifice, in feet.

BMP FEATURE	TOTAL TRIBUTARY AREA (AC)	DISTURBED AREA (AC)	UNDISTURBED AREA (AC)	BOTTOM SIZE (FT)	SEDIMENT VOLUME (AC-FT)	BASIN VOLUME (AC-FT)	BOTTOM ELEVATION	CREST ELEVATION	CREST, WxL (FT)	TOP OF POND ELEVATION	LOWEST ORIFICE ELEVATION	TOTAL AREA OF ORIFICES (SQ IN)	# OF ORIFICE COLUMNS	DIA. OF ORIFICES (IN)	RISER PIPE INVERT	DAYLIGHT ELEVATION	OUTLET PIPE LENGTH (FT)	OUTLET PIPE SLOPE
SB-A	168.6	26.4	142.2	76' x 26'	3.27	13.50	7555.50	7560.93	80' x 102'	7563.00	7558.18	7.91	2	1.50	7556.93	7550.00	102	6.8%
SB-B	25.5	4.8	20.7	60' x 40'	0.54	0.56	7587.00	7590.00	30' x 40'	7591.00	7589.37	1.41	2	15/16	7588.12	7586.00	62	3.4%

*ORIFICES TO BE EVERY 4" FROM LOWEST ORIFICE ELEVATION TO THE TOP OF RISER PIPE, TOTAL NUMBER OF ORIFICES VARY.

HRGreen

APPENDIX E

REFERENCE MATERIALS

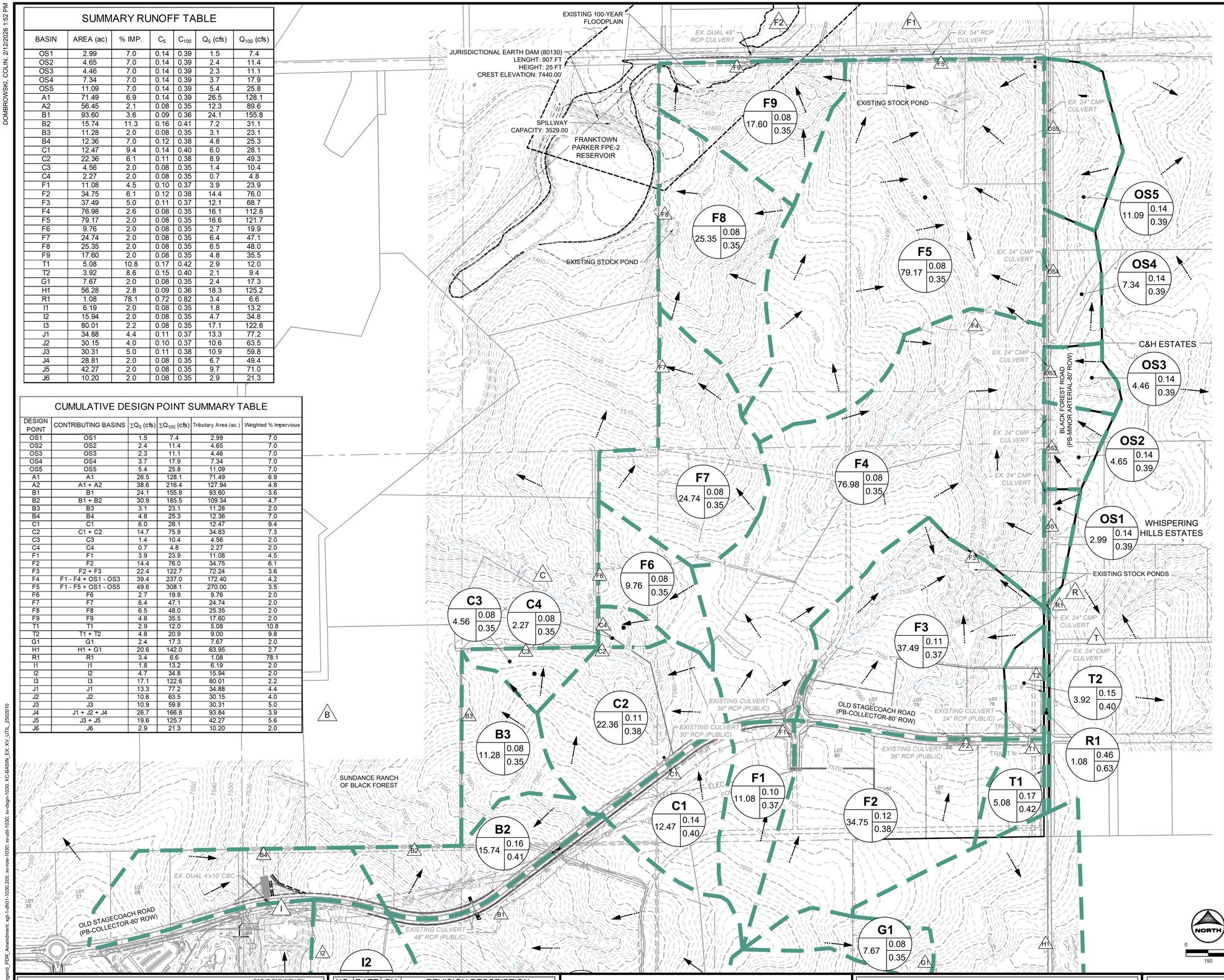
DOMBROWSKI, COLIN, 2/12/2026 1:52 PM

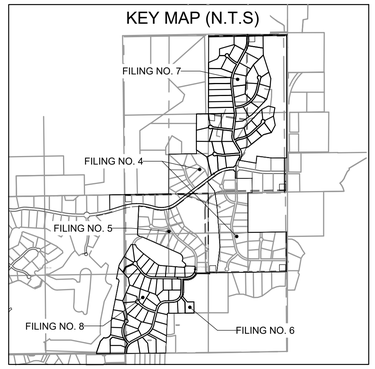
SUMMARY RUNOFF TABLE

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
A1	71.49	6.9	0.14	0.39	26.5	128.1
A2	56.45	2.1	0.08	0.35	12.3	89.6
B1	93.60	3.6	0.09	0.36	24.1	155.8
B2	15.74	11.3	0.16	0.41	7.2	31.1
B3	11.28	2.0	0.08	0.35	3.1	23.1
B4	12.36	7.0	0.12	0.38	4.8	25.3
C1	12.47	9.4	0.14	0.40	6.0	28.1
C2	22.36	6.1	0.11	0.38	8.9	49.3
C3	4.56	2.0	0.08	0.35	1.4	10.4
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
G1	7.67	2.0	0.08	0.35	2.4	17.3
H1	56.28	2.8	0.09	0.36	18.3	125.2
R1	1.08	78.1	0.72	0.82	3.4	6.6
I1	6.19	2.0	0.08	0.35	1.8	13.2
I2	15.94	2.0	0.08	0.35	4.7	34.8
I3	80.01	2.2	0.08	0.35	17.1	122.6
J1	34.88	4.4	0.11	0.37	13.3	77.2
J2	30.15	4.0	0.10	0.37	10.6	63.5
J3	30.31	5.0	0.11	0.38	10.9	59.8
J4	28.81	2.0	0.08	0.35	6.7	49.4
J5	42.27	2.0	0.08	0.35	9.7	71.0
J6	10.20	2.0	0.08	0.35	2.9	21.3

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	2.99	7.0
OS2	OS2	2.4	11.4	4.65	7.0
OS3	OS3	2.3	11.1	4.46	7.0
OS4	OS4	3.7	17.9	7.34	7.0
OS5	OS5	5.4	25.8	11.09	7.0
A1	A1	26.5	128.1	71.49	6.9
A2	A1 + A2	38.6	216.4	127.94	4.8
B1	B1	24.1	155.8	93.60	3.6
B2	B1 + B2	30.9	185.5	109.34	4.7
B3	B3	3.1	23.1	11.28	2.0
B4	B4	4.8	25.3	12.36	7.0
C1	C1	6.0	28.1	12.47	9.4
C2	C1 + C2	14.7	75.9	34.83	7.3
C3	C3	1.4	10.4	4.56	2.0
C4	C4	0.7	4.8	2.27	2.0
F1	F1	3.9	23.9	11.08	4.5
F2	F2	14.4	76.0	34.75	6.1
F3	F2 + F3	22.4	122.7	72.24	3.6
F4	F1 - F4 + OS1 - OS3	39.4	237.0	172.40	4.2
F5	F1 - F5 + OS1 - OS5	49.6	308.1	270.00	3.5
F6	F6	2.7	19.9	9.76	2.0
F7	F7	6.4	47.1	24.74	2.0
F8	F8	6.5	48.0	25.35	2.0
F9	F9	4.8	35.5	17.60	2.0
T1	T1	2.9	12.0	5.08	10.8
T2	T1 + T2	4.8	20.9	9.00	9.8
G1	G1	2.4	17.3	7.67	2.0
H1	H1 + G1	20.6	142.0	63.95	2.7
R1	R1	3.4	6.6	1.08	78.1
I1	I1	1.8	13.2	6.19	2.0
I2	I2	4.7	34.8	15.94	2.0
I3	I3	17.1	122.6	80.01	2.2
J1	J1	13.3	77.2	34.88	4.4
J2	J2	10.6	63.5	30.15	4.0
J3	J3	10.9	59.8	30.31	5.0
J4	J1 + J2 + J4	26.7	166.8	93.84	3.9
J5	J3 + J5	19.6	125.7	42.27	5.6
J6	J6	2.9	21.3	10.20	2.0





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. 6 PARCEL BOUNDARY
- FILING NO. 7 PARCEL BOUNDARY
- FILING NO. 8 PARCEL BOUNDARY
- FLOW DIRECTION
- DRAINAGE BASIN
- EXISTING DRAINAGE BASIN
- DESIGN POINT
- SWALE CROSS SECTION
- BASIN LABEL

A1 — BASIN DESIGNATION
AREA (AC.) 1.00 | 0.40 MINOR 5-YR RUNOFF COEF. | 0.60 MAJOR 100-YR RUNOFF COEF.

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- SEPARATE PERVIOUS AREA (SPA) TOTAL AREA = 2.30 ACRES

PCD FILE NO.: SF2422

DRAWN BY: TMM | JOB DATE: 10/30/2024
APPROVED: RHL | JOB NUMBER: 210742
CAD DATE: 2/12/2026
CAD FILE: J:\2021\211030\CAD\Dwgs\C\Drainage\PDR Amendment\FHN PDR_Existing

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 160
COLORADO SPRINGS, CO 80920
PHONE: 719.300.4140
FAX: 713.965.0044

FLYING HORSE NORTH PDR AMENDMENT
PRI #2, LLC.
EL PASO COUNTY, CO

PRELIMINARY DRAINAGE REPORT - AMENDMENT
EXISTING CONDITIONS HYDROLOGY MAP

SHEET DR | 1

HR GREEN Xrefs: Legend_PDR_Amendment; xg/1-dh01-1030.205; xv-row-1030; xv-auth-1030; xv-dsgn-1030; XC-BASIN_EX; XV_UTIL_2502010

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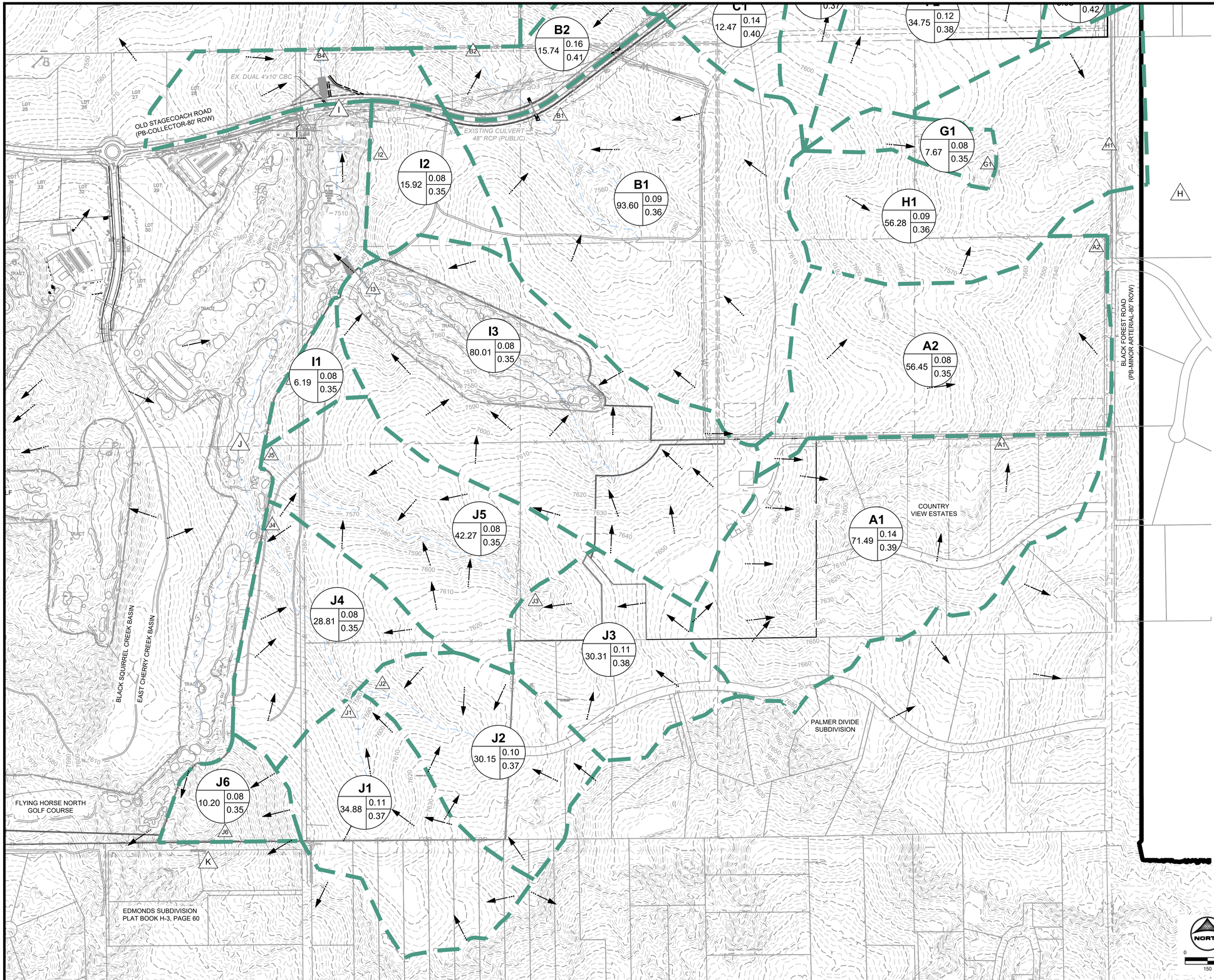

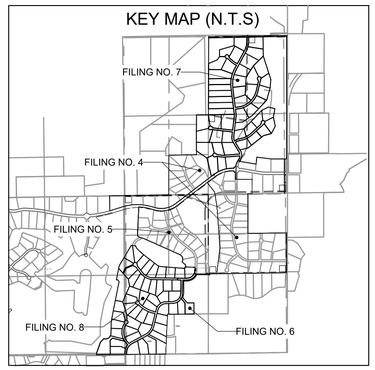

LEGEND:

- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PROPOSED STORM SEWER
- EXISTING STORM SEWER
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NORTH
0 300
150

PCD FILE NO.: SF2422

DRAWN BY:	YOU	JOB DATE:	10/30/2024
APPROVED:	KEN	JOB NUMBER:	210742
CAD DATE:	2/12/2026		
CAD FILE:	J:\2021\211030\CAD\Dwgs\C\Drainage\PDR Amendment\FHN PDR_Existing		

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HRGreen
HR GREEN - COLORADO SPRINGS
1975 RESEARCH PARKWAY SUITE 160
COLORADO SPRINGS, CO 80920
PHONE: 719.300.4140
FAX: 713.965.0044

FLYING HORSE NORTH PDR AMENDMENT
PRI #2, LLC.
EL PASO COUNTY, CO

PRELIMINARY DRAINAGE REPORT - AMENDMENT
EXISTING CONDITIONS HYDROLOGY MAP

SHEET DR 1

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DOMBROWSKI, COLIN, 2/12/2026 1:54 PM

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FLYING HORSE NORTH FILING NO.1 REFERENCE FINAL DRAINAGE REPORT (SF-18-001)

FLYING HORSE NORTH FILING NO.4 REFERENCE FINAL DRAINAGE REPORT (SF2422)

FLYING HORSE NORTH FILING NO.5 REFERENCE FINAL DRAINAGE REPORT (SF2427)

FLYING HORSE FOUNDATION REFERENCE FINAL DRAINAGE REPORT (PPR258)

FLYING HORSE NORTH FILING NO. 4 BOUNDARY

FLYING HORSE NORTH FILING NO. 5 BOUNDARY

FLYING HORSE NORTH FILING NO. 7 BOUNDARY

DRAINAGE ESMT

MAINTENANCE PATH

ROCK CHUTE

POND B OUTLET
60" RCP (DISTRICT)

DISTRICT POND B

EX. DUAL 4'x10' CBC

OLD STAGECOACH ROAD (PB-COLLECTOR-80' ROW)

SWO OUTLET

SPILLWAY OUTLET

FLYING HORSE NORTH IRRIGATION RESERVOIR (POND 13) (SF-18-001)

CULVERT 3
24" RCP (PUBLIC)

CULVERT 4
18" RCP (DISTRICT)

20.00' DRAINAGE ESMT

CULVERT 2
18" RCP (PUBLIC)

CULVERT 9
18" RCP (PUBLIC)

CULVERT 8
18" RCP (PUBLIC)

CULVERT 13
48" RCP (PUBLIC)

DRAINAGE ESMT
(WIDTH VARIES, SEE PLAT)

KEYING ANT I.20

ROUGH TRAIL

SANDBAGGER DRIVE

CULVERT 1
24" RCP (PUBLIC)

20.00' DRAINAGE ESMT

ALLEN RANCH ROAD

FLYING HORSE NORTH GOLF COURSE

CULVERT J6
18" RCP (DISTRICT)

DRAINAGE ESMT

STREET SECTION J1

CULVERT I5
42" RCP (PUBLIC)

CULVERT I4
18" RCP (PUBLIC)

SANDBAGGER DRIVE

PR. 60.00' PUB. DRAINAGE ESMT

DISTRICT POND J

TRACT A

PAR COURT

CULVERT J5
18" RCP (DISTRICT)

CULVERT J3
42" RCP (PUBLIC)

PR. 50.00' PUB. DRAINAGE ESMT

CULVERT J4
18" RCP (DISTRICT)

WEDGE TRAIL

STREET SECTION J2

PR. 40.00' PUB. DRAINAGE ESMT

CULVERT J2
42" RCP (PUBLIC)

HOLMES ROAD

CULVERT J1
36" RCP (PUBLIC)

CULVERT J7
18" RCP (PUBLIC)

BLACK SQUIRREL CREEK BASIN

EAST CHERRY CREEK BASIN

EDMONDS SUBDIVISION
PLAT BOOK H-3, PAGE 60

EX. HOLMES ROAD

PALMER DIVIDE RECEPTION NO. 205084216

COUNTRY VIEW ESTATES

GIMME WAY

60.00' R.O.W.

CULVERT 6
18" RCP (PUBLIC)

CULVERT 5
18" RCP (PUBLIC)

RUBBLE DRIVE (PB-LOCAL RURAL-80' ROW)

25.00' DRAINAGE ESMT

DRAINAGE ESMT

POND A OUTLET PIPE
54" RCP (DISTRICT)

DISTRICT POND A

CULVERT 11
42" RCP (PUBLIC)

CULVERT 4
24" RCP (PUBLIC)

CULVERT 3
18" RCP (PUBLIC)

BUNKER TRAIL

CULVERT 12
48" RCP (DISTRICT)

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

STABLEFORD TERRACE

CULVERT 2
60" RCP (PUBLIC)

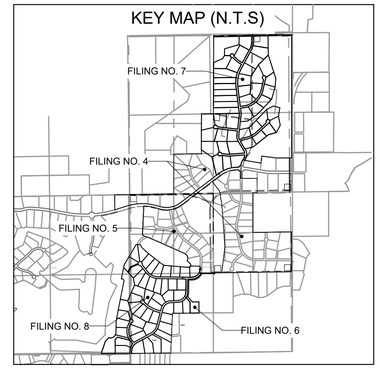
CULVERT 1
18" RCP (PUBLIC)

EX. 18" CULVERT

70.00' DRAINAGE ESMT

B6	21.71	0.17	0.42
B4	11.00	0.21	0.45
B1	57.79	0.10	0.36
B3	1.10	0.36	0.56
B2.3	2.61	0.17	0.42
I2	15.87	0.17	0.42
I1	1.02	0.17	0.42
I3	9.51	0.17	0.42
B2.2	2.80	0.17	0.42
B2.1	6.72	0.17	0.42
B2.4	25.16	0.17	0.42
I6	1.69	0.17	0.42
I8	6.00	0.17	0.42
I7	18.87	0.17	0.42
J6	3.25	0.17	0.42
J8	6.79	0.17	0.42
J7	69.80	0.17	0.42
I4	2.94	0.17	0.42
I5	20.41	0.18	0.42
J5	1.53	0.17	0.42
J4	2.45	0.17	0.42
J3	34.58	0.14	0.40
J2	25.08	0.15	0.41
J9	10.23	0.17	0.42
J1	25.49	0.15	0.40
C1	15.94	0.16	0.41
F1	12.18	0.17	0.42
F2	30.64	0.17	0.42
T1	5.08	0.17	0.42
G1	2.55	0.17	0.42
G2	4.42	0.08	0.35
H3	36.81	0.08	0.35
H1	5.20	0.17	0.42
H2	14.46	0.17	0.42
A7	8.11	0.11	0.37
A2	10.79	0.17	0.42
A5	6.10	0.16	0.41
A6	2.76	0.16	0.41
A1	9.05	0.17	0.42
A4	19.18	0.17	0.42
A3	71.36	0.14	0.39

KEY MAP (N.T.S)



LEGEND:

- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PROPOSED STORM SEWER
- EXISTING STORM SEWER
- EXISTING DRAINAGE SWALE
- PROPOSED DRAINAGE SWALE
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- FILING NO. 4 PARCEL BOUNDARY
- FILING NO. 5 PARCEL BOUNDARY
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NORTH
0 300
150

PCD FILE NO.: SF2422

DRAWN BY:	CMD	JOB DATE:	10/30/2024
APPROVED:	RDL	JOB NUMBER:	210742
CAD DATE:	2/12/2026		
CAD FILE:	J:\2021\211030\CAD\Dwgs\C\Drainage\PDR Amendment\FHN PDR_Proposed		

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HR GREEN - COLORADO SPRINGS
1975 RESEARCH PARKWAY SUITE 160
COLORADO SPRINGS, CO 80920
PHONE: 719.300.4140
FAX: 713.965.0044

FLYING HORSE NORTH PDR AMENDMENT
PRI #2, LLC.
EL PASO COUNTY, CO

PRELIMINARY DRAINAGE REPORT - AMENDMENT

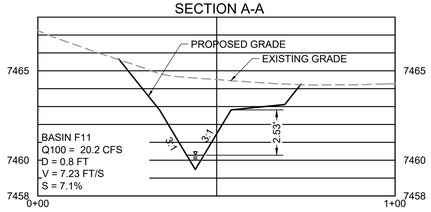
DEVELOPED CONDITIONS HYDROLOGY MAP

SHEET DR 4

DOMBROWSKI, COLIN, 2/12/2026 1:54 PM

HR GREEN Xrefs: Legend_PDR_Amendment; xgl-t-dh01-1030;205; XC-BASIN; xv-row-1030; xv-ulk-1030; xv-dsgn-1030; xc-row-030;240; xc-row-030;250; xc-row-030;260; xc-row-030;270; xc-dsgn-240; xc-dsgn-250; xc-dsgn-260; xc-dsgn-270; XC_DSGN_2502010; XC_ROW_2502010; xc-dsgn-030;202; xc-row-030;202; xc-row-030;290-Trisha; xc-dsgn-260-Trisha

SECTION A-A



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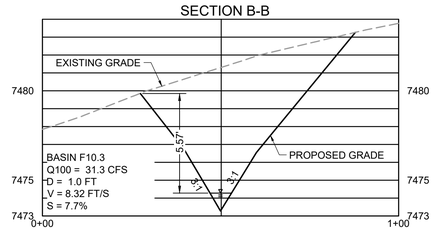

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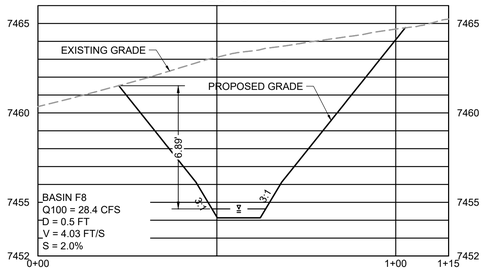

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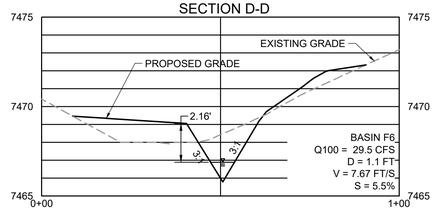

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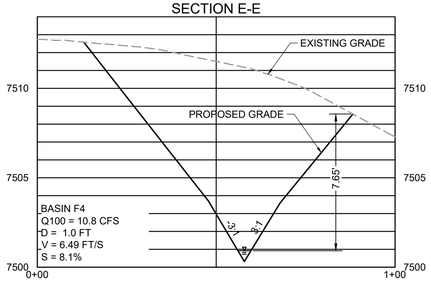

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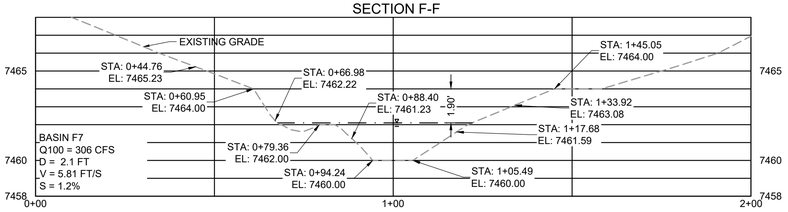

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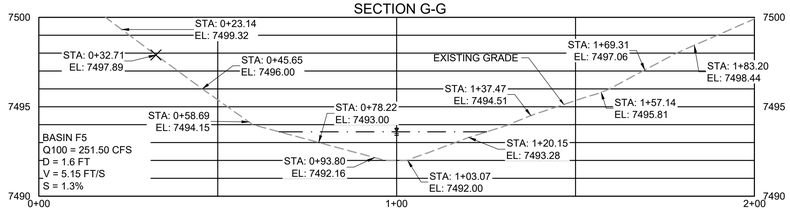

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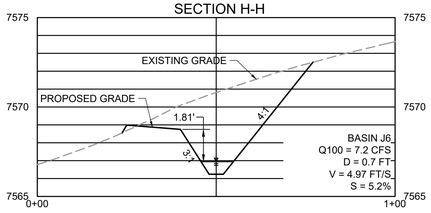
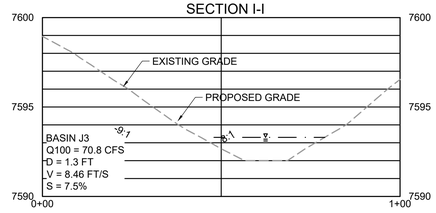


SECTION I-I



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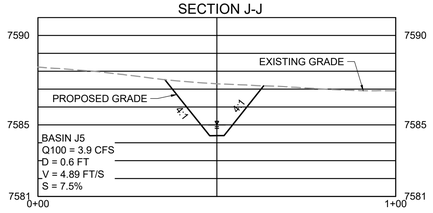
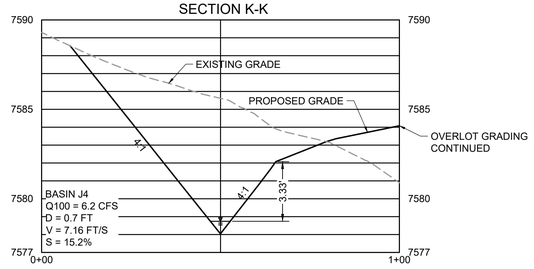
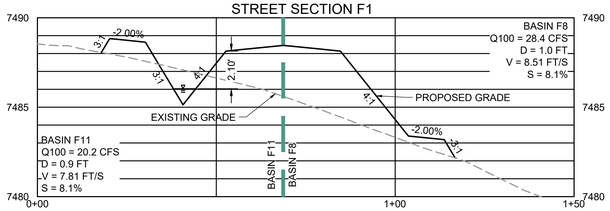


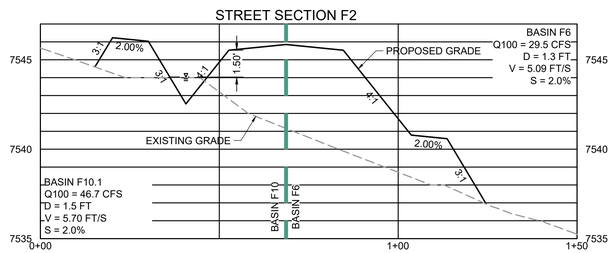
SECTION K-K



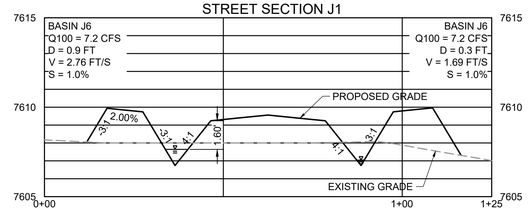
STREET SECTION F1



STREET SECTION F2



STREET SECTION J1



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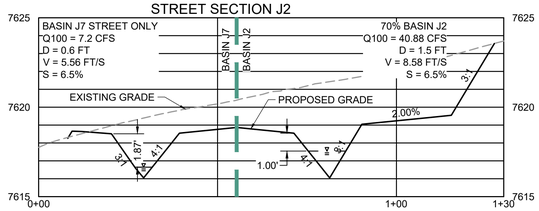

0 4
2
VERTICAL SCALE

0 20
10
HORIZONTAL SCALE

PCD FILE NO.: SF2422

DRAWN BY:	CMD	JOB DATE:	10/30/2024
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IF NOT ONE INCH, ADJUST SCALE ACCORDINGLY.

NO.	DATE	BY	REVISION DESCRIPTION

HRGreen
HR GREEN - COLORADO SPRINGS
1975 RESEARCH PARKWAY SUITE 160
COLORADO SPRINGS, CO 80920
PHONE: 719.300.4140
FAX: 713.965.0044

FLYING HORSE NORTH PDR AMENDMENT
PRI #2, LLC.
EL PASO COUNTY, CO

PRELIMINARY DRAINAGE REPORT - AMENDMENT
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INNOVATIVE DESIGN. CLASSIC RESULTS.

PRELIMINARY DRAINAGE REPORT
FOR
FLYING HORSE NORTH PRELIMINARY PLAN
AND
FINAL DRAINAGE REPORT
FOR
FLYING HORSE NORTH FILING NO. 1

NOVEMBER 2017
Revised June 2018

Prepared for:
PRI #2 LLC
6385 CORPORATE DRIVE SUITE 200
COLORADO SPRINGS CO 80919
(719) 592-9333

Prepared by:
CLASSIC CONSULTING ENGINEERS & SURVEYORS
619 N. CASCADE AVE SUITE 200
COLORADO SPRINGS CO 80903
(719) 785-0790

Job no. 1096.11
PCD File No. SP-17-012 and SF-18-001

PURPOSE

The purpose of this Drainage Report is two-fold: first to identify major drainage corridors within this area and recommend preliminary facilities based on the Preliminary Plan layout and secondly to provide specific final design for the necessary facilities within the Filing No. 1 Final Plat area. These proposed facilities will route all developed storm water runoff to adequate outfall facilities. The drainage improvements proposed in this report that are outside of Filing No. 1 are preliminary in nature and future final drainage reports will be required for these areas. The Filing No. 1 design area within the proposed golf course includes the design of a jurisdictional dam facility. This specific facility design is handled in a separate report and submittal package reviewed and approved by the Colorado Dam Safety Board. However, El Paso County Engineering Staff will have the opportunity to review and approved specific aspects of the facility as well.

GENERAL DESCRIPTION

Flying Horse North is a 1,418 acre site located in all of section 36, township 11 south, range 66 west of the sixth principal meridian, and a portion of sections 30 and 31 township 11 south, range 65 west of the sixth principal meridian. The site is bounded on the north by Hodgen Road and the High Forest Ranch Community, to the south by the Cathedral Pines Subdivision and unplatted county land, to the east by Black Forest Road, and to the west by the State Highway 83 and unplatted county land. The site stretches across 2 existing drainage basins, the Black Squirrel Creek Drainage Basin and East Cherry Creek Drainage Basin. Large lot single family residential and a golf course with a club house are included in the proposed Preliminary Plan for this site. A site specific PUD plan and early grading plan for the golf course and associated private access roads was previously approved in the Fall of 2016. Tree removal, grading and erosion control for the golf course and access roads is currently under construction based on this approval.

The average soil condition reflects Hydrologic Group "B" (Brussett Loam, Elbeth Sandy Loam, Kettle Gravelly Loamy Sand, Peyton Sandy Loam, Peyton Pring Complex, Pring Course Sandy Loam, and Tomah-Crowfoot Loamy Sand) as determined by the "Soil Survey of El Paso County Area," prepared by the Soil Conservation Service (see map in Appendix).

EXISTING DRAINAGE CONDITIONS

As described in the MDDP for Flying Horse North, this site sits in the upper reaches of both the Black Squirrel Creek and the East Cherry Creek Drainage Basins. There are approximately 540 acres in the Black Squirrel Creek Drainage Basin and 878 acres of area in the East Cherry Creek Drainage Basin. The majority of the Filing No. 1 area will be within the Black Squirrel Creek Basin, however, all required improvements for Filing No. 1 including the golf course within both basins will be discussed below.

Black Squirrel Creek Drainage Basin

The Flying Horse North property is located at the top of the Black Squirrel Creek Drainage Basin. Currently there are corrugated metal culverts within Hwy. 83 to convey flows across the existing roadway. Existing conditions in this basin are largely forested with rolling hills and natural valleys and swales draining offsite to the southwest. This basin has been previously studied in the "Black Squirrel Creek Drainage Basin Planning Study" prepared by URS Consultants, January 1989. The majority of the runoff from the area located in the Black Squirrel Drainage Basin converges at the main channel of the Black Squirrel Creek located on the adjacent property (Reach 12 and 13). As a part of the MDDP for Flying Horse North, also prepared by Classic consulting, an existing drainage analysis was performed to confirm allowable release rates at key design points along the project boundary. Offsite flows were recreated from surrounding reports that were previously approved. Drainage Criteria has been updated since these reports have been approved. Flow differences will occur due to the updated drainage criteria. Using these previous reports contributing areas, CN values and time of concentrations, this report along with the MDDP have attempted to recreate offsite flows for use in calculating existing conditions. Currently in the Flying Horse North property boundary within the Black Squirrel Drainage basin there are existing stock ponds with berms that retain existing flows from reaching downstream channels until overtopping. There are no records or design plans for these stock ponds. For this existing condition analysis these ponds were removed from the project model.

Along the northern boundary of the property there are numerous locations where off-site flows come onto the site. The High Forest Ranch development has two detention facilities that release concentrated flows directly onto the property. The on-site downstream corridors from these facilities will remain natural to the greatest extent possible and where required improved to accommodate these existing flows. High Forest Ranch Pond 26 releases flows on-site at the northwest corner of the site (DBPS Reach 1) that then travel through the site towards an existing 48" CMP at Hwy. 83. No significant erosion currently exists in this channel and upon development and re-vegetation, no additional erosion is anticipated. The Pre-development flows at this point as presented in the Flying Horse North MDDP (DP 7) equal (Q_2 = 4 cfs Q_5 = 18 cfs, Q_{100} = 153 cfs). The Highway 83 roadway improvements that will be required with this development will formalize the channel design at the approach to the existing 48" CMP. (See Appendix – Section C-C for channel calculations) At this location the majority of the flows are traveling through the site.

However, the additional development proposed will be routed to an on-site detention/SWQ facility (Pond 1) to properly mitigate any affects to the downstream corridor. High Forest Ranch Pond 16 releases flows on-site approximately 4100 LF east of Hwy. 83 (Reach 6). These flows cross the site and continue to travel in a southwest direction through the Shamrock Ranch property. This is the start of the headwaters of the Black Squirrel Creek Drainage Basin with the majority of the existing flows coming from the High Forest Ranch Development. With little development proposed in this area, there is no significant affect on the downstream corridor.

Section 36 lies approximately 1.5 miles east of Hwy. 83 and this is where the bulk of the Flying Horse North property ownership begins. Several major drainage corridors feeding the Black Squirrel Creek Basin traverse Section 36 and travel in a southwest direction towards the west edge of the property (Reach 12 and 13). Reach 13 is entirely on the Shamrock Ranch property to the west. However, Reach 12 exists within the planned Flying Horse North Golf Course and portions of the Filing No. 1 development. Most of these historic natural drainageways will remain within the Golf Course property and be left as natural as possible with the addition of some private channel improvements (i.e. Permanent TRM with reinforced rock check dams is specified locations) to mitigate the effects of development and minimize erosion transfer potential. These facilities will be contained within proposed drainage easements as shown on the Filing No. 1 final plat. (See Appendix for channel improvement details) The Flying Horse North development remains consistent with the Black Squirrel DBPS assumed land use of 5 acre average over the entire 1400+ acres. This enables even the developed flows within the subdivision to be consistent with what the DBPS anticipated downstream. The DBPS also specified that all developments within the basin that are tributary to the sub-regional detention ponds either, 1) construct a permanent detention facility on-site or 2) construct a temporary detention facility on-site that could later be removed. As seen later in this report, multiple permanent full-spectrum detention/SWQ facilities are proposed to be constructed on-site. More specifically, ponds 4 and 8 will be installed along the west boundary prior to entering existing Reach 13 located just off-site within the Shamrock property. This report has analyzed the downstream corridors below both of these facilities for the pre-development condition (per DBPS hydrology) and post-development condition (per UD-detention designed release) No significant erosion currently exists in these channels and we have been diligently coordinating with the adjacent property owner and his engineer on consistently maintaining proper BMPs along this property boundary. This effort will continue through final construction and revegetation of the permanent detention/SWQ facilities. (See Appendix for Sections A-A

and B-B channel calculations) These facilities not only meet all current drainage criteria but also remain consistent with the intent of the DBPS. It is also noted that these facilities release well under the pre-development flows as established by the DBPS. Thus, the downstream corridor within the existing Reach 13 on the adjacent property will not be significantly affected with the installation of these full-spectrum facilities. Portions of the Cathedral Pines Development to the south contributes developed flows to this property. These flows will be accommodated in the various on-site facility designs. A smaller on-site basin at the southeast corner of section 36 releases historic flows onto the Cathedral Pines and the Edmonds Subdivision. An on-site detention/storm water quality facility is planned in this corridor to help mitigate development.

East Cherry Creek Drainage Basin

The Palmer Divide traverses the eastern half of section 36 which defines the major basin line between the Black Squirrel Creek and the East Cherry Creek Basins. The vegetation also changes drastically in this area. The majority of the East Cherry Creek Basin contains very little trees and more grazing prairie land and meadows. This area defines the edge of Black Forest. In general, historic flow patterns in this basin travel in a northeasterly direction towards Hodgen Road. The MDDP designates several major design points along the north boundary. Again, multiple detention/storm water quality facilities are planned for these corridors and to be constructed along with future land development. This report has analyzed the downstream corridors along the north property line for the pre-development condition (per MDDP hydrology) and post-development condition (per UD-detention designed release). No significant erosion currently exists in these channels and we have been consistently maintaining proper BMPs along this property boundary. This effort will continue through final construction and revegetation of the permanent detention/SWQ facilities. (See Appendix for Sections D-D and E-E channel calculations). Portions of the Palmer Divide Subdivision and multiple large unplatted properties the south contribute developed flows to this property. These flows will be accommodated in the various on-site facility designs.

PROPOSED DRAINAGE CONDITIONS

The proposed land development within the Flying Horse North Filing No. 1 and future development within the remaining portions of the Preliminary Plan will be 2.5-5 acre large lot residential with associated paved streets and roadside ditches. The 18-hole private Golf Course with a club house site, driving range and

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

Given the rural nature of this development, roadside ditches are planned along all roadways. Concrete curb and gutter will only be used at the round-about locations and along the jurisdictional dam embankment as required by the State. The typical roadside ditch will be designed as a V-ditch with a depth of 24 inches. The natural terrain within much of this development creates some steeper slopes on many of the roadways. These slopes range from 1% to 10%. An analysis of the roadside ditches was performed in order to determine the necessary ditch lining required to maintain allowable velocity and shear stress.
The following three basic ditch improvements are recommended throughout the development:
(See Appendix for reference)

1. Revegetation with native seeding (Grass lined only)
   Slope 2% or less and minimal flow

2. Erosion Control Blanket (North American Green SC150 or equiv.) with native seeding Slope 5% or less and max. flow range of 7-43 cfs.
3. Turf Reinforcement Mat (North American Green P300 or equiv.) with natives seeding Slope 10% or less and max. flow of 70 cfs.

The specific ditch lining locations will be shown on the street improvements plans

The following hydrology descriptions will start at the western edge of the Flying Horse North property and move east into the East Cherry Creek Basin, describing the development within the Filing No. 1 area first.

FLYING HORSE NORTH FILING NO. 1

Black Squirrel Creek Drainage Basin

As mentioned previously, Flying Horse North is located in the upper region of the Black Squirrel Creek Drainage Basin. Per the approved DBPS for Black Squirrel Creek, the reaches in this area were proposed to remain as natural as possible. There were no recommendations for detention facilities within the area that is Flying Horse North, but due to current drainage criteria, detention/EURV facilities will be proposed with this development.

High Forest Ranch Detention Pond 26 outfalls onto the property at the very northwest corner of the site. These existing flows will continue to enter the site and travel within the natural channel towards the existing 48" CMP culvert crossing at Hwy. 83. Drainage easements across the proposed lots in this area will be provided on the final plat. The existing stock pond within lots 2 and 3 will be removed with grading of the road in this area. Tract B is platted in order to provide a detention/EURV facility for the lots and public road in this area. This facility will be constructed with Filing No. 1 with ownership and maintenance by the Flying Horse North HOA.

Design Point 1 (Q_2 = 2 cfs Q_5 = 3 cfs, Q_{100} = 11 cfs) represents the existing off-site and on-site developed flows from Basins OS-1A and BS-2B. The combined flow from these basins travel to a low point just east of Stagecoach Road where a proposed 24" RCP culvert will be installed to convey these flows under the road. (See Appendix for culvert design)

Design Point 2 (Q_2 = 3 cfs Q_5 = 9 cfs, Q_{100} = 35 cfs) represents flows from DP 1 and Basin BS-4. These combined flows are collected at a low point where a proposed 30" RCP culvert will be installed to replace the temporary sediment basin installed with early grading. (See Appendix for culvert design)

The total developed flows entering **Detention Facility 1** including Basin BS-1A equal **(Q_2 = 4 cfs Q_5 = 7 cfs, Q_{100} = 38 cfs)**. These combined flows will travel in the natural drainage corridor across lot 1 within a drainage easement and enter the detention facility. The following describes the design of this facility (See Appendix for UD Detention pond design sheets):

Detention Pond 1 (Full Spectrum – see multiple storm release data below)
0.43 Ac.-ft. EURV required
0.50 Ac.-ft. EURV design with 3:1 max. slopes
1.1 Ac.-ft. 100-yr. Storage

Total In-flow:	**Q_2 = 4 cfs,**	**Q_5 = 7 cfs,**	**Q_{100} = 38 cfs**
Pond Design Release:	**Q_2 = 0.1 cfs,**	**Q_5 = 0.2 cfs,**	**Q_{100} = 21 cfs**
Pre-development Release:	**Q_2 = 0.2 cfs,**	**Q_5 = 0.4 cfs,**	**Q_{100} = 23 cfs**

(Ownership and maintenance by the Flying Horse North HOA)

The downstream corridor from this proposed facility shows no indication of erosion at this time and is anticipated to continue to adequately handle the detained developed flows from this portion of the subdivision.

Design Point 4 (Q_2 = 3 cfs Q_5 = 4 cfs, Q_{100} = 8 cfs) represents existing and developed flows from Basin BS-2 (north side of Stagecoach Rd.) These flows will travel in a side road ditch towards Hwy. 83. A temporary sediment basin will be installed during construction of this portion of the roadway. This development will be required to provide improvements to this intersection and Hwy. 83 per the site traffic study. Upon review/approval from CDOT, these improvements will be constructed along with final design of drainage at this intersection which will include the relocation of the dual 18" ERCP culverts and the removal of the temporary sediment basin.

Design Point 5 (Q_2 = 2 cfs Q_5 = 4 cfs, Q_{100} = 13 cfs) represents existing and developed flows from Basins OS-1B and BS-2A (south side of Stagecoach Rd.) These flows will travel in a side road ditch towards Hwy. 83. A temporary sediment basin will be installed during construction of this portion of the roadway. Upon review/approval from CDOT, these improvements will be constructed along with final design of drainage at this intersection and the removal of the temporary sediment basin at this location.

Design Point 6 (Q_2 = 1 cfs Q_5 = 3 cfs, Q_{100} = 15 cfs) represents flows from Basins OS-2 and BS-3. These combined flows travel via the side road ditch along the east side of the road and then around the cul-de-sac, through lot 3 within a drainage easement towards the existing natural channel to the west. These flows then combine with Basin BS-1B and continue to travel in the existing natural channel towards the existing downstream 48" CMP culvert. **Design Point 3 (Q_2 = 1 cfs Q_5 = 6 cfs, Q_{100} = 39 cfs)** then represents the total flow from this site leaving the property at this location. The pre-development on-site flow at this location equals **Q_2 = 1 cfs Q_5 = 5 cfs, Q_{100} = 41 cfs.** Thus, the downstream facilities will not see a significant change in flows.

Design Point 7 (Q_2 = 2 cfs Q_5 = 8 cfs, Q_{100} = 38 cfs) represents existing and developed flows from Basins OS-3 and BS-5. These flows will travel as sheet flow towards the low point where dual 30" RCP culverts will installed under Stagecoach Road to replace the temporary sediment basin installed with early grading. (See Appendix for culvert design)

High Forest Ranch Detention Pond 16 outfalls onto the property just upstream of Design Point 8. These existing flows will continue to enter the site and travel through proposed triple 48" RCP culverts under Stagecoach Road. (See Appendix for culvert design) **Design Point 8 (Q_2 = 21 cfs Q_5 = 70 cfs, Q_{100} = 284 cfs)** represents the existing and developed flows exiting the property and continuing south within the natural channel on the Shamrock Ranch property. These flows remain consistent with the historic flows at this location.

Design Point 9 (Q_2 = 1 cfs Q_5 = 5 cfs, Q_{100} = 23 cfs) represents existing flows from Basins OS-7 and BS-12. These combined flows are collected at a low point where proposed dual 24" RCP culverts will be installed to replace the temporary sediment basin installed with early grading. (See Appendix for culvert design) **Design Point 10 (Q_2 = 11 cfs Q_5 = 32 cfs, Q_{100} = 143 cfs)** represents existing and developed flows

from Basins OS-8, OS-10, OS-11, BS-13 and BS-14. These flows will travel to the low point at this location where dual 42" RCP culverts will be installed for the crossing of Stagecoach Road. (See Appendix for culvert design)

Design Point 11 (Q_2 = 5 cfs Q_5 = 12 cfs, Q_{100} = 36 cfs) represents developed flow from Basin BS-16. These flows will travel to the low point at this location where dual 24" RCP culverts will be installed for the crossing of the road. (See Appendix for culvert design) **Design Point 11A (Q_2 = 0.3 cfs Q_5 = 0.64 cfs, Q_{100} = 4.6 cfs)** represents a small 1.0 ac. sub-basin of BS-17 that will travel as ditch flow to a lowpoint where an 18" culvert will convey the developed flows to the south side of Shortwall Dr. into Basin BS-15. (See Appendix for culvert design) **Design Point 12 (Q_2 = 4 cfs Q_5 = 11 cfs, Q_{100} = 44 cfs)** represents the combined developed flow from Basins BS-16 and BS-15. These flows will travel to the low point at this location where a 36" RCP culvert and storm system will be installed to route the collected flows directly into Detention Pond 4 at the south end. (See Appendix for culvert design)

The total developed flows entering **Detention Facility 4**, including Basins OS-9 and BS-17 equal **(Q_2 = 10 cfs Q_5 = 16 cfs, Q_{100} = 217 cfs)**. The major flows enter the facility at the north end through a rock chute. (See Appendix for rock chute and pond design) The following describes the design of this facility:
(See Appendix for UD Detention pond design sheets):

Detention Pond 4 (Full Spectrum – see multiple storm release data below)
0.99 Ac.-ft. EURV required
1.05 Ac.-ft. EURV design with 4:1 max. slopes
5.1 Ac.-ft. 100-yr. Storage

Total In-flow:	**Q_2 = 10 cfs,**	**Q_5 = 16 cfs,**	**Q_{100} = 217 cfs**
Pond Design Release:	**Q_2 = 0.3 cfs,**	**Q_5 = 0.4 cfs,**	**Q_{100} = 142 cfs**
Pre-development Release:	**Q_2 = 1.5 cfs,**	**Q_5 = 2.5 cfs,**	**Q_{100} = 152cfs**

(Ownership and maintenance by the Flying Horse North HOA)

The downstream corridor from this proposed facility shows little indication of erosion at this time and is anticipated to continue to adequately handle the detained developed flows from this portion of the subdivision. In addition, we have been coordinating with the adjacent property owner and his engineering

consultant on this specific corridor and will continue to do so until the on-site detention facility construction is complete and all disturbed areas are re-established.

Design Point 14 (Q_2 = 4 cfs Q_5 = 12 cfs, Q_{100} = 56 cfs) represents the developed flow from Basin BS-18. These flows will travel to the low point at this location where three 24" RCP culverts will be installed to cross under the road. (See Appendix for culvert design) These flows then enter Basin OS-23 through a drainage easement on the rear of lot 65 and continue to travel towards DP-16. **Design Point 15 (Q_2 = 2 cfs Q_5 = 5 cfs, Q_{100} = 15 cfs)** represents the developed flow from Basin BS-19. These flows will travel to the low point at this location where dual 18" RCP culverts will be installed to cross under the road. (See Appendix for culvert design) These flows then enter Basin OS-22 through a drainage easement across lots 60 and 61 and continue to travel towards the golf course.

Basins BS-20, BS-21, BS-22, BS-23 and BS-23A are relatively large basins that contain both Filing 1 lots, much of the golf course but also future lots that will remain undeveloped at this time. However, these basins all ultimately travel in a southwesterly direction towards the proposed Detention Facility 8. This report analyzes both the "Filing 1 Only" condition as well as the "full build-out condition" in the design of this detention facility. With the development of Filing 1, Detention Facility 8 will be sized and graded for the ultimate design accounting for the future lot development. The outlet structure and emergency overflow weir will also be designed for the ultimate condition. However, we will provide two orifice plate designs for the outlet box. The initial plate will be constructed that will handle the proper release for the Filing 1 development only. Upon the next phase of lot development within these basins (BS-20, BS-21, BS-22, BS-23 and BS-23A) the ultimate plate will be installed to replace this initial plate design. No further changes to the outlet structure or pond will need to take place. Thus, the following describes the two scenarios:

Full Build-out Design (accounting for future lot development)

Design Point 16 (Q_2 = 25 cfs Q_5 = 78 cfs, Q_{100} = 362 cfs) represents the total developed flows from Basins BS-18 thru BS-23 with the fully developed golf course and lots in Filing 1 and the future phases. These flows travel to the low point at this location where dual 60" RCP culverts will be installed to cross under the road. (See Appendix for culvert design) These flows represent the major portion of the flows entering Detention Facility 8 with the remaining flows coming from Basin OS-23A.

The total developed flow entering **Detention Facility 4** includes Basin BS-23A. The following describes the design of this facility: (See Appendix for UD Detention pond – **Full Build-out** design sheets):

Detention Pond 8 (Full Spectrum – see multiple storm release data below)
2.40 Ac.-ft. EURV required
2.45 Ac.-ft. EURV design with 4:1 max. slopes
9.32 Ac.-ft. 100-yr. Storage
Total In-flow: Q_2 **= 28 cfs,** Q_5 **= 85 cfs,** Q_{100} **= 383 cfs**
Pond Design Release: Q_2 **= 0.8 cfs,** Q_5 **= 1.0 cfs,** Q_{100} **= 253 cfs**
Pre-development Release: Q_2 **= 2.6 cfs,** Q_5 **= 4.5 cfs,** Q_{100} **= 274cfs**
(Ownership and maintenance by the Flying Horse North HOA)

Filing 1 Only Design (accounting for golf course and Filing 1 lot development)

Under this scenario, only the golf course and Filing 1 lots are developed and Basins BS-20, BS-21, BS-22, BS-23 and BS-23A have been adjusted to account for only this initial phase of development. The following describes the facility requirements for this design: (See Appendix for UD Detention pond – **Filing 1 Only** design sheets):

****Detention Pond 8 (Full Spectrum – see multiple storm release data below)**
1.13 Ac.-ft. EURV required
2.45 Ac.-ft. EURV design with 4:1 max. slopes
7.76 Ac.-ft. 100-yr. Storage
Total In-flow: Q_2 **= 9 cfs,** Q_5 **= 14 cfs,** Q_{100} **= 301 cfs**
Pond Design Release: Q_2 **= 0.4 cfs,** Q_5 **= 0.5 cfs,** Q_{100} **= 219 cfs**
Pre-development Release: Q_2 **= 2.2 cfs,** Q_5 **= 3.9 cfs,** Q_{100} **= 237cfs**
(Ownership and maintenance by the Flying Horse North HOA)

**Please note that all facility design remains the same as the Full Build-out scenario except for the different orifice plate.

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The downstream corridor from this proposed facility shows little indication of erosion at this time and is anticipated to continue to adequately handle the detained developed flows from this portion of the subdivision. In addition, we have been coordinating with the adjacent property owner and his engineering consultant on this specific corridor and will continue to do so until the on-site detention facility construction is complete and all disturbed areas are re-established.

Basin BS-24 (Q_2 = 0.6 cfs Q_5 = 3 cfs, Q_{100} = 18 cfs) represents sheet flow from three residential lots within Filing No. 1 that will continue to direct release off-site. However, portions of this historic basin area will be routed into Flying Horse North Pond 8, therefore the developed flows from this basin do not significantly change from the pre-development condition. The pre-development flows from the historic basin area equal **Q_2 = 0.2 cfs Q_5 = 2 cfs, Q_{100} = 18 cfs.** Also, given the lot size, no water quality is required.

FLYING HORSE NORTH FILING NO. 1

East Cherry Creek Drainage Basin

The following basins are still tributary to the Filing No. 1 platting area but are within the East Chery Creek Drainage Basin:

Design Point 24 (Q_2 = 2 cfs Q_5 = 8 cfs, Q_{100} = 45 cfs) represents developed flows from Basins CC-4C and CC-5. Basin CC-4C represents the future golf course clubhouse site. Upon future development of this site a site specific detention/SWQ facility will be installed. This future facility will release into the side road ditch on the west side of Allen Ranch Road and travel in a northerly direction. The side road ditch along this stretch of Allen Ranch Road and the south side of Old Stagecoach Road will be sized to handle these flows. The 100-yr. emergency overflow from this future facility will also be into the side road ditch of Allen Ranch Road and not towards any residential lots. For ultimate downstream design purposes this basin is assumed to release pre-development flows. These flows will travel towards Design Point 24 where a 36" RCP culvert is sized to handle the fully developed flows at this location. (See Appendix for culvert design)

The total developed flows entering **Detention Facility 12**, including Basin CC-6 equals **(Q_2 = 6 cfs Q_5 = 9 cfs, Q_{100} = 85 cfs)**. The following describes the design of this facility:
(See Appendix for UD Detention pond design sheets):

Detention Pond 12 (Full Spectrum – see multiple storm release data below)
0.66 Ac.-ft. EURV required
0.75 Ac.-ft. EURV design with 4:1 max. slopes
2.69 Ac.-ft. 100-yr. Storage

Total In-flow:	**Q_2 = 6 cfs, Q_5 = 9 cfs, Q_{100} = 85 cfs**
Pond Design Release:	**Q_2 = 0.2 cfs, Q_5 = 0.3 cfs, Q_{100} = 45 cfs**
Pre-development Release:	**Q_2 = 0.5 cfs, Q_5 = 0.9 cfs, Q_{100} = 55 cfs**

(Ownership and maintenance by the Flying Horse North HOA)

The downstream corridor from this proposed facility shows no indication of erosion at this time and is anticipated to continue to adequately handle the detained developed flows from this portion of the subdivision.

Design Point 25 (Q_2 = 0.2 cfs Q_5 = 0.3cfs, Q_{100} = 45 cfs) then represents the total flow leaving the site at this location. The pre-development flow at this location equals **Q_2 = 0.5 cfs Q_5 = 0.9 cfs, Q_{100} = 55 cfs.** Thus, the downstream facilities will not see a significant change in flows.

Basins OS-12, OS-13, OS-14, CC-1A, CC-1B, CC-2A, CC-2B, CC-2C, CC-3, CC-4A, CC-4B and CC-9 are all tributary to the proposed Flying Horse North Pond 13. Nearly all the proposed residential lots within these basins are part of future development outside of Filing No. 1 platting. The only structure associated with Filing No. 1 development is the pond embankment/outlet structure crossing Stagecoach Road. However, this facility has been classified by the Colorado Dam Safety Branch (DSB) as a low-hazard, jurisdictional facility. As such, a separate Design Report including hydrology/hydraulic design and embankment/structure design has been prepared for DSB and El Paso County review and approval. Please reference this report for the required detention/SWQ design for this facility.

Design Point 26 (Q_2 = 3 cfs Q_5 = 16 cfs, Q_{100} = 102 cfs) represents the full build-out developed flows from Basins CC-8 and CC-10. Basin CC-8 represents future residential lots and CC-10 mostly future passive park area. These flows will continue to sheet flow towards the low-point where a 48" RCP culvert is sized to handle the fully developed flows at this location. (See Appendix for culvert design) After crossing Stagecoach Road, these flows will continue to flow directly into the existing stock pond just north of the roadway. This facility will provided sediment control for the small developed roadway area. Upon future development and plating of the lots planned within these basins, this stock pond will be formally designed into a detention facility.

Basin CC-15 (Q_2 = 1 cfs Q_5 = 4 cfs, Q_{100} = 20 cfs) represents the full build-out developed flows from the future residential lots tributary to this basin. These flows will continue to sheet flow towards the low-point where a 30" RCP culvert is sized to handle the fully developed flows at this location. (See Appendix for culvert design) A downstream sediment basin will be installed to provide sediment control for the small developed roadway area.

Basin CC-16 (Q_2 = 1 cfs Q_5 = 5 cfs, Q_{100} = 24 cfs) represents the full build-out developed flows from the future residential lots tributary to this basin. These flows will continue to sheet flow towards the low-point at the southwest corner of Old Stagecoach Road and Rubble Drive where a 24" RCP culvert is sized to handle the fully developed flows at this location. (See Appendix for culvert design) A downstream sediment basin will be installed to provide sediment control for the small developed roadway area.

Design Point 30 (Q_2 = 0.7 cfs Q_5 = 2 cfs, Q_{100} = 10 cfs) represents the full build-out developed flows from Basin CC-18. This Basin represents future residential lots. The flows will continue to sheet flow towards the low-point where a 24" RCP culvert is sized to handle the fully developed flows at this location. (See Appendix for culvert design) A downstream sediment basin will be installed to provide sediment control for the small developed roadway area.

Design Point 31 (Q_2 = 0.9 cfs Q_5 = 3 cfs, Q_{100} = 15 cfs) represents the full build-out developed flows from Basin CC-19 and the upstream release from DP-30. This Basin represents future residential 5 ac. lots. The flows will continue to sheet flow within a proposed drainage easement towards the existing low-point where an existing 24" CMP culvert will adequately handle the fully developed flows at this location.

Design Point 32 (Q_2 = 2 cfs Q_5 = 8 cfs, Q_{100} = 40 cfs) represents the full build-out developed flows from Basins OS-16 and CC-17. Basin CC-17 represents future residential lots and OS-16 unplatted, 5-ac. zoned residential property. These flows will continue to sheet flow towards the low-point where a 36" RCP culvert is sized to handle the fully developed flows at this location. (See Appendix for culvert design) A downstream sediment basin will be installed to provide sediment control for the small developed roadway area.

FLYING HORSE NORTH PRELIMINARY PLAN (Future Platting)

Black Squirrel Creek Drainage Basin

The following basins are in the Black Squirrel Creek Drainage Basin but are not a part of Filing 1 lot development. These areas will require future final drainage report(s) upon future lot development.

Design Point 18 (Q_2 = 5 cfs Q_5 = 22 cfs, Q_{100} = 115 cfs) represents developed flows from Basins BS-28, BS-29, BS-30 and OS-18. Portions of basins BS-28 and BS-29 include golf course development taking place with Filing No. 1. However, the majority of these basins include forested future residential lots with basin OS-18 being existing 2.5 ac. minimum lots. Future developed flows will be routed to this location where a future detention facility will be installed. This facility will be sized to meet EURV requirements and release pre-development flow quantities into the future side road ditch and through future drainage easements towards the future detention facility at Design Point 19. These future facilities will be further analyzed as ponds in series and emergency overflow paths well defined with the future final drainage report. In the interim, with only the golf course construction, a temporary sediment basin located within the future roadway in basin BS-28 will be installed to provide sediment control from the developed golf course area.

Design Point 19 (Q_2 = 4 cfs Q_5 = 17 cfs, Q_{100} = 126 cfs) represents developed flows from Basins BS-27 and OS-17. These basins include forested future residential lots with basin OS-17 being existing 2.5 ac. minimum lots. Future developed flows will be routed to this location where a future detention facility will be installed to meet EURV requirements and release pre-development flow quantities. Both of these future facilities will be constructed in tracts with ownership and maintenance by the Flying Horse North HOA.

Basin BS-26 (Q_2 = 0.04 cfs Q_5 = 0.4 cfs, Q_{100} = 3 cfs) represents sheet flow from the extreme rear portion of a future residential lot. This area of the lot will likely not be built upon, therefore not significantly changing the drainage conditions from the pre-development condition. The pre-development flow from the historic basin area equals **Q_2 = 0.04 cfs Q_5 = 0.4 cfs, Q_{100} = 3 cfs.** Also, given the lot size, no water quality is required.

Basins BS-31 (Q_2 = 0.3 cfs Q_5 = 2 cfs, Q_{100} = 12 cfs), BS-32 (Q_2 = 0.3 cfs Q_5 = 2 cfs, Q_{100} = 9 cfs) and BS-33 (Q_2 = 0.8 cfs Q_5 = 3 cfs, Q_{100} = 15 cfs) represent smaller basins that will continue to sheet flow off-site to the south. These basins represent some golf course development and multiple future residential lots. Given the lot size, no water quality is required. However, permanent sediment basins will be installed downstream of the golf course development to provide sediment control. Developed flows released from these basins will not be significantly different than the pre-development flows.

East Cherry Creek Drainage Basin

The following basins are not tributary to the Filing No. 1 platting area but are within the East Chery Creek Drainage Basin and planned for future residential lot development.

Design Point 28 (Q_2 = 5 cfs Q_5 = 20 cfs, Q_{100} = 110 cfs) represents the full build-out developed flows from Basins OS-13 and CC-13A. Basin CC-13A represents future residential lots and OS-13 platted, 5-ac. zoned residential property. These flows will continue to sheet flow towards the low-point where a future culvert will be installed to handle the fully developed flows at this location. The flows are then conveyed in the natural channel towards Design Point 29.

Design Point 29 (Q_2 = 6 cfs Q_5 = 27 cfs, Q_{100} = 155 cfs) represents the full build-out developed flows from Basins CC-13B, CC-13C and release from DP-28. These basins represent future residential lots. At this location, a future detention facility will be installed to meet EURV requirements and release pre-development flow quantities. This future facility will be constructed in a tract with ownership and maintenance by the Flying Horse North HOA.

Basin CC-13D (Q_2 = 2 cfs Q_5 = 6 cfs, Q_{100} = 29 cfs) represents future residential lots that will continue to sheet flow off-site. Given the lot size, no water quality is required. However, a permanent sediment basin will be installed just prior to release off-site to provide sediment control. Developed flows released from this basin will not be significantly different than the pre-development flows.

Basin CC-14 (Q_2 = 0.4 cfs Q_5 = 2 cfs, Q_{100} = 8 cfs) represents sheet flow from the rear portion of two future residential lots. The majority of this area is not anticipated to be developed, therefore not significantly changing the drainage conditions from the pre-development condition. Also, given the lot size, no water quality is required.

Design Point 27 (Q_2 = 4 cfs Q_5 = 17 cfs, Q_{100} = 81 cfs) represents the full build-out developed flows from the previously described basin CC-15 and CC-20. These basins represent future residential lots. At this location, a future detention facility will be installed to meet EURV requirements and release pre-development flow quantities. This future facility will be constructed in a tract with ownership and maintenance by the Flying Horse North HOA.

Basins CC-21 (Q_2 = 0.1 cfs Q_5 = 1 cfs, Q_{100} = 9 cfs) and CC-22 (Q_2 = 1 cfs Q_5 = 5 cfs, Q_{100} = 21 cfs) represent future residential 5 ac. lots and park area that will continue to sheet flow off-site. Given the lot size, no water quality is required. However, a permanent sediment basin will be installed just prior to release off-site to provide sediment control. Developed flows released from this basin will not be significantly different than the pre-development flows.

Basins CC-23 (Q_2 = 0.4 cfs Q_5 = 1 cfs, Q_{100} = 8 cfs) and CC-24 (Q_2 = 3 cfs Q_5 = 13 cfs, Q_{100} = 62 cfs) represent future 5 ac. residential lots that will continue to sheet flow off-site. Given the lot size, no water quality is required. Given that the proposed lots are planned for 5 ac. residential, the developed flows released from this basin will not be significantly different than the pre-development flows. However, multiple permanent sediment basins may be installed just prior to release off-site to provide sediment control. This basin also contains a portion of the adjacent Franktown/Parker Reservoir emergency spillway crossing two proposed lots. This existing facility, which doesn't appear to be within any existing easement, will be further analyzed with a final drainage report for this area. Appropriate drainage easements may be provided at time of final plating.

Basin CC-25 (Q_2 = 0.3 cfs Q_5 = 1 cfs, Q_{100} = 6 cfs) represents a small portion of two future residential 5 ac. lots that will continue to sheet flow off-site. Given that the proposed lots are planned for 5 ac. residential, the developed flows released from this basin will not be significantly different than the pre-development flows.

Design Point 34 (Q_2 = 6 cfs Q_5 = 24 cfs, Q_{100} = 168 cfs) represents the full build-out developed flows from Basins CC-26, CC-27, CC-28, release from CC-16 and release from DP-32. These basins represent future residential lots and park area. At this location, a future detention facility will be installed and likely replace the existing stock pond to meet EURV requirements and release pre-development flow quantities. The downstream existing culvert under Hodgen Road will be further analyzed with future final drainage reports. This future facility will be constructed in a tract with ownership and maintenance by the Flying Horse North HOA.

FACILITY MAINTENANCE

All proposed drainage structures within the platted County ROW will be owned and maintained by El Paso County. All proposed drainage structures within easements or tracts will be owned and maintained by the Flying Horse North HOA of Golf Course owner.

DRAINAGE CRITERIA

Hydrologic calculations were performed using the City of Colorado Springs/El Paso County Drainage Criteria Manual, revised in November 1991 and October 1994 with County adopted Chapter 6 and Section 3.2.1 of Chapter 13 of the City of Colorado Springs/El Paso County Drainage Criteria Manual as revised in May 2014. Detention storage and storm sewer conveyance to Black Squirrel Creek Drainage Basin was established with the Black Squirrel DBPS, previously referenced. The IDF curves from Figure 6-5 of the City of Colorado Springs/El Paso County DCM was used to estimate storm water runoff anticipated from design storms for the 2 year, 5 year and 100 year recurrence interval. (See Appendix)

The City of Colorado Springs/El Paso County DCM requires the Four Step Process for receiving water protection that focuses on reducing runoff volumes, treating the water quality capture volume (WQCV),

stabilizing drainage ways, and implementing long-term source controls. The Four Step Process pertains to management of smaller, frequently occurring storm events, as opposed to larger storms for which drainage and flood control infrastructure are sized. Implementation of these four steps helps to achieve storm water permit requirements. This site adheres to this **Four Step Process** as follows:

1. **Employ Runoff Reduction Practices:** Development of project site is proposed large lot single family residential (2.5 ac. min.) with homes and associated landscaping along with a private golf course. Proposed impervious areas (roof tops, patios) will sheet flow across landscaped ground, through open space areas and across the golf course to slow runoff and increase time of concentration prior to being conveyed to the proposed public streets. This will minimize directly connected impervious areas within the project site.

2. **Stabilize Drainageways:** This site will utilize roadside ditches with culvert crossings throughout the site and channel stabilization and grade control structures installed within some of the historic natural channels. These facilities will then direct the on-site development flows to the multiple detention/SWQ ponds mentioned above, designed to release at or below historic rates into Black Squirrel and East Cherry Creek. Based upon the proposed reduction in released flows compared to the pre-developed flows, no impact to downstream drainageways is anticipated.

3. **Provide Water Quality Capture Volume (WQCV):** Runoff from this development will be treated through capture and slow release of the WQCV in multiple permanent Extended Detention Basins designed per current El Paso County drainage criteria.

4. **Consider need for Industrial and Commercial BMPs**: No industrial or commercial uses are proposed within this development. However, a site specific storm water quality and erosion control plan and narrative was previously approved for this development in October 2016 (PUD-16-002). Details such as site specific source control construction BMP's as well as permanent BMP's were detailed in this plan and narrative to protect receiving waters. Much of these BMP's are currently constructed and being maintained as the majority of the development has been graded and erosion control methods employed.

FLOODPLAIN STATEMENT

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

DRAINAGE AND BRIDGE FEES

FLYING HORSE NORTH FILING NO. 1

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

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

2.5 ac. lots (incl. roads and tracts)

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

234.4 Ac. x 11% = **25.78 Impervious Ac.**

Golf Course Development

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

108.3 Ac. x 2% = **2.17 Impervious Ac.**

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

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

FILING 1 FEE TOTALS (prior to reduction):

Bridge Fees

$ 492.00 x 27.95 Impervious Ac. = $ 13,751.40

Drainage Fees

$ 7,808.00 x 27.95 Impervious Ac. = $ 218,233.60

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

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

Detention Pond 1	1.1 ac-ft. full spectrum	$ 24,448 x 50% =	$ 12,224.00
Detention Pond 4	4.5 ac-ft. full spectrum	$ 130,270 x 50% =	$ 65,135.00
Detention Pond 8	9.4 ac-ft. full spectrum	$ 111,320 x 50% =	$ 55,660.00
Total Reduction			**$ 133,019.00**

CLASSIC CONSULTING ENGINEERS & SURVEYORS

FILING 1 FEE TOTALS:

Bridge Fees

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

Drainage Fees

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

SUMMARY

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

PREPARED BY:

Classic Consulting Engineers & Surveyors, LLC

Marc A. Whorton, P.E.
Project Manager

Maw/109611/reports/109611PDR.doc

REFERENCES

1. City of Colorado Springs/County of El Paso Drainage Criteria Manual, as revised in November 1991 and 1994 with County adopted Chapter 6 and Section 3.2.1 of Chapter 13 of the City of Colorado Springs/El Paso County Drainage Criteria Manual as revised in May 2014.

2. "Master Development Drainage Plan for Flying Horse North", Classic Consulting, dated September 2016.

3. "Preliminary Drainage Report for Flying Horse North (Golf Course Grading and Private Access Roads)", Classic Consulting, dated September 2016.

4. "Final Drainage Report High Forest Ranch Filing No. 1" JR Engineering, dated March 2001.

5. "Final Drainage Report for High Forest Ranch Filing No. 2 and High Forest Ranch Filing No. 3" Classic Consulting Engineers and Surveyors dated May 2001.

6. "Final Drainage Report and Plan for Cathedral Pines Subdivision Filing No. 2," Leigh Whitehead & Associates, dated March 2005.

7. "Final Drainage Report and Plan for Cathedral Pines Subdivision Filing No. 3," Stillwater Engineering, dated July 2006.

8. "Black Squirrel Creek Drainage Basin Planning Study," URS Corporation, dated August 1987.

9. "Final Drainage Report for Country View Estates" Associated Design Professionals Inc, dated October 1998.

10. "Urban Storm Drainage Criteria Manual Volume 1, 2 & 3" Urban Drainage and Flood Control District, dated January 2016.

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

C_N VALUES - DEVELOPED CONDITIONS

BASIN (label)	BASIN AREA (Ac)	**GOLF COURSE / WOODS (B)**		**2 AC. RESIDENTIAL (B)**		**COMPOSITE C_N**
		CN	AREA (Ac.)	CN	AREA (Ac.)	
OS-1A	4.4	61	4.4	65	0.0	**61.0**
OS-1B	5.6	61	5.6	65	0.0	**61.0**
EX-DP-3 (Pre-Dev.)	36.0	60	36.0	65	0.0	**60.0**
OS-2	2.9	61	2.9	65	0.0	**61.0**
OS-3	10.2	61	0.0	65	10.2	**65.0**
OS-4	32.9	61	0.0	65	32.9	**65.0**
OS-5	29.7	61	0.0	65	29.7	**65.0**
OS-6	9.2	61	0.0	65	9.2	**65.0**
OS-7	5.0	61	0.0	65	5.0	**65.0**
OS-8	14.2	61	0.0	65	14.2	**65.0**
OS-9	9.8	60	9.8	65	0.0	**60.0**
OS-10	4.1	61	0.0	65	4.1	**65.0**
OS-11	28.0	61	0.0	65	28.0	**65.0**
OS-12	68.1	61	40.0	65	28.1	**62.7**
OS-13	36.9	61	18.0	65	18.9	**63.0**
OS-14	26.4	61	20.0	65	6.4	**62.0**
OS-15	70.8	61	20.0	65	50.8	**63.9**
OS-16	4.5	61	0.0	65	4.5	**65.0**
OS-17	15.8	61	0.0	65	15.8	**65.0**
OS-18	13.0	61	0.0	65	13.0	**65.0**

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

C_N VALUES - DEVELOPED CONDITIONS

BASIN (label)	BASIN AREA (Ac)	**GOLF COURSE / WOODS (B)**		**2 AC. RESIDENTIAL (B)**		**COMPOSITE C_N**
		CN	AREA (Ac.)	CN	AREA (Ac.)	
BS-1A	3.5	61	0.0	65	3.5	**65.0**
BS-1B	8.9	61	0.0	65	8.9	**65.0**
BS-2	1.9	61	0.0	89	1.9	**89.0**
BS-2A	0.8	61	0.0	89	0.8	**89.0**
BS-2B	0.9	61	0.0	89	0.9	**89.0**
BS-3	6.2	61	0.0	65	6.2	**65.0**
BS-4	13.0	61	0.0	67	13.0	**67.0**
BS-5	11.2	61	0.0	65	11.2	**65.0**
BS-6	1.2	61	0.0	89	1.2	**89.0**
BS-7	2.9	61	0.0	65	2.9	**65.0**
BS-8	1.0	61	0.0	89	1.0	**89.0**
BS-9	1.5	61	0.0	89	1.5	**89.0**
BS-10	4.5	61	0.0	65	4.5	**65.0**
BS-11	0.9	61	0.0	89	0.9	**89.0**
BS-12	7.7	61	0.0	65	7.7	**65.0**
BS-13	25.6	61	0.0	65	25.6	**65.0**
BS-14	13.4	61	0.0	65	13.4	**65.0**
BS-15	5.3	61	0.0	65	5.3	**65.0**
BS-16	21.6	61	0.0	65	21.6	**65.0**
BS-17	12.1	61	0.0	65	12.1	**65.0**
BS-18	33.8	61	12.1	65	21.7	**63.6**
BS-19	6.3	61	0.0	65	6.3	**65.0**
BS-20	73.9	61	30.2	65	43.7	**63.4**
BS-21	69.5	61	12.1	65	57.4	**64.3**
BS-22	18.1	61	2.5	65	15.6	**64.4**
BS-23	37.1	61	15.4	65	21.7	**63.3**
BS-23A	16.3	61	2.5	65	13.8	**64.4**
BS-24	10.9	60	4.3	65	6.6	**63.0**
EX-24 (Pre-Dev.)	13.2	60	13.2	65	0.0	**60.0**
BS-25	12.7	60	5.0	65	7.7	**63.0**
BS-26	2.5	60	2.5	65	0.0	**60.0**
BS-27	23.3	61	0.0	65	23.3	**65.0**
BS-28	36.9	61	5.6	65	31.3	**64.4**
BS-29	27.7	61	7.2	65	20.5	**64.0**
BS-30	6.7	61	0.0	65	6.7	**65.0**
BS-31	8.4	60	4.2	65	4.2	**62.5**
BS-32	6.2	60	3.0	65	3.2	**62.6**
BS-33	8.9	60	0.6	65	8.3	**64.7**

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

C_N VALUES - DEVELOPED CONDITIONS

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

TIME OF CONCENTRATION - DEVELOPED

BASIN	COMPOSITE Cn	C(5)	OVERLAND Length (ft)	OVERLAND Height (ft)	OVERLAND Tc (min)	STREET / CHANNEL FLOW (DCM Vol. 1 Fig. 6-25) Length (ft)	Slope (%)	Velocity (fps)	Tc (min)	Tc TOTAL (min)	Tc LAG (0.6tc) (min)	Tc LAG (0.6tc) (hr)
OS-1A	61.0	0.08	300	20	17.1	150	4.0%	1.0	2.5	19.6	11.7	0.20
OS-1B	61.0	0.08	300	20	17.1	300	8.0%	1.4	3.6	20.6	12.4	0.21
EX-DP-3 (Pre-Dev.)	60.0	0.08	300	20	17.1	900	5.0%	1.9	7.9	25.0	15.0	0.25
OS-2	61.0	0.08	300	20	17.1	300	6.0%	2.0	2.5	19.6	11.7	0.20
OS-3	65.0	0.08	300	22	16.5	275	6.2%	2.0	2.3	18.8	11.3	0.19
OS-4	65.0	0.08	300	18	17.7	420	4.3%	1.3	5.4	23.0	13.8	0.23
OS-5	65.0	0.08	300	12	20.2	1200	2.5%	1.1	19.0	39.2	23.5	0.39
OS-6	65.0	0.08	300	17	18.0	300	5.5%	1.9	2.6	20.6	12.4	0.21
OS-7	65.0	0.08	300	20	17.1	180	6.5%	2.1	1.4	18.5	11.1	0.18
OS-8	65.0	0.08	300	14	19.2	260	5.5%	0.6	7.5	26.7	16.0	0.27
OS-9	60.0	0.08	300	12	20.2	500	3.5%	0.5	16.7	36.9	22.1	0.37
OS-10	65.0	0.08	300	19	17.3					17.3	10.4	0.17
OS-11	65.0	0.08	300	14	19.2	600	6.5%	0.7	15.4	34.6	20.7	0.35
OS-12	62.7	0.08	300	10	21.4	1400	2.5%	1.5	15.6	37.0	22.2	0.37
OS-13	63.0	0.08	300	10	21.4	1000	3.0%	1.5	11.1	32.6	19.5	0.33
OS-14	62.0	0.08	300	8	23.1	1000	5.0%	2.1	7.9	31.0	18.6	0.31
OS-15	63.9	0.08	300	16	18.4	2200	4.0%	1.9	19.3	37.7	22.6	0.38
OS-16	65.0	0.08	300	7	24.1					24.1	14.5	0.24
OS-17	65.0	0.08	300	20	17.1	350	6.0%	2.5	2.3	19.4	11.6	0.19
OS-18	65.0	0.08	300	18	17.7	300	6.0%	2.5	2.0	19.7	11.8	0.20
BS-1A	65.0	0.08	300	19	17.3					17.3	10.4	0.17
BS-1B	65.0	0.08	300	18	17.7	200	2.5%	1.2	2.8	20.4	12.3	0.20
BS-2	89.0	0.08	300	16	18.4	630	7.0%	0.7	16.2	34.5	20.7	0.35
BS-2A	89.0	0.08	30	1.5	5.9	700	6.5%	1.7	6.9	12.8	7.7	0.13
BS-2B	89.0	0.08	30	1.5	5.9	800	6.5%	2.2	6.1	12.0	7.2	0.12
BS-3	65.0	0.08	300	18	17.7	300	5.3%	2.2	2.3	19.9	12.0	0.20
BS-4	67.0	0.08	300	22	16.5	960	7.0%	2.4	6.7	23.2	13.9	0.23
BS-5	65.0	0.08	300	20	17.1	150	7.0%	2.4	1.0	18.1	10.9	0.18
BS-6	89.0	0.08	10	0.2	4.6	700	7.0%	2.4	4.9	9.5	5.7	0.09

TIME OF CONCENTRATION - DEVELOPED

BASIN	COMPOSITE Cn	C(5)	OVERLAND Length (ft)	OVERLAND Height (ft)	OVERLAND Tc (min)	STREET / CHANNEL FLOW (DCM Vol. 1 Fig. 6-25) Length (ft)	Slope (%)	Velocity (fps)	Tc (min)	Tc TOTAL (min)	Tc LAG (0.6tc) (min)	Tc LAG (0.6tc) (hr)
BS-7	65.0	0.08	90	6	9.3	400	2.0%	2.0	3.3	12.7	7.6	0.13
BS-8	89.0	0.08	10	0.2	4.6	960	7.0%	2.3	7.0	11.6	7.0	0.12
BS-9	89.0	0.08	10	0.2	4.6	1100	5.0%	2.2	8.3	13.0	7.8	0.13
BS-10	65.0	0.08	300	16	18.4	800	5.0%	2.2	6.1	24.4	14.7	0.24
BS-11	89.0	0.08	10	0.2	4.6	300	3.0%	1.6	3.1	7.8	4.7	0.08
BS-12	65.0	0.08	300	18	17.7	180	3.0%	1.8	1.7	19.3	11.6	0.19
BS-13	65.0	0.08	300	16	18.4	630	7.0%	2.5	4.2	22.6	13.5	0.23
BS-14	65.0	0.08	300	14	19.2	700	8.0%	2.8	4.2	23.4	14.0	0.23
BS-15	65.0	0.08	300	26	15.6	250	5.0%	2.0	2.1	17.7	10.6	0.18
BS-16	65.0	0.08	300	18	17.7	1500	3.0%	1.5	16.7	34.3	20.6	0.34
BS-17	65.0	0.08	300	14	19.2	250	5.0%	2.0	2.1	21.3	12.8	0.21
BS-18	63.6	0.08	300	26	15.6	1800	3.0%	1.2	25.0	40.6	24.4	0.41
BS-19	65.0	0.08	300	16	18.4					18.4	11.0	0.18
BS-20	63.4	0.08	300	18	17.7	1650	6.5%	2.0	13.8	31.4	18.8	0.31
BS-21	64.3	0.08	300	30	14.9	2000	5.0%	1.7	19.6	34.5	20.7	0.35
BS-22	64.4	0.08	300	21	16.8	500	4.0%	1.5	5.6	22.3	13.4	0.22
BS-23	63.3	0.08	300	14	19.2	800	4.0%	1.0	13.3	32.5	19.5	0.33
BS-23A	64.4	0.08	300	14	19.2	1200	4.0%	2.0	10.0	29.2	17.5	0.29
BS-24	63.0	0.08	300	22	16.5					16.5	9.9	0.17
EX-24 (Pre-Dev.)	60.0	0.08	300	22	16.5					16.5	9.9	0.17
BS-25	63.0	0.08	300	10	21.4	200	5.0%	2.1	1.6	23.0	13.8	0.23
BS-26	60.0	0.08	300	20	17.1	100	4.0%	2.0	0.8	17.9	10.7	0.18
BS-27	65.0	0.08	300	22	16.5	900	8.0%	2.8	5.4	21.9	13.1	0.22
BS-28	64.4	0.08	300	16	18.4	1500	3.0%	1.8	13.9	32.2	19.3	0.32
BS-29	64.0	0.08	300	18	17.7	1900	4.5%	2.1	15.1	32.7	19.6	0.33
BS-30	65.0	0.08	300	20	17.1	400	6.0%	2.3	2.9	20.0	12.0	0.20
BS-31	62.5	0.08	300	12	20.2	300	4.0%	2.0	2.5	22.7	13.6	0.23
BS-32	62.6	0.08	300	18	17.7	200	5.0%	1.7	2.0	19.6	11.8	0.20
BS-33	64.7	0.08	300	22	16.5	350	6.0%	2.3	2.5	19.1	11.4	0.19

TIME OF CONCENTRATION - DEVELOPED

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

BASIN SUMMARY - DEVELOPED CONDITIONS

BASIN (label)	AREA (acres)	COMPOSITE CN	TOTAL LAG TIME (hours)	Q 2 Yr. (cfs)	Q 5 Yr. (cfs)	Q 100 Yr. (cfs)
OS-1A	4.40	61.0	0.20	0.4	1.6	7.7
OS-1B	5.60	61.0	0.21	0.5	1.9	9.4
EX-DP-3 (Pre-Dev.)	36.00	60.0	0.25	0.5	4.8	41.3
OS-2	2.90	61.0	0.20	0.1	0.6	4.0
OS-3	10.20	65.0	0.19	1.0	3.8	17.9
OS-4	32.90	65.0	0.23	2.8	11.2	53.6
OS-5	29.70	65.0	0.39	1.9	7.1	37.0
OS-6	9.20	65.0	0.21	0.9	3.2	15.5
OS-7	5.00	65.0	0.18	0.5	2.0	9.0
OS-8	14.20	65.0	0.27	2.1	6.2	24.7
OS-9	9.80	60.0	0.37	0.1	1.0	9.1
OS-10	4.10	65.0	0.17	0.7	2.1	8.2
OS-11	28.00	65.0	0.35	2.4	8.2	38.7
OS-12	68.10	62.7	0.37	2.2	11.9	75.8
OS-13	36.90	63.0	0.33	1.4	7.4	45.0
OS-14	26.40	62.0	0.31	0.7	4.6	31.0
OS-15	70.80	63.9	0.38	3.3	14.8	84.2
OS-16	4.50	65.0	0.24	0.4	1.5	7.2
OS-17	15.80	65.0	0.19	1.6	5.9	27.7
OS-18	13.00	65.0	0.20	1.3	4.7	22.6

BASIN SUMMARY - DEVELOPED CONDITIONS

BASIN (label)	AREA (acres)	COMPOSITE CN	TOTAL LAG TIME (hours)	Q 2 Yr. (cfs)	Q 5 Yr. (cfs)	Q 100 Yr. (cfs)
BS-1A	3.50	65.0	0.17	0.4	1.4	6.3
BS-1B	8.90	65.0	0.20	0.4	2.4	13.8
BS-2	1.90	89.0	0.35	2.9	4.2	8.4
BS-2A	0.80	89.0	0.13	1.2	1.8	3.5
BS-2B	0.90	89.0	0.12	1.4	2.0	4.0
BS-3	6.20	65.0	0.20	0.6	2.3	10.8
BS-4	13.00	67.0	0.23	1.9	5.5	23.6
BS-5	11.20	65.0	0.18	1.1	4.4	20.1
BS-6	1.20	89.0	0.09	1.9	2.8	5.4
BS-7	2.90	65.0	0.13	4.4	6.4	12.8
BS-8	1.00	89.0	0.12	1.6	2.2	4.5
BS-9	1.50	89.0	0.13	2.3	3.3	6.6
BS-10	4.50	65.0	0.24	6.0	8.7	17.5
BS-11	0.90	89.0	0.08	1.5	2.1	4.1
BS-12	7.70	65.0	0.19	0.8	3.0	13.8
BS-13	25.60	65.0	0.23	3.7	10.2	40.7
BS-14	13.40	65.0	0.23	2.6	6.8	26.5
BS-15	5.30	65.0	0.18	1.6	3.7	12.2
BS-16	21.60	65.0	0.34	4.6	11.8	44.1
BS-17	12.10	65.0	0.21	3.1	7.7	26.7
BS-18	33.80	63.6	0.41	3.5	12.4	56.0
BS-19	6.30	65.0	0.18	2.1	4.6	15.0
BS-20	73.90	63.4	0.31	7.4	24.6	112.4
BS-21	69.50	64.3	0.35	7.8	23.9	103.0
BS-22	18.10	64.4	0.22	3.7	9.6	36.5
BS-23	37.10	63.3	0.33	4.5	13.6	58.2
BS-23A	16.30	64.4	0.29	5.5	12.0	38.3
BS-24	10.90	63.0	0.17	0.6	3.3	17.6
EX-24 (Pre-Dev.)	13.20	60.0	0.17	0.2	2.2	17.8
BS-25	12.70	63.0	0.23	0.4	2.7	17.3
BS-26	2.50	60.0	0.18	0.0	0.4	3.4
BS-27	23.30	65.0	0.22	2.1	8.0	38.8
BS-28	36.90	64.4	0.32	2.2	9.3	49.4
BS-29	27.70	64.0	0.33	1.4	6.5	35.9
BS-30	6.70	65.0	0.20	0.7	2.4	11.7
BS-31	8.40	62.5	0.23	0.3	1.9	11.8
BS-32	6.20	62.6	0.20	0.3	1.6	9.4
BS-33	8.90	64.7	0.19	0.8	3.2	15.3

BASIN SUMMARY - DEVELOPED CONDITIONS

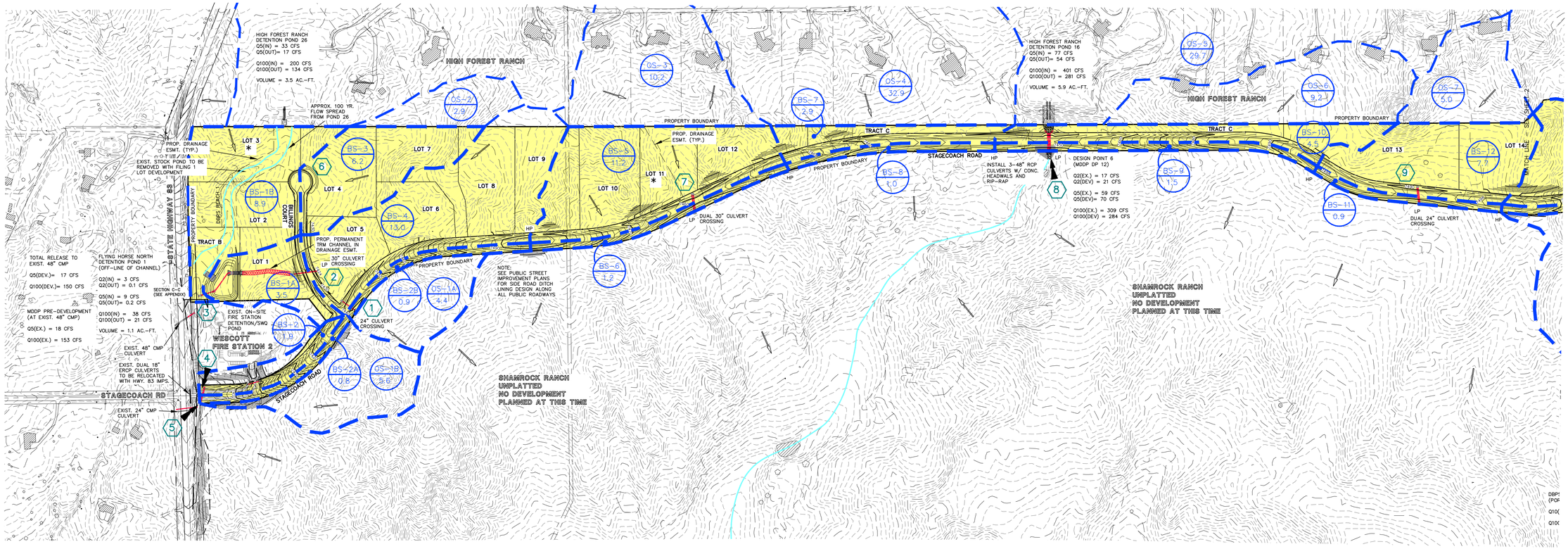
BASIN (label)	AREA (acres)	COMPOSITE CN	TOTAL LAG TIME (hours)	Q 2 Yr. (cfs)	Q 5 Yr. (cfs)	Q 100 Yr. (cfs)
CC-1A	9.80	65.0	0.23	0.8	3.3	16.0
CC-1B	12.60	64.8	0.25	1.0	4.0	19.4
CC-2A	11.00	65.0	0.22	1.0	3.8	18.3
CC-2B	20.80	65.0	0.22	1.9	7.1	34.6
CC-2C	6.40	65.0	0.18	0.7	2.5	11.5
CC-3	52.50	63.1	0.43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

DESIGN POINTS SURFACE ROUTING SUMMARY - DEVELOPED CONDITIONS

Design Point (label)	**Contributing Basins**	**Q 2 Yr.** Q (cfs)	**Q 5 Yr.** Q (cfs)	**Q 100 Yr.** Q (cfs)
DP-1 DEV	OS-1A, BS-2B	1.6	3.4	11
DP-2 DEV	DP-1, BS-4	3.2	8.8	35
TOTAL INFLOW TO POND 1 (UD Detention hydrograph)	**DP-1, DP-2, BS-1A**	**4**	**7**	**38**
DP-3 DEV (Pond Pack routing)	**OS-2, BS-3, BS-1B, Release from FHN Pond 1**	**1**	**6**	**39**
DP-4 DEV	BS-2	2.9	4.2	8
DP-5 DEV	OS-1B, BS-2A	1.5	3.5	13
DP-6 DEV	OS-2, BS-3	0.6	2.8	15
DP-7 DEV	OS-3, BS-5	2.1	8.2	38
DP-8 DEV	OS-4, OS-5, OS-6, BS-7, BS-10, Release from Exist. HFR Pond 16	20.9	70.4	284
DP-9 DEV	OS-7, BS-12	1.3	5.0	23
DP-10 DEV	OS-8, OS-10, OS-11, BS-13, BS-14	10.7	32.0	143
DP-11 DEV	BS-16	4.6	11.8	36
DP-12 DEV	DP-11, 1.0 Ac. Portion of BS-17 and BS-15	4.2	11.8	46
TOTAL INFLOW TO POND 4 (UD Detention hydrograph)	**DP-10, DP-12, BS-17, OS-9**	**10**	**16**	**217**
DP-13 DEV	**Release from FHN Pond 4**	**0.3**	**0.3**	**142**
DP-14 DEV	BS-18	3.5	12.4	56
DP-15 DEV	BS-19	2.1	4.6	15
DP-16 DEV	DP-14, DP-15, BS-20, BS-21, BS-22, BS-23	25.0	78.0	362
TOTAL INFLOW TO FHN POND 8 (Full Build-out) (UD Detention hydrograph)	**DP-10, DP-12, BS-17, OS-9**	**24**	**37**	**390**
DP-17 DEV (Full Build-out)	**Release from FHN Pond 8**	**0.8**	**1.0**	**253**
TOTAL INFLOW TO FHN POND 8 (Filing 1 Only) (UD Detention hydrograph)	**DP-10, DP-12, BS-17, OS-9**	**9**	**14**	**301**
DP-17 DEV (Filing 1 Only)	**Release from FHN Pond 8**	**0.4**	**0.5**	**219**

DESIGN POINTS SURFACE ROUTING SUMMARY - DEVELOPED CONDITIONS

Design Point (label)	**Contributing Basins**	**Q 2 Yr.** Q (cfs)	**Q 5 Yr.** Q (cfs)	**Q 100 Yr.** Q (cfs)
DP-18 DEV	BS-28, BS-29, BS-30, OS-18	5.0	21.6	115
DP-19 DEV	BS-27, OS-17, Release from DP-18	3.8	16.8	126
DP-20 DEV	CC-1A, OS-12	3.2	14.3	88
DP-21 DEV	CC-2A, OS-13	2.1	10.5	62
DP-22 DEV	CC-2B, Release from DP-21	3.7	16.6	92
DP-23 DEV	CC-3, OS-14	2.5	13.0	84
DP-24 DEV	CC-4C (Pre-Dev.), CC-5	1.9	8.4	45
TOTAL INFLOW TO POND 12 (UD Detention hydrograph)	**CC-4C, CC-5, CC-6**	**6**	**9**	**85**
DP-25 DEV	**Release from FHN Pond 12**	**0.2**	**0.3**	**45**
DP-26 DEV	CC-8, CC-10	3.0	15.9	102
DP-27 DEV	CC-15, CC-20	4.3	17.2	81
DP-28 DEV	CC-13A, OS-15	4.6	19.8	110
DP-29 DEV	CC-13B, CC-13C, Release from DP-28	5.8	26.6	155
DP-30 DEV	CC-18	0.7	2.2	10
DP-31 DEV	CC-19, Release from DP-30	0.9	3.2	15
DP-32 DEV	CC-17, OS-16	2.0	7.8	40
DP-33 DEV	CC-23, CC-24	3.6	14.4	69
DP-34 DEV	CC-26, CC-27, CC-28 and Release from CC-16 & DP-32	6.0	23.5	168



BASIN SUMMARY - DEVELOPED CONDITIONS

BASIN (label)	AREA (acres)	COMPOSITE CN	TOTAL LAG TIME (hours)	Q 2 Yr. (cfs)	Q 5 Yr. (cfs)	Q 100 Yr. (cfs)
OS-1A	4.40	61.0	0.20	0.4	1.6	7.7
OS-1B	5.60	61.0	0.21	0.5	1.9	9.4
EX-DP-3 (Pre-Dev.)	36.00	60.0	0.25	0.5	4.8	41.3
OS-2	2.90	61.0	0.20	0.1	0.6	4.0
OS-3	10.20	65.0	0.19	1.0	3.8	17.9
OS-4	32.90	65.0	0.23	2.8	11.2	53.6
OS-5	29.70	65.0	0.39	1.9	7.1	37.0
OS-6	9.20	65.0	0.21	0.9	3.2	15.5
OS-7	5.00	65.0	0.18	0.5	2.0	9.0
BS-1A	3.50	65.0	0.17	0.4	1.4	6.3
BS-1B	8.90	65.0	0.20	0.4	2.4	13.8
BS-2	1.90	89.0	0.35	2.9	4.2	8.4
BS-2A	0.80	89.0	0.13	1.2	1.8	3.5
BS-2B	0.90	89.0	0.12	1.4	2.0	4.0
BS-3	6.20	65.0	0.20	0.6	2.3	10.8
BS-4	13.00	67.0	0.23	1.9	5.5	23.6
BS-5	11.20	65.0	0.18	1.1	4.4	20.1
BS-6	1.20	89.0	0.09	1.9	2.8	5.4
BS-7	2.90	65.0	0.13	4.4	6.4	12.8
BS-8	1.00	89.0	0.12	1.6	2.2	4.5
BS-9	1.50	89.0	0.13	2.3	3.3	6.6
BS-10	4.50	65.0	0.24	6.0	8.7	17.5
BS-11	0.90	89.0	0.08	1.5	2.1	4.1
BS-12	7.70	65.0	0.19	0.8	3.0	13.8

DESIGN POINTS SURFACE ROUTING SUMMARY - DEVELOPED CONDITIONS

Design Point (label)	Contributing Basins	Q 2 Yr. Q (cfs)	Q 5 Yr. Q (cfs)	Q 100 Yr. Q (cfs)
DP-1 DEV	OS-1A, BS-2B	1.6	3.4	11
DP-2 DEV	DP-1, BS-4	3.2	8.8	35
TOTAL INFLOW TO POND 1 (UD Detention hydrograph)	**DP-1, DP-2, BS-1A**	**4**	**7**	**38**
DP-3 DEV (Pond Pack routing)	**OS-2, BS-3, BS-1B, Release from FHN Pond 1**	**1**	**6**	**39**
DP-4 DEV	BS-2	2.9	4.2	8
DP-5 DEV	OS-1B, BS-2A	1.5	3.5	13
DP-6 DEV	OS-2, BS-3	0.6	2.8	15
DP-7 DEV	OS-3, BS-5	2.1	8.2	38
DP-8 DEV	OS-4, OS-5, OS-6, BS-7, BS-10, Release from Exist. HFR Pond 16	20.9	70.4	284
DP-9 DEV	OS-7, BS-12	1.3	5.0	23

LEGEND

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

N

200 100 0 200 400

SCALE: 1" = 200'

CLASSIC CONSULTING ENGINEERS & SURVEYORS SM
619 N. Cascade Avenue, Suite 200 (719)785-0790
Colorado Springs, Colorado 80903 (719)785-0799 (Fax)

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

DESIGNED BY	MAW	SCALE	DATE 10-20-17
DRAWN BY	MAW	(H) 1"= 200'	SHEET 1 OF 4
CHECKED BY		(V) 1"= N/A	JOB NO. 1096.11

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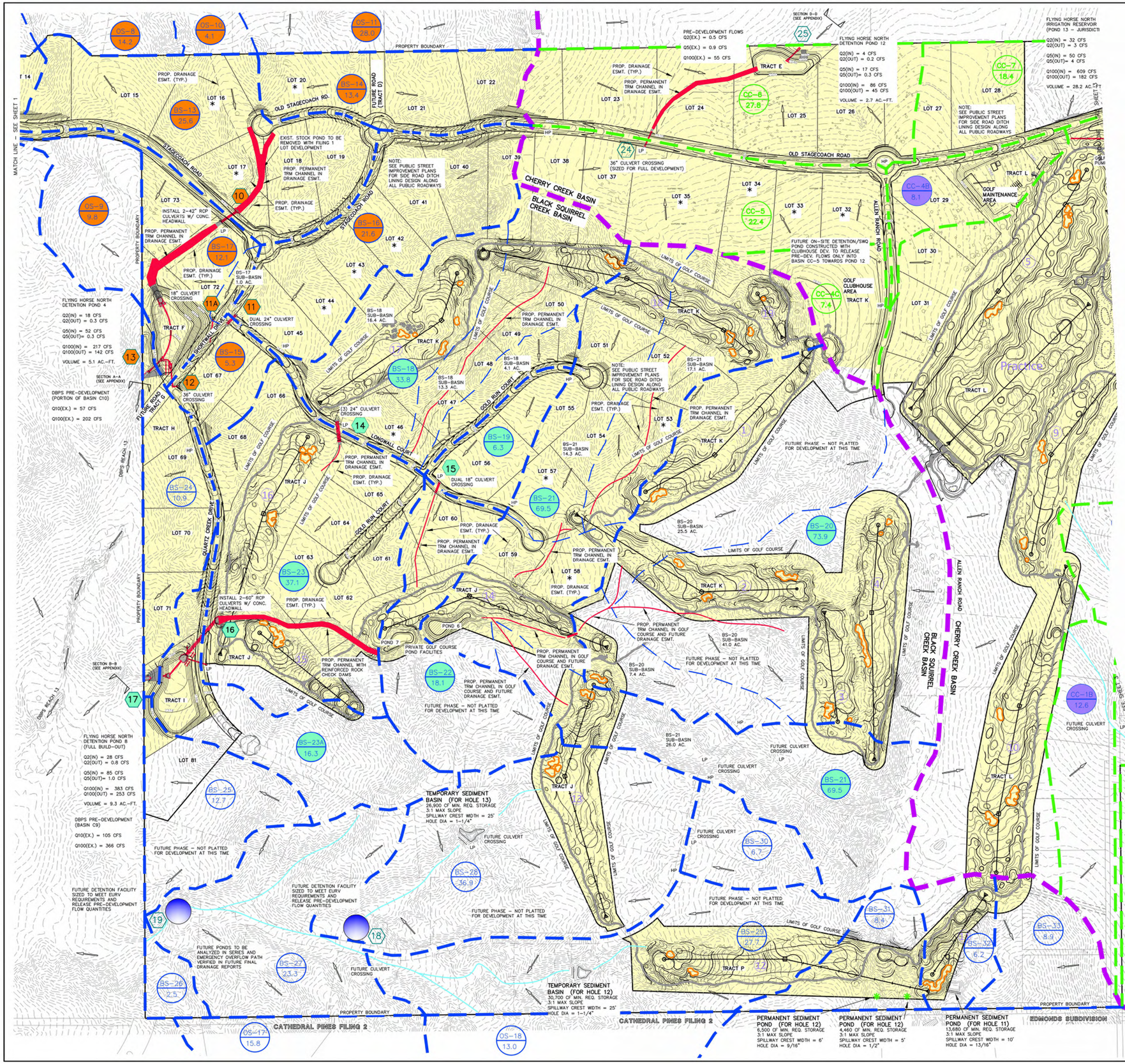


BASIN SUMMARY - DEVELOPED CONDITIONS

BASIN (label)	AREA (acres)	COMPOSITE CN	TOTAL LAG TIME (hours)	Q 2 Yr. (cfs)	Q 5 Yr. (cfs)	Q 100 Yr. (cfs)
OS-8	14.20	65.0	0.27	2.1	6.2	24.7
OS-9	9.80	60.0	0.37	0.1	1.0	9.1
OS-10	4.10	65.0	0.17	0.7	2.1	8.2
OS-11	28.00	65.0	0.35	2.4	8.2	38.7
OS-12	66.10	62.7	0.37	2.2	11.9	75.8
OS-13	36.90	63.0	0.33	1.4	7.4	45.0
OS-14	26.40	62.0	0.31	0.7	4.6	31.0
OS-15	70.80	63.9	0.38	3.3	14.8	84.2
OS-16	4.50	65.0	0.24	0.4	1.5	7.2
OS-17	15.80	65.0	0.19	1.6	5.9	27.7
OS-18	13.00	65.0	0.20	1.3	4.7	22.6
BS-13	25.60	65.0	0.23	3.7	10.2	40.7
BS-14	13.40	65.0	0.23	2.6	6.8	26.5
BS-15	5.30	65.0	0.19	1.6	3.7	12.2
BS-16	21.60	65.0	0.34	4.6	11.8	44.1
BS-17	12.10	65.0	0.21	3.1	7.7	28.7
BS-18	33.80	63.6	0.41	3.5	12.4	56.0
BS-19	6.30	65.0	0.19	2.1	4.6	15.0
BS-20	73.90	63.4	0.31	7.4	24.6	112.4
BS-21	69.50	64.3	0.35	7.8	23.9	103.0
BS-22	18.10	64.4	0.22	3.7	9.6	36.5
BS-23	37.10	63.3	0.33	4.5	13.6	58.2
BS-23A	16.30	64.4	0.29	5.5	12.0	38.3
BS-24	10.90	63.0	0.17	0.6	3.3	17.6
EX-24 (Pre-Dev.)	13.20	60.0	0.17	0.2	2.2	17.8
BS-25	12.70	63.0	0.23	0.4	2.7	17.3
BS-26	2.50	60.0	0.18	0.0	0.4	3.4
BS-27	23.30	65.0	0.22	2.1	8.0	38.8
BS-28	36.90	64.4	0.32	2.2	9.3	49.4
BS-29	27.70	64.0	0.33	1.4	6.5	35.9
BS-30	6.70	65.0	0.20	0.7	2.4	11.7
BS-31	8.40	62.5	0.23	0.3	1.9	11.8
BS-32	6.20	62.6	0.20	0.3	1.6	9.4
BS-33	8.90	64.7	0.19	0.8	3.2	15.3
CC-1A	9.80	65.0	0.23	0.8	3.3	16.9
CC-1B	12.60	64.9	0.25	1.0	4.0	19.4
CC-2A	11.00	66.0	0.22	1.0	3.8	18.3
CC-2B	20.80	65.0	0.22	1.9	7.1	34.6
CC-2C	6.40	65.0	0.18	0.7	2.5	11.5
CC-3	52.50	63.1	0.43	1.8	8.9	54.5
CC-4A	108.70	62.6	0.44	15.4	39.0	158.0
CC-4B	8.10	76.1	0.26	4.0	7.3	20.6
CC-4C (Pre-Dev.)	7.40	61.0	0.13	0.2	1.8	11.2
CC-5	22.40	65.0	0.26	1.8	7.1	34.3
CC-6	27.80	65.0	0.25	2.3	9.1	43.2
CC-7	18.40	65.0	0.29	1.4	5.4	27.0

DESIGN POINTS SURFACE ROUTING SUMMARY - DEVELOPED CONDITIONS

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

LEGEND

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

N

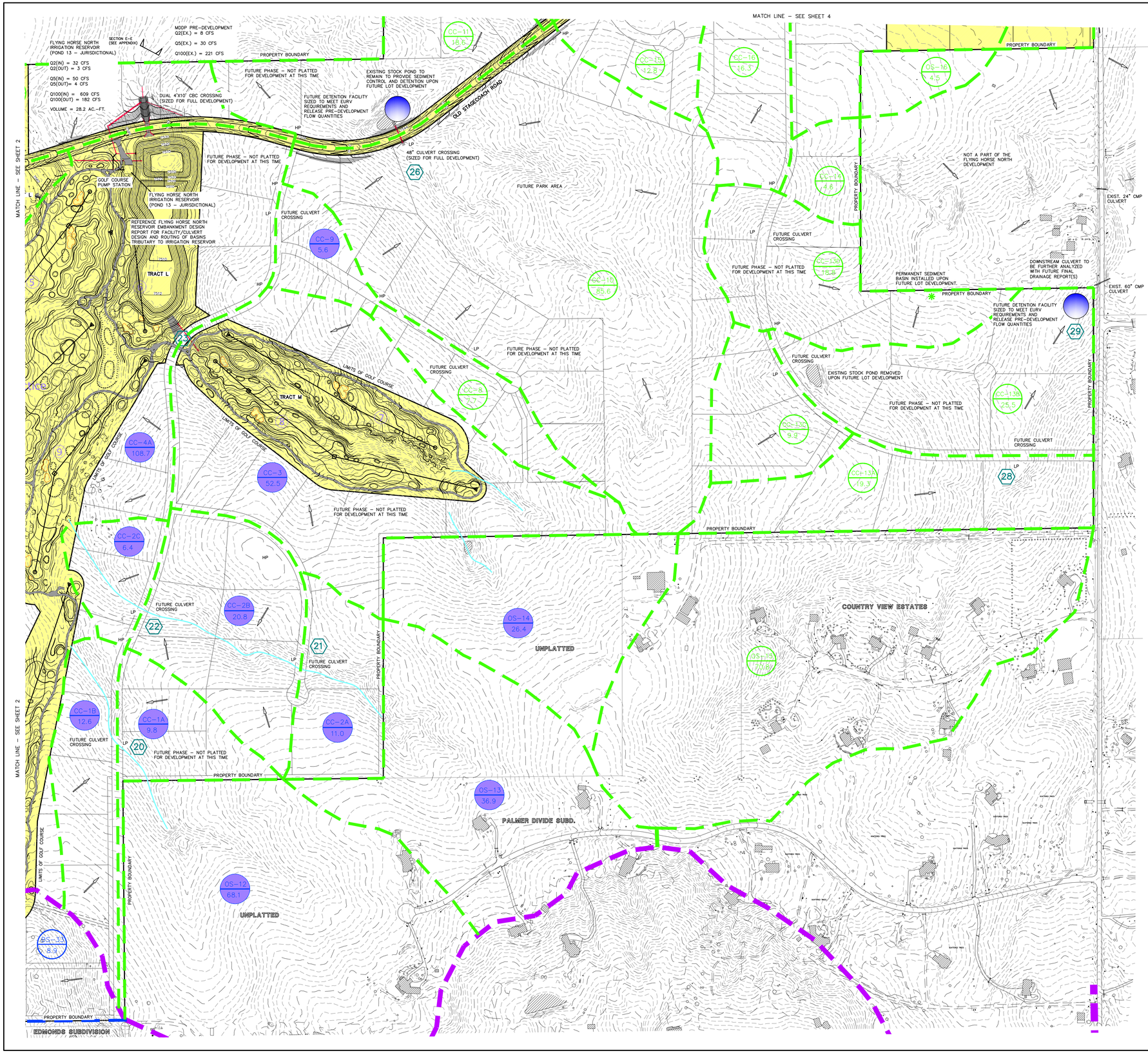
200 100 0 200 400

SCALE: 1" = 200'

CLASSIC CONSULTING ENGINEERS & SURVEYORS SM
619 N. Cascade Avenue, Suite 200
Colorado Springs, Colorado 80903
(719)785-0790
(719)785-0799 (Fax)

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

DESIGNED BY	MAW	SCALE		DATE	10-25-17
DRAWN BY	MAW	(H) 1"= 200'		SHEET	2 OF 4
CHECKED BY		(V) 1"= N/A		JOB NO.	1096.11



BASIN SUMMARY - DEVELOPED CONDITIONS

BASIN (label)	AREA (acres)	COMPOSITE CN	TOTAL LAG TIME (hours)	Q 2 Yr. (cfs)	Q 5 Yr. (cfs)	Q 100 Yr. (cfs)
OS-8	14.20	65.0	0.27	2.1	6.2	24.7
OS-9	9.90	60.0	0.37	0.1	1.0	9.1
OS-10	4.10	65.0	0.17	0.7	2.1	9.2
OS-11	28.00	65.0	0.35	2.4	8.2	38.7
OS-12	68.10	62.7	0.37	2.2	11.9	75.8
OS-13	36.90	63.0	0.33	1.4	7.4	45.0
OS-14	26.40	62.2	0.31	0.7	4.6	31.9
OS-15	70.80	63.9	0.38	3.3	14.8	84.2
OS-16	4.50	65.0	0.24	0.4	1.5	7.2
OS-17	15.80	65.0	0.19	1.6	5.9	27.7
OS-18	13.00	65.0	0.20	1.3	4.7	22.6
CC-1A	9.80	65.0	0.23	0.8	3.3	16.9
CC-1B	12.60	64.8	0.25	1.0	4.0	19.4
CC-2A	11.00	65.0	0.22	1.0	3.8	18.3
CC-2B	20.80	65.0	0.22	1.9	7.1	34.6
CC-2C	6.40	65.0	0.18	0.7	2.5	11.5
CC-3	52.50	63.1	0.43	1.8	8.8	54.5
CC-4A	108.70	62.6	0.44	15.4	39.0	156.0
CC-4B	8.10	76.1	0.26	4.0	7.3	20.6
CC-4C (Pre-Dev.)	7.40	61.9	0.13	0.2	1.8	11.2
CC-5	22.40	65.0	0.26	1.8	7.1	34.3
CC-6	27.80	65.0	0.25	2.3	9.1	43.2
CC-7	18.40	65.0	0.29	1.4	5.4	27.0
CC-8	7.70	65.0	0.25	0.6	2.5	12.0
CC-9	5.60	65.0	0.19	0.6	2.1	9.8
CC-10	85.60	62.5	0.39	2.6	14.1	91.9
CC-11	18.60	63.1	0.21	0.9	5.0	29.1
CC-12	12.20	65.0	0.26	1.0	3.9	18.7
CC-13A	19.30	65.0	0.31	1.4	5.4	27.3
CC-13B	25.50	65.0	0.31	1.8	7.2	36.1
CC-13C	9.90	65.0	0.22	0.9	3.4	16.5
CC-13D	18.80	65.0	0.25	1.5	6.2	29.2
CC-14	4.60	65.0	0.21	0.4	1.6	7.8
CC-15	12.80	65.0	0.24	1.1	4.3	20.4
CC-16	16.30	65.0	0.30	1.2	4.6	23.6
CC-17	25.00	65.0	0.35	1.7	6.5	32.8
CC-18	6.20	66.5	0.30	0.7	2.2	9.7
CC-19	3.70	65.0	0.25	0.3	1.2	5.8
CC-20	39.30	65.0	0.25	3.2	12.9	61.9
CC-21	6.20	61.0	0.20	0.1	1.2	9.5
CC-22	13.80	65.0	0.25	1.1	4.5	21.4
CC-23	5.70	64.7	0.33	0.4	1.5	7.7
CC-24	39.60	65.0	0.25	3.3	13.0	61.5
CC-25	3.50	65.0	0.23	0.3	1.2	5.7
CC-26	16.70	65.0	0.26	1.4	5.3	25.6
CC-27	18.90	64.4	0.31	1.2	4.9	25.8
CC-28	154.80	64.4	0.63	6.5	24.7	136.3

DESIGN POINTS SURFACE ROUTING SUMMARY - DEVELOPED CONDITIONS

Design Point (label)	Contributing Basins	Q 2 Yr. Q (cfs)	Q 5 Yr. Q (cfs)	Q 100 Yr. Q (cfs)
DP-20 DEV	CC-1A, OS-12	3.2	14.3	88
DP-21 DEV	CC-2A, OS-13	2.1	10.5	62
DP-22 DEV	CC-2B. Release from DP-21	3.7	16.6	92
DP-23 DEV	CC-3, OS-14	2.5	13.0	94
DP-24 DEV	CC-4C (Pre-Dev.), CC-5	1.9	9.4	45
TOTAL INFLOW TO POND 12 (UD Detention hydrograph)	**CC-4C, CC-5, CC-6**	**5**	**9**	**85**
DP-25 DEV	**Release from FHN Pond 12**	**0.2**	**0.3**	**45**
DP-26 DEV	CC-8, CC-10	3.0	15.9	102
DP-27 DEV	CC-15, CC-20	4.3	17.2	81
DP-28 DEV	CC-13A, OS-15	4.6	19.8	110
DP-29 DEV	CC-13B, CC-13C, Release from DP-28	5.8	28.6	155
DP-30 DEV	CC-18	0.7	2.2	10
DP-31 DEV	CC-19. Release from DP-30	0.9	3.2	15
DP-32 DEV	CC-17, OS-16	2.0	7.5	40
DP-33 DEV	CC-23, CC-24	3.6	14.4	69
DP-34 DEV	CC-26, CC-27, CC-28 and Release from CC-16 & DP-32	6.0	23.5	168

LEGEND

DESCRIPTION	SYMBOL
EXISTING GROUND CONTOUR	6910
PROPOSED FINISHED CONTOUR	6910
BASIN BOUNDARY EAST CHERRY CREEK	
MAJOR BASIN BOUNDARY	
DESIGN POINT	3
BASIN IDENTIFIER / AREA IN ACRES	BB 10.0
EXISTING DIRECTION OF FLOW	
PROPOSED DIRECTION OF FLOW	
STORM SEWER	
FILING NO. 1 PLAT AREA	

N

200 100 0 200 400

SCALE: 1" = 200'

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

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

CLASSIC CONSULTING ENGINEERING & SURVEYING

DESIGNED BY	MAW	SCALE		DATE	10-25-17
DRAWN BY	MAW	(H) 1"= 200'		SHEET	3 OF 4
CHECKED BY		(V) 1"= N/A		JOB NO.	1096.11

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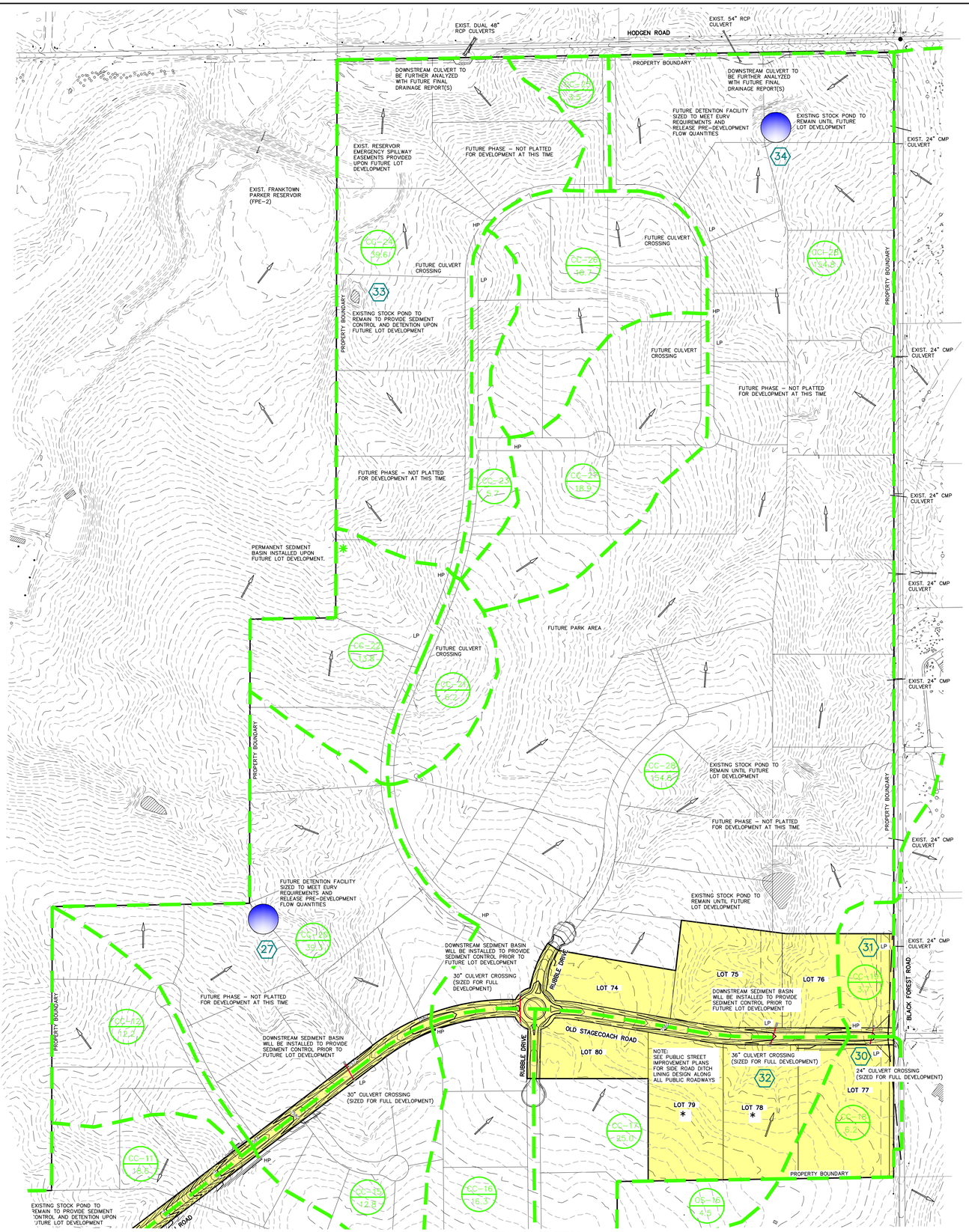

BASIN SUMMARY - DEVELOPED CONDITIONS

BASIN (label)	AREA (acres)	COMPOSITE CN	TOTAL LAG TIME (hours)	Q 2 Yr. (cfs)	Q 5 Yr. (cfs)	Q 100 Yr. (cfs)
OS-16	4.50	65.0	0.24	0.4	1.5	7.2
OS-17	15.80	65.0	0.19	1.6	5.9	27.7
OS-18	13.00	65.0	0.20	1.3	4.7	22.6
CC-11	18.60	63.1	0.21	0.9	5.0	28.1
CC-12	12.20	65.0	0.26	1.0	3.9	18.7
CC-13A	19.30	65.0	0.31	1.4	5.4	27.3
CC-13B	25.50	65.0	0.31	1.8	7.2	36.1
CC-13C	9.90	65.0	0.22	0.9	3.4	16.5
CC-13D	18.80	65.0	0.25	1.5	6.2	29.2
CC-14	4.60	65.0	0.21	0.4	1.6	7.8
CC-15	12.80	65.0	0.24	1.1	4.3	20.4
CC-16	16.30	65.0	0.30	1.2	4.6	23.6
CC-17	25.00	65.0	0.35	1.7	6.5	32.8
CC-18	6.20	66.5	0.30	0.7	2.2	9.7
CC-19	3.70	65.0	0.25	0.3	1.2	5.8
CC-20	39.30	65.0	0.25	3.2	12.9	61.0
CC-21	6.20	61.0	0.20	0.1	1.2	8.5
CC-22	13.80	65.0	0.25	1.1	4.5	21.4
CC-23	5.70	64.7	0.33	0.4	1.5	7.7
CC-24	39.60	65.0	0.25	3.3	13.0	61.5
CC-25	3.50	65.0	0.23	0.3	1.2	5.7
CC-26	16.70	65.0	0.26	1.4	5.3	25.6
CC-27	18.90	64.4	0.31	1.2	4.9	25.8
CC-28	154.80	64.4	0.63	6.5	24.7	136.3

DESIGN POINTS SURFACE ROUTING SUMMARY - DEVELOPED CONDITIONS

Design Point (label)	Contributing Basins	Q 2 Yr. Q (cfs)	Q 5 Yr. Q (cfs)	Q 100 Yr. Q (cfs)
DP-27 DEV	CC-15, CC-20	4.3	17.2	81
DP-28 DEV	CC-13A, OS-15	4.6	19.8	110
DP-29 DEV	CC-13B, CC-13C, Release from DP-28	5.8	26.6	155
DP-30 DEV	CC-18	0.7	2.2	10
DP-31 DEV	CC-19, Release from DP-30	0.9	3.2	15
DP-32 DEV	CC-17, OS-16	2.0	7.8	40
DP-33 DEV	CC-23, CC-24	3.6	14.4	69
DP-34 DEV	CC-26, CC-27, CC-28 and Release from CC-16 & DP-32	6.0	23.5	168

LEGEND

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

N

200 100 0 200 400

SCALE: 1" = 200'

CLASSIC CONSULTING ENGINEERS & SURVEYORS SM
619 N. Cascade Avenue, Suite 200
Colorado Springs, Colorado 80903
(719)785-0790
(719)785-0799 (Fax)

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

CLASSIC CONSULTING ENGINEERS & SURVEYORS

DESIGNED BY	MAW	SCALE		DATE	10-17-17
DRAWN BY	MAW	(H) 1"= 200'		SHEET	4 OF 4
CHECKED BY		(V) 1"= N/A		JOB NO.	1096.11

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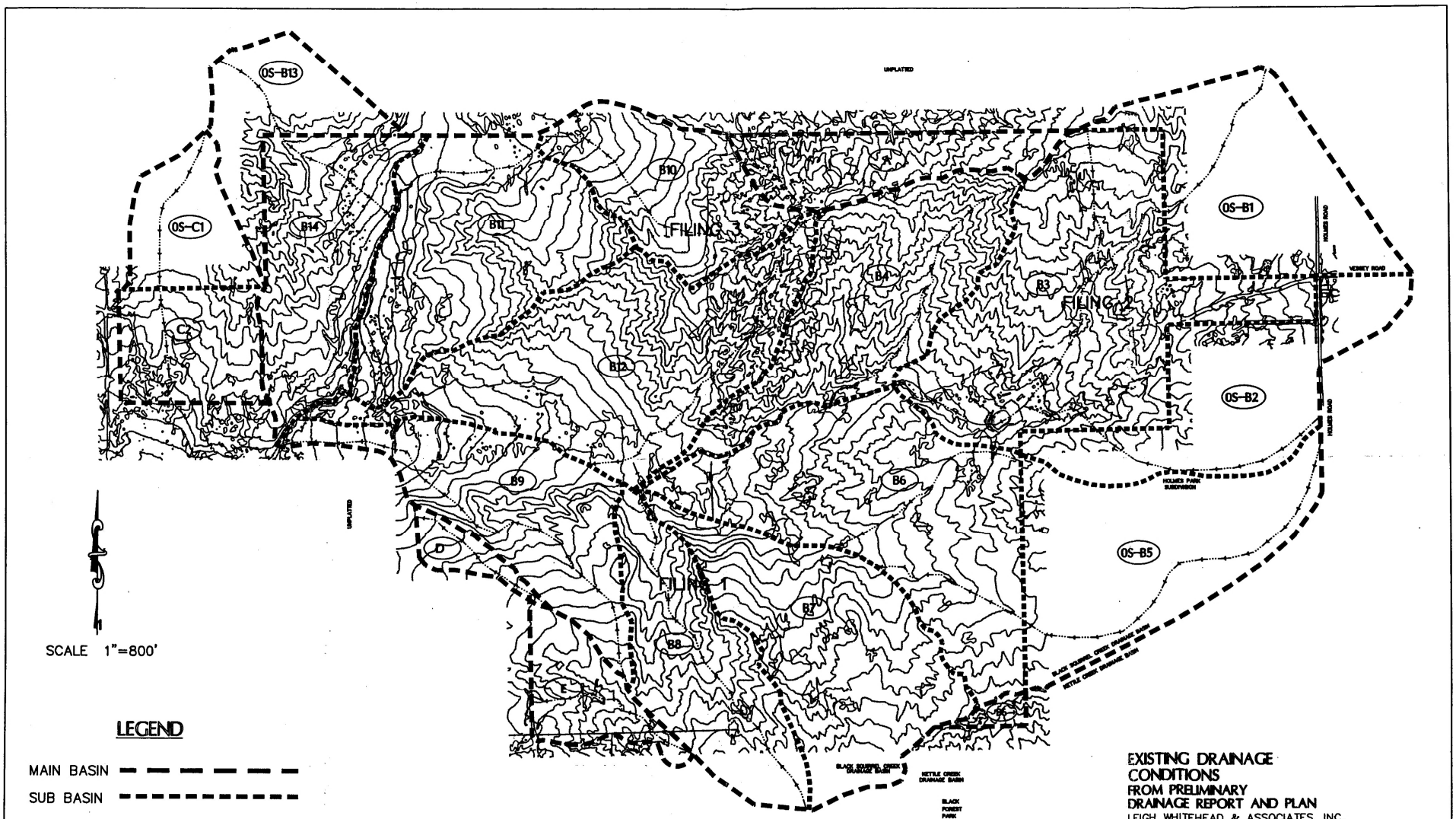
NEW DOC

FINAL
DRAINAGE REPORT AND PLAN
FOR
CATHEDRAL PINES SUBDIVISION FILING NO. 2

March, 2005
August, 2005
July, 2005
July, 2005

PYEATTS ENGINEERING
Colorado Springs - Pueblo, Colorado - Carlsbad, New Mexico



EXISTING DRAINAGE CONDITIONS
FROM PRELIMINARY DRAINAGE REPORT AND PLAN

LEIGH WHITEHEAD & ASSOCIATES, INC.
2906 BEACON STREET
COLORADO SPRINGS, CO 80907
719-636-5179

04040
CATHEDRAL PINES SUB.

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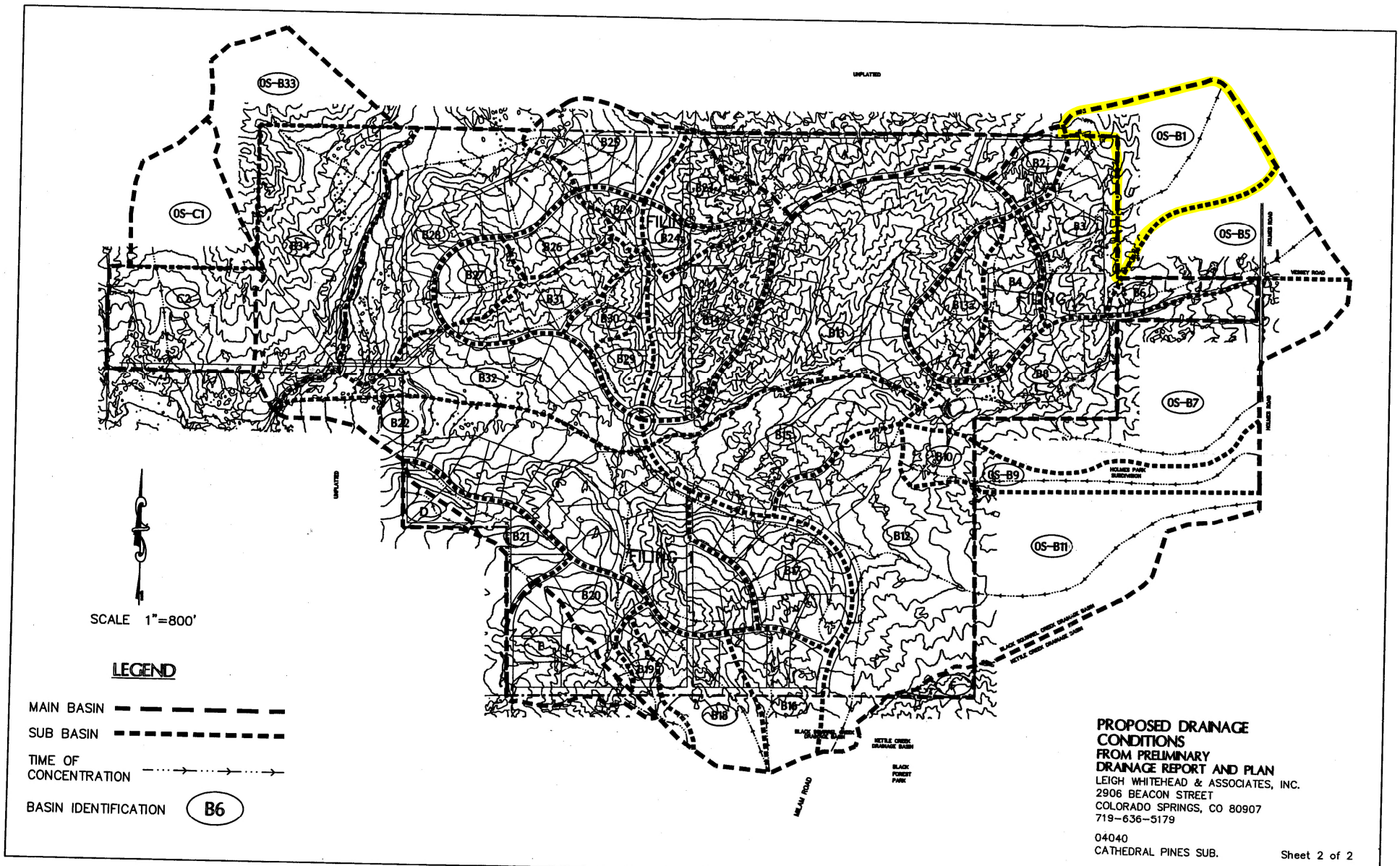


PROPOSED DRAINAGE CONDITIONS
FROM PRELIMINARY DRAINAGE REPORT AND PLAN

LEIGH WHITEHEAD & ASSOCIATES, INC.
2906 BEACON STREET
COLORADO SPRINGS, CO 80907
719-636-5179

04040
CATHEDRAL PINES SUB.

RUNOFF COMPUTATIONS
RATIONAL METHOD

CATHEDRAL PINES SUBDIVISION FILING NO. 2
WEST OF HOLMES ROAD & NORTH OF SHOUP ROAD
Section's 1 and 2, T12S, R66W
EL PASO COUNTY, COLORADO

PYEATTS ENGINEERING
Engineers, Surveyors & Planners
COLORADO SPRINGS, COLORADO

TABLE A: **CURRENT CONDITIONS** 11-Jun-05 SHEET 1 OF 2

BASIN	AREA	SOIL TYPE	C 5 / C 100	GEOMETRY LENGTH / SLOPE	GEOMETRY HEIGHT	Tt 5 / Tt 100	V / Tt	tc 5 / tc 100	i 5 / i 100	Q5	Q100	COMMENTS
A1	5.53	B	0.18	360	25.0	17.22	3.18	19.42	2.96	2.9		
		26	0.25	6.94		15.91	2.20	18.11	5.36		7.4	
A2	6.35	B	0.18	300	25.0	14.80	3.49	17.81	3.10	3.5		
		26	0.25	8.33		13.68	3.01	16.69	5.59		8.9	
A3	2.40	B	0.18	250	17.0	14.45	2.99	16.51	3.22	1.4		
		26	0.25	6.80		13.35	2.06	15.41	5.81		3.5	
A4	2.21	B	0.18	170	8.0	13.45	3.44	15.97	3.27	1.3		
		26	0.25	4.71		12.43	2.52	14.95	5.90		3.3	
A5	3.62	B	0.18	320	29.0	14.87	2.90	17.03	3.17	2.1		
		26	0.25	9.06		13.74	2.16	15.90	5.73		5.2	
A6	4.75	B	0.18	310	21.0	16.11	3.25	18.29	3.05	2.6		
		26	0.25	6.77		14.89	2.18	17.07	5.53		6.6	
A7	2.20	B	0.18	220	15.0	13.54	3.30	15.91	3.28	1.3		
		26	0.25	6.82		12.51	2.37	14.88	5.91		3.3	
A8	5.73	B	0.18	210	17.0	12.50	3.74	16.15	3.25	3.4		
		26	0.25	8.10		11.55	3.65	15.20	5.85		8.4	
A (Onsite)	32.78	B	0.18	360	25.0	17.22	3.18	19.42	2.96	17.5		
		26	0.25	6.94		15.91	2.20	18.11	5.36		43.9	
A (Offsite)	34.25	B	0.18	600	40.0	22.53	4.66	40.40	1.93	11.9		Total Offsite A
		26	0.25	6.67		20.82	17.87	38.69	3.47		29.7	
A	67.03	B	0.18	600	40.0	22.53	4.66	40.40	1.93	23.3		
		26	0.25	6.67		20.82	17.87	38.69	3.47		58.1	
OS-B1	57.67	B	0.25	300	15.0	16.19	4.66	21.91	2.77	40.0		
		26	0.32	5.00		14.85	5.72	20.57	5.01		92.5	
OS-B2	84.67	B	0.25	300	14.0	16.56	Varies	31.50	2.25	47.7		
		26	0.32	4.67		15.20	14.94	30.14	4.04		109.4	
B3	87.98	B	0.18	580	47.0	20.77	3.80	31.65	2.25	35.6		
		26	0.25	8.10		19.19	10.88	30.07	4.04		89.0	

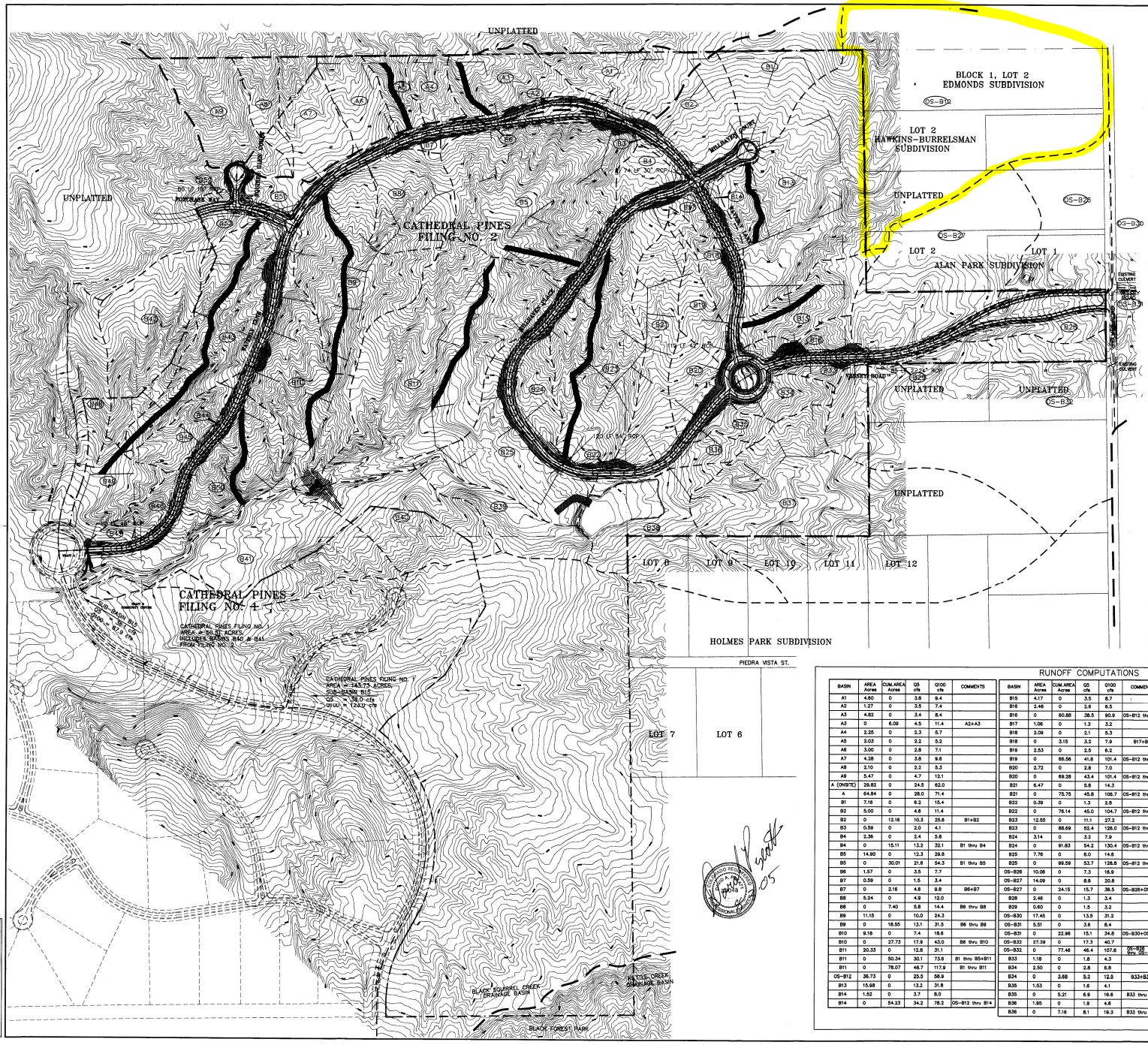
RUNOFF COMPUTATIONS
RATIONAL METHOD

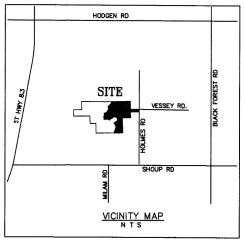
CATHEDRAL PINES SUBDIVISION FILING NO. 2
WEST OF HOLMES ROAD & NORTH OF SHOUP ROAD
Section's 1 and 2, T12S, R66W
EL PASO COUNTY, COLORADO

PYEATTS ENGINEERING
Engineers, Surveyors & Planners
COLORADO SPRINGS, COLORADO

TABLE A: **PROPOSED CONDITIONS** 11-Jun-05 SHEET 3 OF 8

BASIN	AREA	SOIL TYPE	C 5 / C 100	GEOMETRY LENGTH / SLOPE	GEOMETRY HEIGHT	Tt 5 / Tt 100	V / Tt	tc 5 / tc 100	i 5 / i 100	Q5	Q100	COMMENTS
B10	27.73	B	0.27	80	1.0	12.90	Varies	28.44	2.39	17.9		B6 through B10
(cum.)		26	0.36	1.25		11.50	15.54	27.04	4.30		43.0	
B11	20.33	B	0.23	300	30.0	13.18	Varies	22.38	2.74	12.8		
		26	0.31	10.00		11.97	9.20	21.17	4.94		31.1	
B11	50.34	B	0.25	300	28.0	13.17	Varies	28.46	2.39	30.1		B1 through B5 & B11
(cum.)		26	0.34	9.33		11.78	15.29	27.07	4.30		73.6	
B11	78.07	B	0.26	300	28.0	13.02	Varies	28.31	2.40	48.7		B1 through B11
(cum.)		26	0.35	9.33		11.62	15.29	26.91	4.32		117.9	
OS-B12	36.73	B	0.25	300	15.0	16.19	4.66	21.91	2.77	25.5		
		26	0.32	5.00		14.85	5.72	20.57	5.01		58.9	
B13	15.98	B	0.27	300	34.0	12.07	Varies	18.35	3.05	13.2		
		26	0.36	11.33		10.76	6.28	17.04	5.53		31.8	
B14	1.52	B	0.60	110	3.0	7.04	Varies	9.96	4.06	3.7		
		26	0.70	2.73		5.63	2.92	8.55	7.53		8.0	
B14	54.23	B	0.26	300	12.0	17.22	Varies	27.80	2.42	34.2		OS-B12 through B14
(cum.)		26	0.33	4.00		15.78	10.58	26.36	4.37		78.2	
B15	4.17	B	0.28	300	12.0	16.81	5.26	19.23	2.98	3.5		
		26	0.38	4.00		14.76	2.42	17.18	5.51		8.7	
B16	2.48	B	0.30	300	32.0	11.86	4.52	13.52	3.54	2.6		
		26	0.40	10.67		10.38	1.66	12.04	6.53		6.5	
B16	60.88	B	0.26	300	15.0	16.00	Varies	27.63	2.43	38.5		OS-B12 through B16
(cum.)		26	0.34	5.00		14.47	11.63	26.10	4.39		90.9	
B17	1.06	B	0.30	170	19.0	8.79	4.78	9.52	4.13	1.3		
		26	0.40	11.18		7.70	0.73	8.43	7.58		3.2	
B18	2.09	B	0.30	300	27.0	12.55	Varies	14.56	3.42	2.1		
		26	0.40	9.00		10.98	2.01	12.99	6.31		5.3	
B18	3.15	B	0.30	300	27.0	12.55	Varies	14.56	3.42	3.2		B17 & B18
(cum.)		26	0.40	9.00		10.98	2.01	12.99	6.31		7.9	
B19	2.53	B	0.30	300	21.0	13.63	5.38	15.43	3.33	2.5		
		26	0.40	7.00		11.93	1.80	13.73	6.15		6.2	





N

GRAPHIC SCALE

(IN FEET)
1 inch = 800 ft.
CONTOUR INTERVAL = 2 FT

DESIGN POINT — DP - 1 — AREA
5 YR FLOW — 5.6 — 26.9 — 100 YR FLOW

OS-3B — BASIN
3.4 Ac. — AREA
5 YR FLOW — 22 — 103 — 100 YR FLOW

EXISTING BASIN - MAIN
EXISTING BASIN - SUB
PROPOSED BASIN - MAIN
PROPOSED BASIN - SUB
EXISTING TIME OF CONCENTRATION
PROPOSED TIME OF CONCENTRATION

EASEMENTS:

SIDE AND REAR LOT LINES ARE HEREBY PLATTED WITH A TEN(10) FOOT EASEMENT FOR DRAINAGE AND PUBLIC UTILITIES ONLY, FRONT LOT LINES ARE HEREBY PLATTED WITH A FIFTEEN(15) FOOT EASEMENT FOR DRAINAGE AND PUBLIC UTILITIES ONLY, AND THE SUBDIVISION BOUNDARY IS HEREBY PLATTED WITH A THIRTY(30) FOOT EASEMENT FOR DRAINAGE PURPOSES AND PUBLIC UTILITIES ONLY, WITH THE SOLE RESPONSIBILITY FOR MAINTENANCE BEING VESTED WITH THE PROPERTY OWNERS.

DETENTION POND DATA

	5 YEAR					100 YEAR				
BASIN	DETAIN	IN	OUT	EXIST.	W.S.	DETAIN	IN	OUT	EXIST.	W.S.
B38	33	46	13	66	7425.9	93	113	20	193	7428.5
B40	29	108	79	72	7375.9	80	266	186	213	7379.3

RUNOFF COMPUTATIONS

BASIN	AREA Acres	CUM.AREA Acres	Q5 cfs	Q100 cfs	COMMENTS
A1	4.60	0	3.6	9.4	
A2	1.27	0	3.5	7.4	
A3	4.62	0	3.4	8.4	
A3	0	8.09	4.5	11.4	A2+A3
A4	2.25	0	2.3	5.7	
A5	2.03	0	2.2	5.2	
A6	3.00	0	2.8	7.1	
A7	4.28	0	3.8	9.8	
A8	2.10	0	2.2	5.3	
A9	5.47	0	4.7	12.1	
A (ONSITE)	29.82	0	24.5	62.0	
A	64.84	0	28.0	71.4	
B1	7.16	0	6.2	15.4	
B2	5.00	0	4.6	11.4	
B2	0	12.16	10.3	25.6	B1+B2
B3	0.59	0	2.0	4.1	
B4	2.36	0	2.4	5.8	
B4	0	15.11	13.2	32.1	B1 thru B4
B5	14.90	0	12.3	29.8	
B5	0	30.01	21.6	54.3	B1 thru B5
B6	1.57	0	3.5	7.7	
B7	0.59	0	1.5	3.4	
B7	0	2.16	4.6	9.8	B6+B7
B8	5.24	0	4.9	12.0	
B8	0	7.40	5.8	14.4	B6 thru B8
B9	11.15	0	10.0	24.3	
B9	0	18.55	13.1	31.5	B6 thru B9
B10	9.18	0	7.4	18.6	
B10	0	27.73	17.9	43.0	B6 thru B10
B11	20.33	0	12.8	31.1	
B11	0	50.34	30.1	73.6	B1 thru B5+B11
B11	0	78.07	48.7	117.9	B1 thru B11
OS-B12	36.73	0	25.5	56.9	
B13	15.98	0	13.2	31.8	
B14	1.52	0	3.7	8.0	
B14	0	54.23	34.2	78.2	OS-B12 thru B14
B15	4.17	0	3.5	8.7	
B16	2.48	0	2.6	6.5	
B16	0	60.88	38.5	90.9	OS-B12 thru B16
B17	1.06	0	1.3	3.2	
B18	2.09	0	2.1	5.3	
B18	0	3.15	3.2	7.9	B17+B18
B19	2.53	0	2.5	6.2	
B19	0	66.56	41.6	101.4	OS-B12 thru B19
B20	2.72	0	2.8	7.0	
B20	0	69.28	43.4	101.4	OS-B12 thru B20
B21	6.47	0	5.8	14.3	
B21	0	75.75	45.8	105.7	OS-B12 thru B21
B22	0.39	0	1.3	2.8	
B22	0	76.14	45.0	104.7	OS-B12 thru B22
B23	12.55	0	11.1	27.2	
B23	0	88.69	52.4	126.0	OS-B12 thru B23
B24	3.14	0	3.2	7.9	
B24	0	91.83	54.2	130.4	OS-B12 thru B24
B25	7.76	0	6.0	14.6	
B25	0	99.59	53.7	128.8	OS-B12 thru B25
OS-B26	10.06	0	7.3	16.9	
OS-B27	14.09	0	8.8	20.8	
OS-B27	0	24.15	15.7	36.5	OS-B26+OS-B27
B28	2.46	0	1.3	3.4	
B29	0.60	0	1.5	3.2	
OS-B30	17.45	0	13.5	31.2	
OS-B31	5.51	0	3.6	8.4	
OS-B31	0	22.96	15.1	34.8	OS-B30+OS-B31
OS-B32	27.39	0	17.3	40.7	
OS-B32	0	77.46	46.4	107.8	OS-B26 thru OS-B32
B33	1.18	0	1.8	4.3	
B34	2.50	0	2.8	6.8	
B34	0	3.68	5.2	12.5	B33+B34
B35	1.53	0	1.6	4.1	
B35	0	5.21	6.9	16.6	B33 thru B35
B36	1.95	0	1.9	4.6	
B36	0	7.16	8.1	19.3	B33 thru B36
B37	30.39	0	19.4	45.0	
B37	0	107.85	39.0	96.0	OS-B26 thru OS-B32+B37
B38	10.69	0	6.6	16.2	
B38	0	125.70	46.0	113.0	
B39	4.42	0	2.5	6.2	OS-B1 thru B3
B39	0	130.12	47.0	114.0	OS-B26 thru B39
B39	0	229.71	79.0	193.0	OS-B12 thru B39
B40	7.66	0	5.3	12.7	
B40	0	237.37	81.0	195.0	OS-B12 thru B40
B40	0	315.44	108.0	266.0	B1 thru B40
B41	12.61	0	7.9	19.3	
B41	0	107.84	82.0	274.0	B1 thru B41
B42	8.97	0	8.3	20.3	
B43	8.22	0	8.1	19.9	
B44	0.65	0	2.0	4.1	
B45	2.69	0	2.8	6.9	
B45	0	21.53	19.0	46.6	B42 + B45
B46	1.50	0	2.1	5.1	
B47	0.80	0	1.0	2.5	
B47	0	2.30	3.1	7.4	B46 + B47
B48	4.18	0	4.9	11.9	
B49	3.92	0	4.1	9.9	
B49	0	8.10	8.9	21.6	B48 + B49
B49	0	31.93	26.0	63.3	B42 thru B49
B50	8.54	0	6.3	15.4	
B50	0	40.47	30.9	75.7	B42 thru B50
B50	0	368.52	131.0	321.0	B1 thru B50
B15/FIL 1	0	173.97	43.0	110.0	
B50	0	542.49	167.0	415.0	B1 thru B50,B15
B51	3.08	0	3.3	8.1	
B52	0.73	0	1.0	2.4	
B52	0	3.81	4.0	9.8	B51 + B52
B53	1.17	0	1.8	4.0	

LEIGH WHITEHEAD & ASSOCIATES
2006 BEACON STREET
COLORADO SPRINGS, CO 80907
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SHEET TITLE: FINAL DRAINAGE PLAN PROPOSED CONDITIONS

PROJECT NAME: CATHEDRAL PINES FILING 2

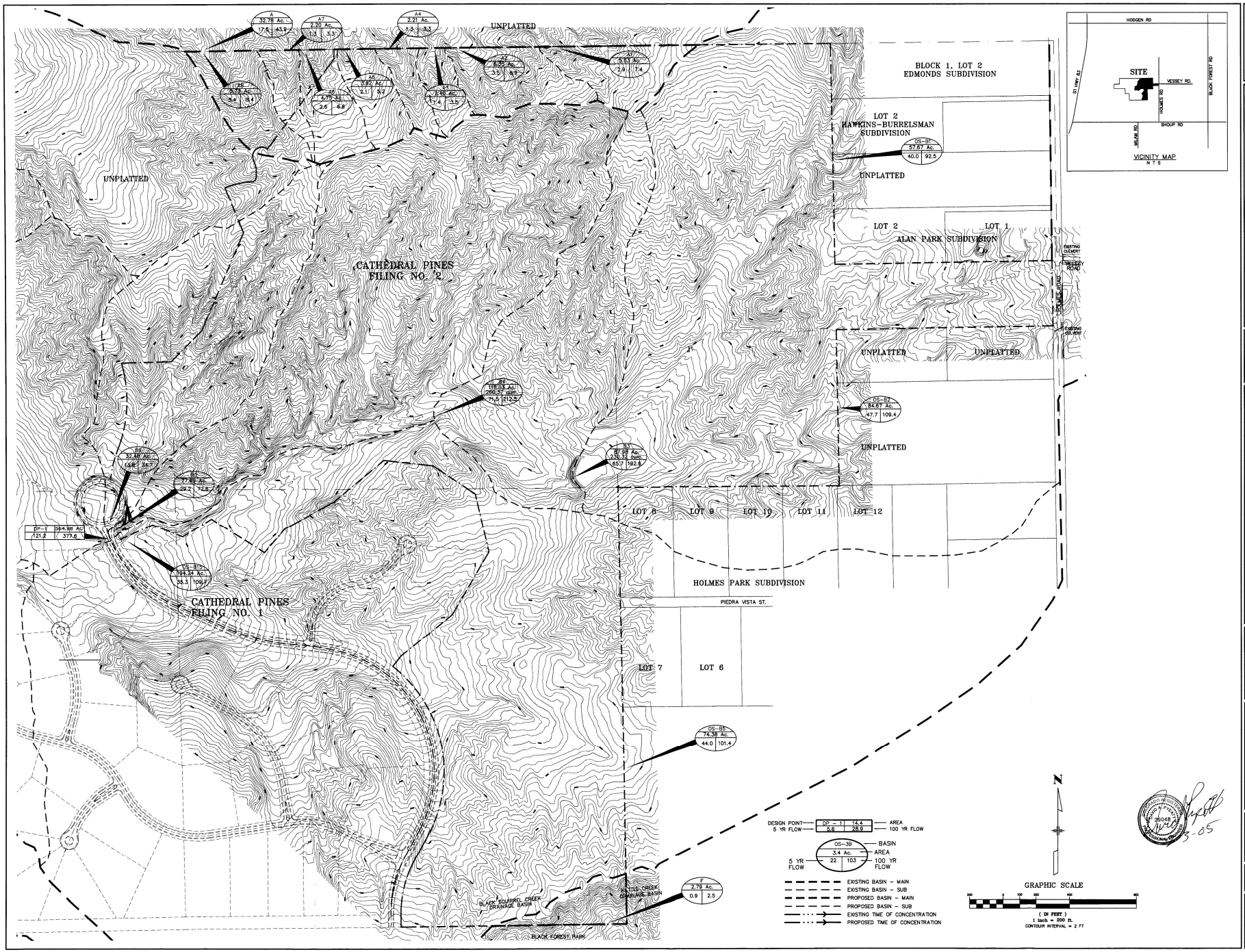
BENCHMARK:
TOP OF 5/8" DIAM. REBAR 25' NORTH AND 80' EAST OF THE SOUTHWEST COR. OF SECTION 1
ELEV=7436.65 (NGVD '88)

REVISIONS:

SCALE: 1"=200'
DATE: 3/10/05
DRAWN BY: CLH/LJ
CHECKED BY: LAB

SHEET NO: 2 OF 2

PROJECT NO: 04080
DRAWING NAME: CP Fil 2 Drainage
VIEW: Proposed



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COLORADO SPRINGS, CO 80907
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SHEET TITLE: FINAL DRAINAGE PLAN EXISTING CONDITIONS

PROJECT NAME: CATHEDRAL PINES FILING 2

BENCHMARK:
TOP OF 5/8" DIAM. REBAR 53' NORTH AND 20' EAST OF THE SOUTHWEST COR. OF SECTION 1
ELEV=7436.65 (NGVD '88)

REVISIONS:

SCALE: 1"=200'
DATE: 3/10/05
DRAWN BY: CLH/LJ
CHECKED BY: LAD

SHEET NO: 1 OF 2

PROJECT NO: 04080
DRAWING NAME: CP Fil 2 Drainage
VIEW: Existing

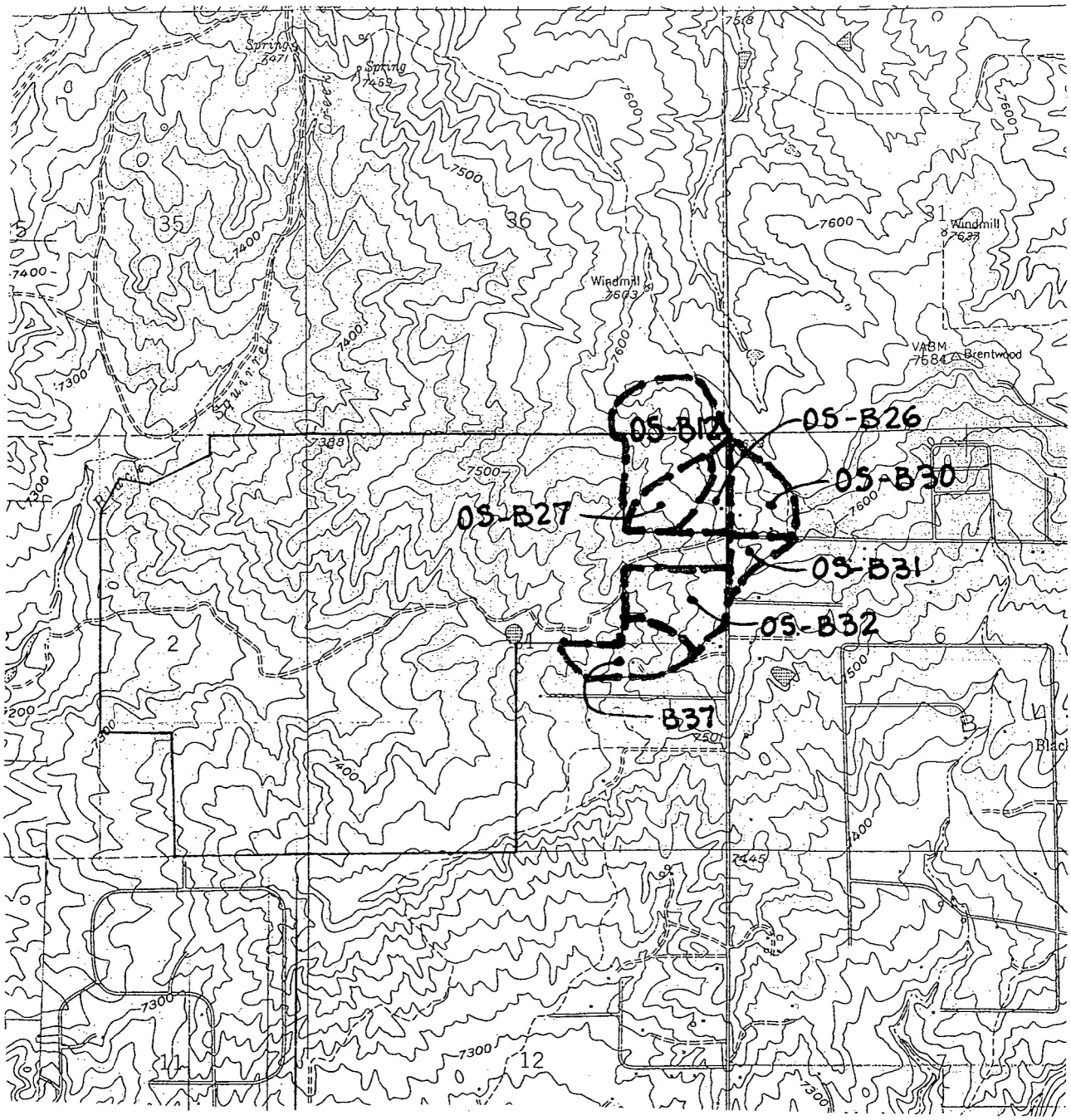
FINAL
DRAINAGE REPORT AND PLAN
FOR
CATHEDRAL PINES SUBDIVISION FILING NO. 2

March, 2005

Leigh
& Whitehead
Associates, Inc.

CONSULTING CIVIL ENGINEERS & SURVEYORS
2906 BEACON STREET
COLORADO SPRINGS, CO 80907-6192

LWA Project No. 04080.62

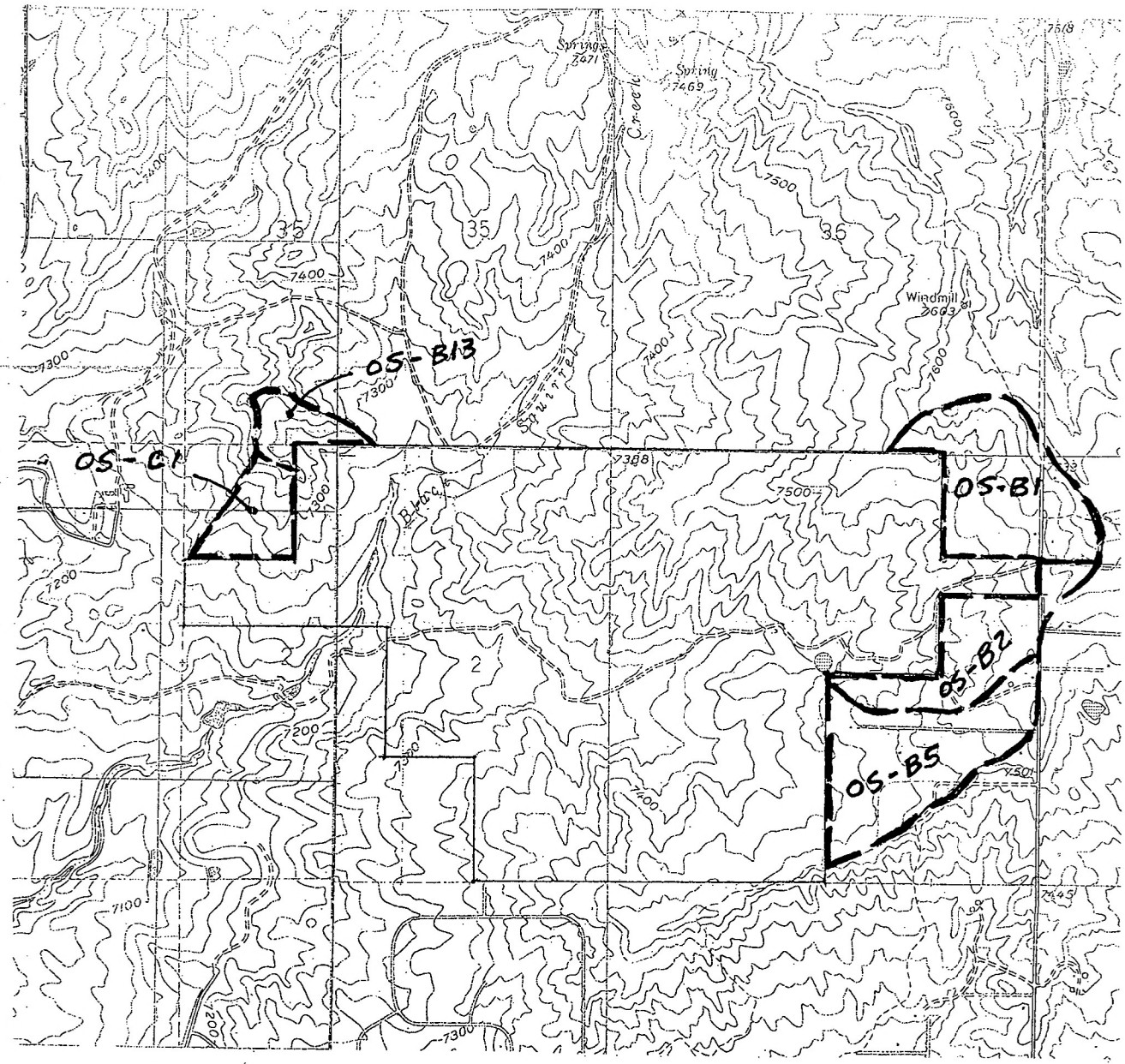


DEVELOPED CONDITIONS

OFFSITE DRAINAGE

Leigh & Whitehead Associates, Inc.

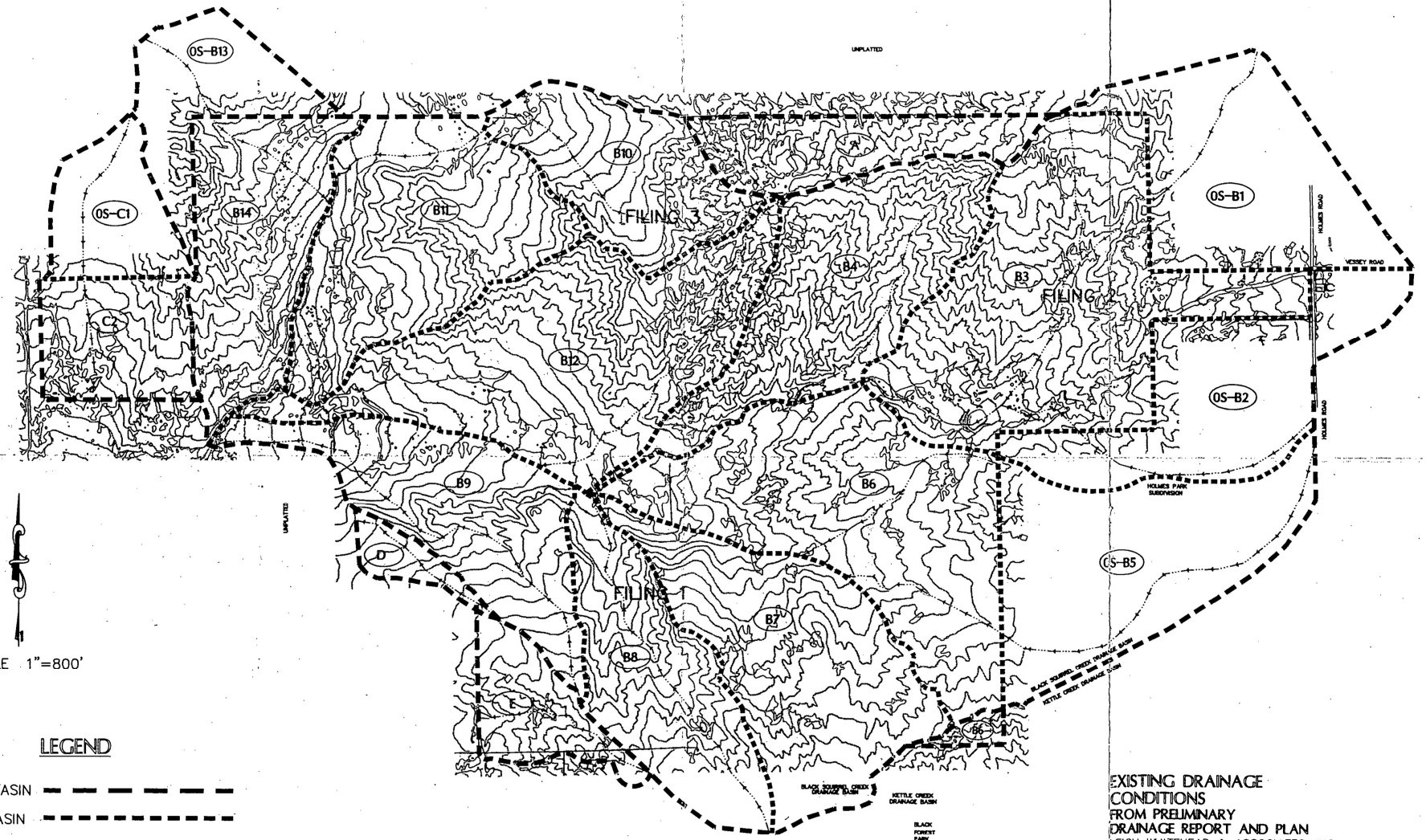
CONSULTING CIVIL ENGINEERS & SURVEYORS
2906 BEACON STREET
COLORADO SPRINGS, CO 809076192



CURRENT CONDITIONS

OFFSITE DRAINAGE

Leigh & Whitehead Associates, Inc.
CONSULTING CIVIL ENGINEERS & SURVEYORS
2906 Beacon Street
COLORADO SPRINGS, CO 809076192



EXISTING DRAINAGE CONDITIONS FROM PRELIMINARY DRAINAGE REPORT AND PLAN

LEIGH WHITEHEAD & ASSOCIATES, INC.
2906 BEACON STREET
COLORADO SPRINGS, CO 80907
719-636-5179

04040
CATHEDRAL PINES SUB.

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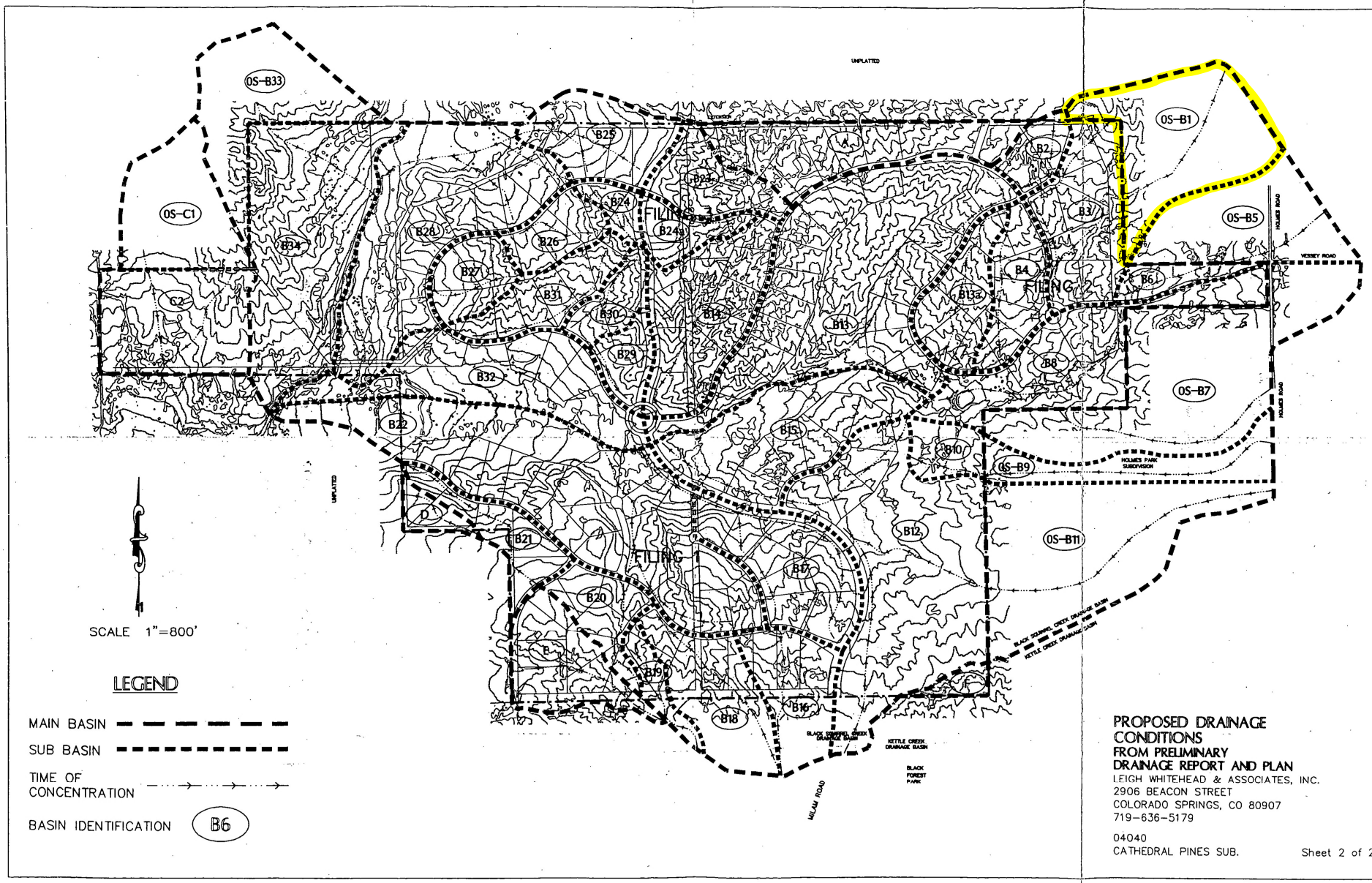

PROPOSED DRAINAGE CONDITIONS
FROM PRELIMINARY DRAINAGE REPORT AND PLAN

LEIGH WHITEHEAD & ASSOCIATES, INC.
2906 BEACON STREET
COLORADO SPRINGS, CO 80907
719-636-5179

04040
CATHEDRAL PINES SUB.

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RUNOFF COMPUTATIONS
RATIONAL METHOD

CATHEDRAL PINES SUBDIVISION FILING NO. 2
WEST OF HOLMES ROAD & NORTH OF SHOUP ROAD
Section's 1 and 2, T12S, R66W
EL PASO COUNTY, COLORADO

LWA # 04080.62

04080.XLS

LEIGH WHITEHEAD & ASSOCIATES, INC.
Engineers, Surveyors & Planners
2906 BEACON STREET
COLORADO SPRINGS, COLORADO
(719) 636-5179

TABLE A: **CURRENT CONDITIONS**

23-Feb-05

BASIN	AREA	SOIL TYPE	C 5 / C 100	GEOMETRY LENGTH / SLOPE / HEIGHT	Tt 5 / Tt 100	V / Tt	tc 5 / tc 100	i 5 / i 100	Q5	Q100	COMMENTS
A1	5.53	B	0.18	360 / 6.94 / 25.0	17.22	3.18	19.42	2.96	2.9		
		26	0.25		15.91	2.20	18.11	5.36		7.4	
A2	6.35	B	0.18	300 / 8.33 / 25.0	14.80	3.49	17.81	3.10	3.5		
		26	0.25		13.68	3.01	16.69	5.59		8.9	
A3	2.40	B	0.18	250 / 6.80 / 17.0	14.45	2.99	16.51	3.22	1.4		
		26	0.25		13.35	2.06	15.41	5.81		3.5	
A4	2.21	B	0.18	170 / 4.71 / 8.0	13.45	3.44	15.97	3.27	1.3		
		26	0.25		12.43	2.52	14.95	5.90		3.3	
A5	3.62	B	0.18	320 / 9.06 / 29.0	14.87	2.90	17.03	3.17	2.1		
		26	0.25		13.74	2.16	15.90	5.73		5.2	
A6	4.75	B	0.18	310 / 6.77 / 21.0	16.11	3.25	18.29	3.05	2.6		
		26	0.25		14.89	2.18	17.07	5.53		6.6	
A7	2.20	B	0.18	220 / 6.82 / 15.0	13.54	3.30	15.91	3.28	1.3		
		26	0.25		12.51	2.37	14.88	5.91		3.3	
A8	5.73	B	0.18	210 / 8.10 / 17.0	12.50	3.74	16.15	3.25	3.4		
		26	0.25		11.55	3.65	15.20	5.85		8.4	
A (Onsite)	32.78	B	0.18	360 / 6.94 / 25.0	17.22	3.18	19.42	2.96	17.5		
		26	0.25		15.91	2.20	18.11	5.36		43.9	
A	67.03	B	0.18	600 / 6.67 / 40.0	22.53	4.66	40.40	1.93	23.3		
		26	0.25		20.82	17.87	38.69	3.47		58.1	
OS-B1	57.67	B	0.25	300 / 5.00 / 15.0	16.19	4.66	21.91	2.77	40.0		
		26	0.32		14.85	5.72	20.57	5.01		92.5	
OS-B2	84.67	B	0.25	300 / 4.67 / 14.0	16.56	Varies	31.50	2.25	47.7		
		26	0.32		15.20	14.94	30.14	4.04		109.4	
B3	87.98	B	0.18	580 / 8.10 / 47.0	20.77	3.80	31.65	2.25	35.6		
		26	0.25		19.19	10.88	30.07	4.04		89.0	
B3 (Cum.)	230.32	B	0.22	300 / 4.67 / 14.0	17.14	Varies	40.07	1.94	98.4		OS-B1 -- B3
		26	0.29		15.78	22.93	38.71	3.47		231.5	

RUNOFF COMPUTATIONS
RATIONAL METHOD

CATHEDRAL PINES SUBDIVISION FILING NO. 2
WEST OF HOLMES ROAD & NORTH OF SHOUP ROAD
Section's 1 and 2, T12S, R66W
EL PASO COUNTY, COLORADO

LWA # 04080.62

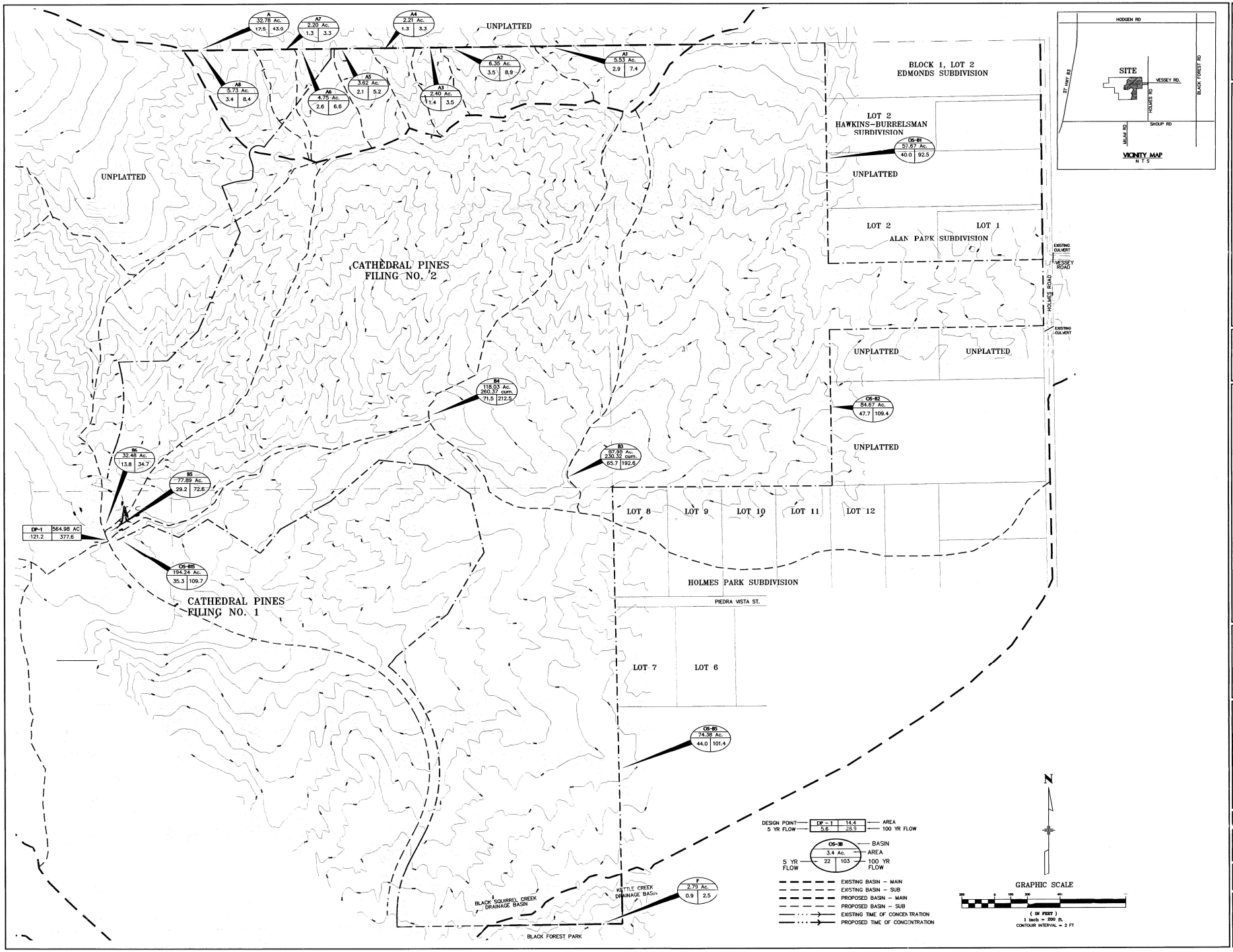
LEIGH WHITEHEAD & ASSOCIATES, INC.
Engineers, Surveyors & Planners
2906 BEACON STREET
COLORADO SPRINGS, COLORADO
(719) 636-5179

04080.XLS

TABLE A: **PROPOSED CONDITIONS**

23-Feb-05

BASIN	AREA	SOIL TYPE	C 5 / C 100	GEOMETRY LENGTH / SLOPE	GEOMETRY HEIGHT	Tt 5 / Tt 100	V / Tt	tc 5 / tc 100	i 5 / i 100	Q5	Q100	COMMENTS
B10	27.73	B	0.27	80	1.0	12.90	Varies	28.44	2.39	17.9		B6 through B10
(cum.)		26	0.36	1.25		11.50	15.54	27.04	4.30		43.0	
B11	20.33	B	0.23	300	30.0	13.18	Varies	22.38	2.74	12.8		
		26	0.31	10.00		11.97	9.20	21.17	4.94		31.1	
B11	50.34	B	0.25	300	28.0	13.17	Varies	28.46	2.39	30.1		B1 through B5 & B11
(cum.)		26	0.34	9.33		11.78	15.29	27.07	4.30		73.6	
B11	78.07	B	0.26	300	28.0	13.02	Varies	28.31	2.40	48.7		B1 through B11
(cum.)		26	0.35	9.33		11.62	15.29	26.91	4.32		117.9	
OS-B12	36.73	B	0.25	300	15.0	16.19	4.66	21.91	2.77	25.5		
		26	0.32	5.00		14.85	5.72	20.57	5.01		58.9	
B13	15.98	B	0.27	300	34.0	12.07	Varies	18.35	3.05	13.2		
		26	0.36	11.33		10.76	6.28	17.04	5.53		31.8	
B14	1.52	B	0.60	110	3.0	7.04	Varies	9.96	4.06	3.7		
		26	0.70	2.73		5.63	2.92	8.55	7.53		8.0	
B14	54.23	B	0.26	300	12.0	17.22	Varies	27.80	2.42	34.2		OS-B12 through B14
(cum.)		26	0.33	4.00		15.78	10.58	26.36	4.37		78.2	
B15	4.17	B	0.28	300	12.0	16.81	5.26	19.23	2.98	3.5		
		26	0.38	4.00		14.76	2.42	17.18	5.51		8.7	
B16	2.48	B	0.30	300	32.0	11.86	4.52	13.52	3.54	2.6		
		26	0.40	10.67		10.38	1.66	12.04	6.53		6.5	
B16	60.88	B	0.26	300	15.0	16.00	Varies	27.63	2.43	38.5		OS-B12 through B16
(cum.)		26	0.34	5.00		14.47	11.63	26.10	4.39		90.9	
B17	1.06	B	0.30	170	19.0	8.79	4.78	9.52	4.13	1.3		
		26	0.40	11.18		7.70	0.73	8.43	7.58		3.2	
B18	2.09	B	0.30	300	27.0	12.55	Varies	14.56	3.42	2.1		
		26	0.40	9.00		10.98	2.01	12.99	6.31		5.3	
B18	3.15	B	0.30	300	27.0	12.55	Varies	14.56	3.42	3.2		B17 & B18
(cum.)		26	0.40	9.00		10.98	2.01	12.99	6.31		7.9	
B19	2.53	B	0.30	300	21.0	13.63	5.38	15.43	3.33	2.5		
		26	0.40	7.00		11.93	1.80	13.73	6.15		6.2	



ENGINEERS
PLANNERS
SURVEYORS
LEIGH WHITEHEAD & ASSOCIATES
2905 BEACON STREET
COLORADO SPRINGS, CO 80907
PHONE (719) 598-0370 * FAX (719) 598-5199

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SHEET TITLE: FINAL DRAINAGE PLAN EXISTING CONDITIONS

PROJECT NAME: CATHEDRAL PINES FLING 2

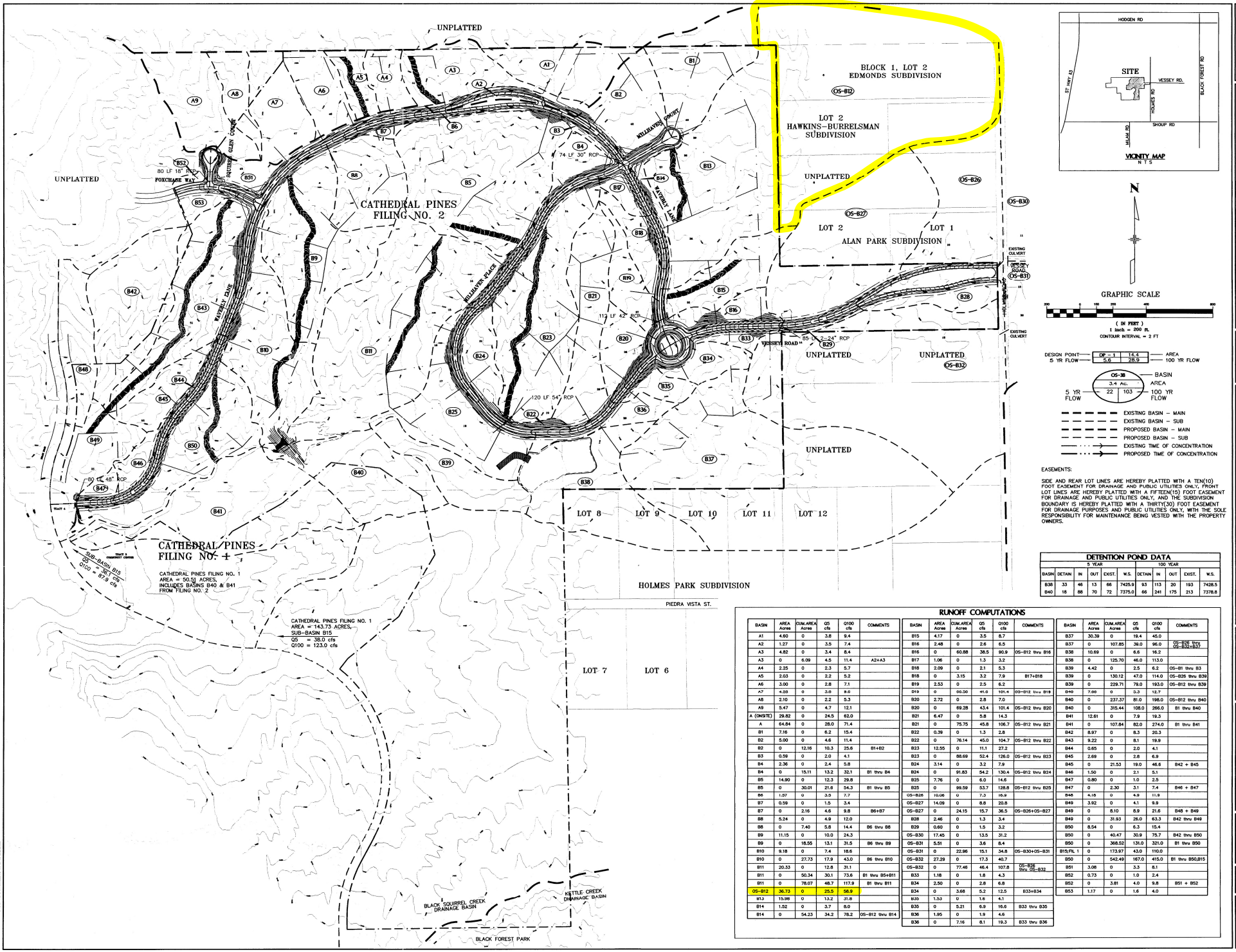
BENCHMARK:
TOP OF 5/8" DIAM. REBAR 23' NORTH AND 20' EAST OF THE SOUTHWEST COR. OF SECTION 1
ELEV=7436.65 (NGVD '88)

REVISIONS:

SCALE: 1"=200'
DATE: 7/10/06
DRAWN BY: CLH/LJ
CHECKED BY: LAB

SHEET NO:
1 OF 2

PROJECT NO: 04080
DRAWING NAME: CP FH 2 Drainage
VIEW: Existing



EASEMENTS:

SIDE AND REAR LOT LINES ARE HEREBY PLATTED WITH A TEN(10) FOOT EASEMENT FOR DRAINAGE AND PUBLIC UTILITIES ONLY, FRONT LOT LINES ARE HEREBY PLATTED WITH A FIFTEEN(15) FOOT EASEMENT FOR DRAINAGE AND PUBLIC UTILITIES ONLY, AND THE SUBDIVISION BOUNDARY IS HEREBY PLATTED WITH A THIRTY(30) FOOT EASEMENT FOR DRAINAGE PURPOSES AND PUBLIC UTILITIES ONLY, WITH THE SOLE RESPONSIBILITY FOR MAINTENANCE BEING VESTED WITH THE PROPERTY OWNERS.

DETENTION POND DATA

	5 YEAR					100 YEAR				
BASIN	DETAIN	IN	OUT	EXIST.	W.S.	DETAIN	IN	OUT	EXIST.	W.S.
B38	33	46	13	66	7425.9	93	113	20	193	7428.5
B40	16	88	70	72	7375.0	66	241	175	213	7378.8

RUNOFF COMPUTATIONS

BASIN	AREA Acres	CUM.AREA Acres	Q5 cfs	Q100 cfs	COMMENTS
A1	4.60	0	3.8	9.4	
A2	1.27	0	3.5	7.4	
A3	4.82	0	3.4	8.4	
A3	0	6.09	4.5	11.4	A2+A3
A4	2.25	0	2.3	5.7	
A5	2.03	0	2.2	5.2	
A6	3.00	0	2.8	7.1	
A7	4.80	0	3.0	9.0	
A8	2.10	0	2.2	5.3	
A9	5.47	0	4.7	12.1	
A (ONSITE)	29.82	0	24.5	62.0	
A	64.84	0	28.0	71.4	
B1	7.16	0	6.2	15.4	
B2	5.00	0	4.6	11.4	
B2	0	12.16	10.3	25.6	B1+B2
B3	0.59	0	2.0	4.1	
B4	2.36	0	2.4	5.8	
B4	0	15.11	13.2	32.1	B1 thru B4
B5	14.90	0	12.3	29.8	
B5	0	30.01	21.6	54.3	B1 thru B5
B6	1.97	0	3.5	7.7	
B7	0.59	0	1.5	3.4	
B7	0	2.16	4.6	9.8	B6+B7
B8	5.24	0	4.9	12.0	
B8	0	7.40	5.8	14.4	B6 thru B8
B9	11.15	0	10.0	24.3	
B9	0	18.55	13.1	31.5	B6 thru B9
B10	9.18	0	7.4	18.6	
B10	0	27.73	17.9	43.0	B6 thru B10
B11	20.33	0	12.8	31.1	
B11	0	50.34	30.1	73.6	B1 thru B5+B11
B11	0	78.07	48.7	117.9	B1 thru B11
OS-B12	36.73	0	25.5	58.9	
B13	15.98	0	13.2	31.8	
B14	1.52	0	3.7	8.0	
B14	0	54.23	34.2	78.2	OS-B12 thru B14
B15	4.17	0	3.5	8.7	
B16	2.48	0	2.6	6.5	
B16	0	60.88	38.5	90.9	OS-B12 thru B16
B17	1.06	0	1.3	3.2	
B18	2.09	0	2.1	5.3	
B18	0	3.15	3.2	7.9	B17+B18
B19	2.53	0	2.5	6.2	
D19	0	60.50	41.0	101.4	OS-B12 thru B19
B20	2.72	0	2.8	7.0	
B20	0	69.28	43.4	101.4	OS-B12 thru B20
B21	6.47	0	5.8	14.3	
B21	0	75.75	45.8	106.7	OS-B12 thru B21
B22	0.39	0	1.3	2.8	
B22	0	76.14	45.0	104.7	OS-B12 thru B22
B23	12.55	0	11.1	27.2	
B23	0	88.69	52.4	126.0	OS-B12 thru B23
B24	3.14	0	3.2	7.9	
B24	0	91.83	54.2	130.4	OS-B12 thru B24
B25	7.76	0	6.0	14.6	
B25	0	99.59	53.7	128.8	OS-B12 thru B25
OS-B26	10.06	0	7.3	16.9	
OS-B27	14.09	0	8.8	20.8	
OS-B27	0	24.15	15.7	36.5	OS-B26+OS-B27
B28	2.46	0	1.3	3.4	
B29	0.60	0	1.5	3.2	
OS-B30	17.45	0	13.5	31.2	
OS-B31	5.51	0	3.6	8.4	
OS-B31	0	22.96	15.1	34.8	OS-B30+OS-B31
OS-B32	27.29	0	17.3	40.7	
OS-B32	0	77.46	46.4	107.8	OS-B26 thru OS-B32
B33	1.18	0	1.8	4.3	
B34	2.50	0	2.8	6.8	
B34	0	3.68	5.2	12.5	B33+B34
B35	1.53	0	1.6	4.1	
B35	0	5.21	6.9	16.6	B33 thru B35
B36	1.95	0	1.9	4.6	
B36	0	7.16	8.1	19.3	B33 thru B36
B37	30.39	0	19.4	45.0	
B37	0	107.85	38.0	96.0	OS-B26 thru OS-B32+B37
B38	10.69	0	6.6	16.2	
B38	0	125.70	46.0	113.0	
B39	4.42	0	2.5	6.2	OS-B1 thru B3
B39	0	130.12	47.0	114.0	OS-B26 thru B39
B39	0	229.71	79.0	193.0	OS-B12 thru B39
B40	7.00	0	5.3	12.7	
B40	0	237.37	81.0	198.0	OS-B12 thru B40
B40	0	315.44	108.0	266.0	B1 thru B40
B41	12.61	0	7.9	19.3	
B41	0	107.84	82.0	274.0	B1 thru B41
B42	8.97	0	8.3	20.3	
B43	9.22	0	8.1	19.9	
B44	0.65	0	2.0	4.1	
B45	2.69	0	2.8	6.9	
B45	0	21.53	19.0	46.6	B42 + B45
B46	1.50	0	2.1	5.1	
B47	0.80	0	1.0	2.5	
B47	0	2.30	3.1	7.4	B46 + B47
B48	4.16	0	4.9	11.9	
B49	3.92	0	4.1	9.9	
B49	0	8.10	8.9	21.6	B48 + B49
B49	0	31.93	26.0	63.3	B42 thru B49
B50	8.54	0	6.3	15.4	
B50	0	40.47	30.9	75.7	B42 thru B50
B50	0	368.52	131.0	321.0	B1 thru B50
B15/FIL 1	0	173.97	43.0	110.0	
B50	0	542.49	167.0	415.0	B1 thru B50,B15
B51	3.08	0	3.3	8.1	
B52	0.73	0	1.0	2.4	
B52	0	3.81	4.0	9.8	B51 + B52
B53	1.17	0	1.6	4.0	

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PHONE (719) 550-8179 * FAX (719) 550-8199

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SHEET TITLE: FINAL DRAINAGE PLAN PROPOSED CONDITIONS

PROJECT NAME: CATHEDRAL PINES FILING 2

BENCHMARK:
TOP OF 5/8" DIAM. REBAR 25' NORTH AND 20' EAST OF THE SOUTHWEST COR. OF SECTION 1
ELEV=7436.65 (NGVD '88)

REVISIONS:

SCALE: 1"=200'
DATE: 3/10/05
DRAWN BY: CLH/LJ
CHECKED BY: LAB

SHEET NO: 2 OF 2

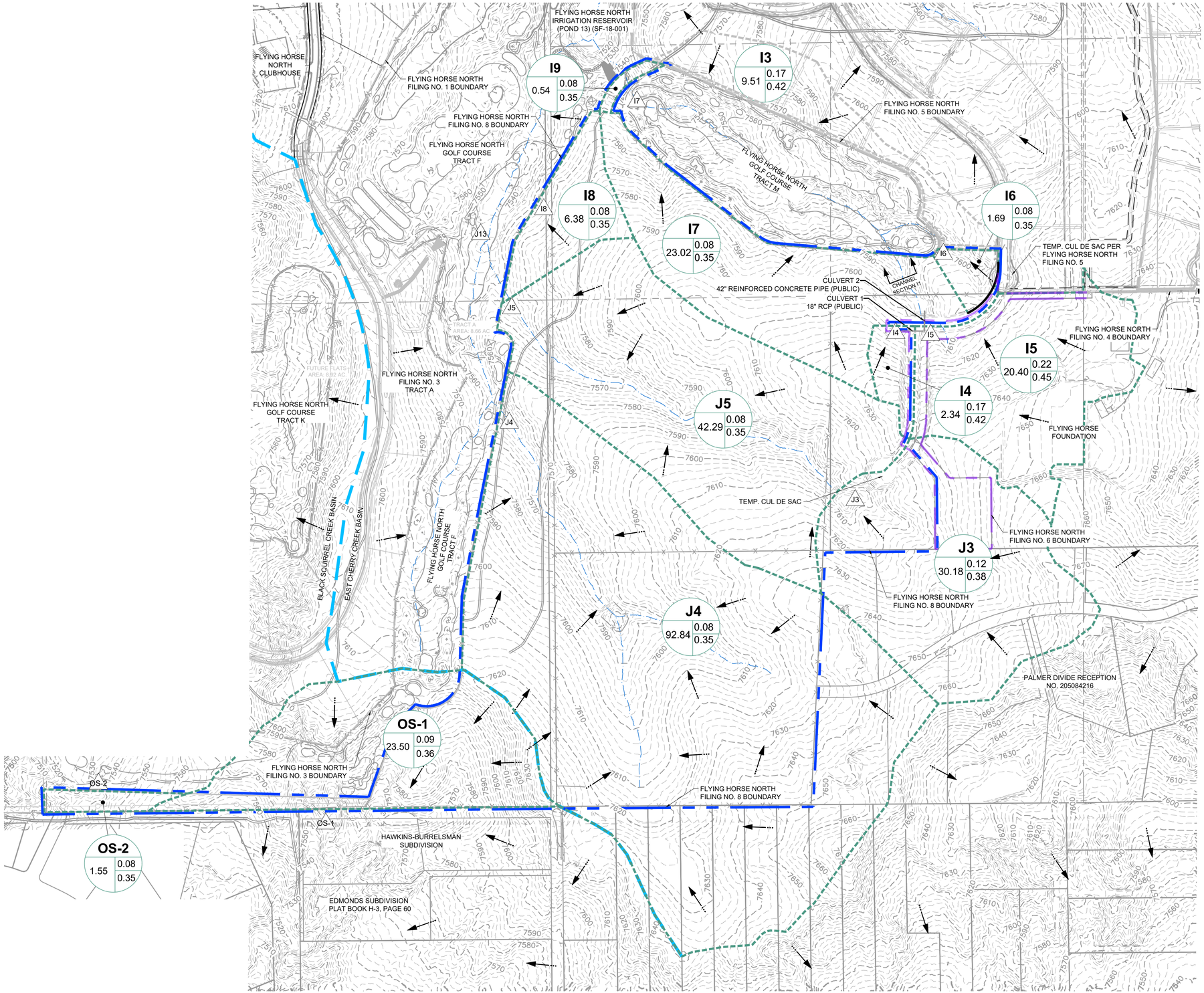
PROJECT NO: 04080
DRAWING NAME: CP Fil 2 Drainage
VIEW: Proposed

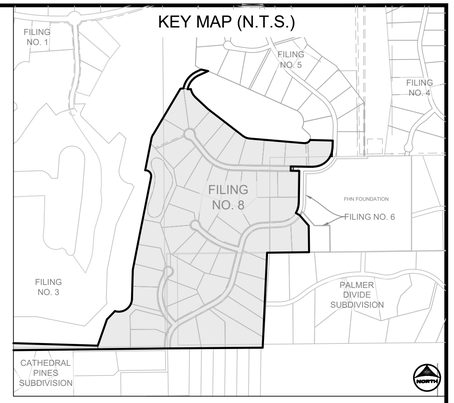
HRGreen

APPENDIX F

DRAINAGE MAPS

DOMBROWSKI, COLIN, 4/2/2026 11:17 AM
HR GREEN Xrefs: Key_Map; xv--dsgn--1030; xc--row--030.202; xc--row--030.250; xc--dsgn--030.202; xc--dsgn--250; xv--row--1030; xc--row--030.240; xc--dsgn--240; XC_DSGN_2502010; xc--dsgn--260--Trisha; xg1--1--dh01--1030.270





VICINITY MAP
SCALE = N.T.S.

LEGEND

	EXISTING	PROPOSED
PROPERTY LINE		
EASEMENT LINE		
RIGHT OF WAY		
CENTERLINE		
DRAINAGE BASIN		
DRAINAGE SWALE		
TERTIARY DRAINAGE WAY		
MAJOR CONTOUR	5900	5900
MINOR CONTOUR	5902	5902
STORM SEWER		
FLOW DIRECTION		
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

SUMMARY RUNOFF TABLE

BASIN	AREA (ac)	% IMP.	C_5	C_{100}	Q_5 (cfs)	Q_{100} (cfs)
I3	9.51	11.0	0.17	0.42	6.3	26.0
I4	2.34	13.3	0.17	0.42	1.5	6.0
I5	20.40	18.9	0.22	0.45	15.0	51.9
I6	1.69	2.0	0.08	0.35	0.5	3.8
I7	23.02	2.0	0.08	0.35	6.0	44.2
I8	6.38	2.0	0.08	0.35	1.8	13.6
I9	0.54	2.0	0.08	0.35	0.2	1.4
J3	30.10	6.0	0.12	0.38	11.5	59.1
J4	92.88	2.0	0.08	0.35	19.5	142.8
J5	42.29	2.4	0.08	0.35	10.1	71.9
OS-1	23.50	3.3	0.09	0.36	7.4	48.2
OS-2	1.55	2.0	0.08	0.35	0.5	3.4

CUMULATIVE DESIGN POINT SUMMARY TABLE

DESIGN POINT	CONTRIBUTING BASINS	ΣQ_5 (cfs)	ΣQ_{100} (cfs)	Tributary Area (ac.)	Weighted % Impervious
I3	I3	6.3	26.0	9.5	11.0
I4	I4	1.5	6.0	2.3	13.3
I5	I4, I5	16.4	57.4	22.7	18.3
I6	I6	0.5	3.8	1.7	2.0
I7	I7	6.0	44.2	23.0	2.0
I8	I8	1.8	13.6	6.4	2.0
I9	I3, I4, I5, I6, I7, I9	27.9	126.5	57.5	9.9
J3	J3	11.5	59.1	30.1	6.0
J4	J4	19.5	142.8	92.9	2.0
J5	J3, J5	38.5	259.0	72.4	3.9
OS-1	OS-1	7.4	48.2	23.5	3.3
OS-2	OS-2	7.4	48.2	23.5	3.3

NORTH
0 400
200

PCD FILE NO.: SF2531

DRAWN BY: CVW JOB DATE: 4/1/2026
APPROVED: RDL JOB NUMBER: 211030.270
CAD DATE: 4/2/2026
CAD FILE: J:\2021\211030\CAD\Dwgs\C\Drainage\FDR Filing 8 - South\Ex_Drainage_Map_FHNF8

BAR IS ONE INCH ON OFFICIAL DRAWINGS. 0 1"
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NO.	DATE	BY	REVISION DESCRIPTION

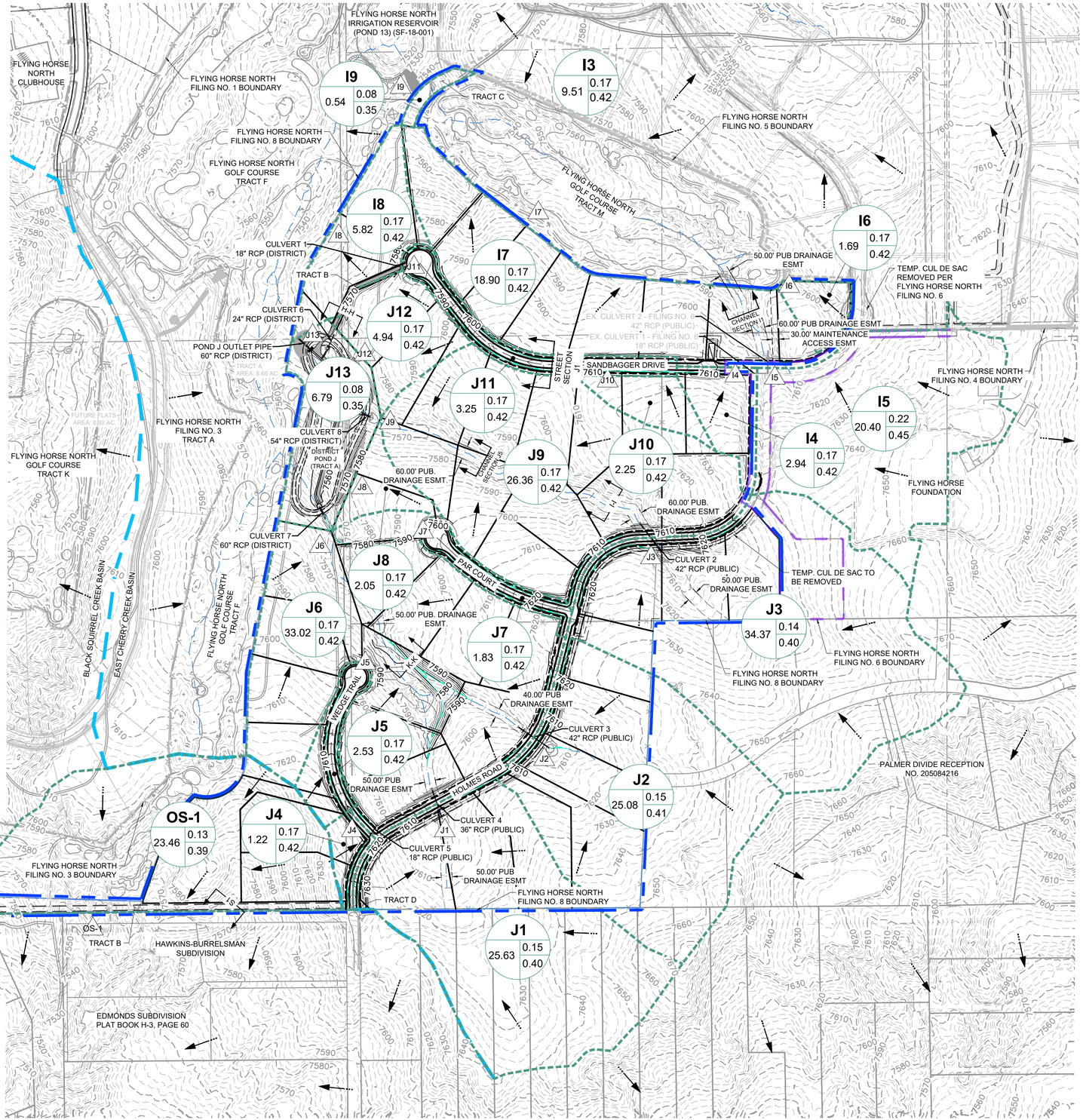
HR GREEN - COLORADO SPRINGS
1975 RESEARCH PARKWAY SUITE 160
COLORADO SPRINGS, CO 80920
PHONE: 719.300.4140
FAX: 713.965.0044

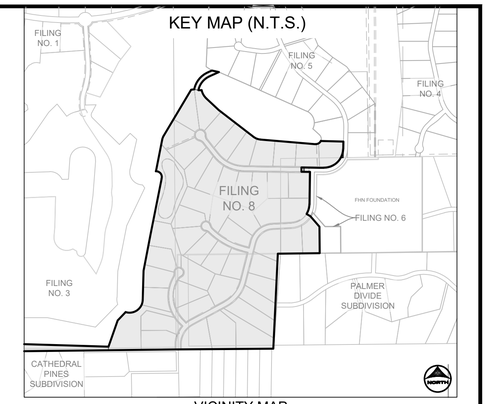
FLYING HORSE NORTH FILING NO. 8
PRI #2, LLC.
EL PASO COUNTY, CO

DRAINAGE MAPS
EXISTING DRAINAGE MAP

SHEET EX 01

DOMBROWSKI, COLIN, 4/3/2026 10:32 AM
HR GREEN Xrefs: xc--dsgn--270; xc--row--030.270; Key_Map; xv--dsgn--1030; xc--row--030.202; xc--dsgn--030.250; xc--row--030.250; xc--dsgn--030.202; xc--row--1030; xc--dsgn--250; xc--row--1030; xc--dsgn--240; xc--dsgn--240; XC_DSGN_2502010; xc--dsgn--260--Trisha; xgt--1--dn01--1030.270





VICINITY MAP
SCALE = N.T.S.

LEGEND

	EXISTING	PROPOSED
PROPERTY LINE		
EASEMENT LINE		
RIGHT OF WAY		
CENTERLINE		
DRAINAGE BASIN		
DRAINAGE SWALE		
TERTIARY DRAINAGE WAY		
MAJOR CONTOUR	5900	5900
MINOR CONTOUR	5902	5902
STORM SEWER		
FLOW DIRECTION		
DESIGN POINT		
SWALE CROSS SECTION		
BASIN LABEL		

BASIN DESIGNATION: A1 | AREA (AC.): 1.00 | 0.40 MINOR 5-YR RUNOFF COEF. | 0.60 MAJOR 100-YR RUNOFF COEF.

Water Quality Treatment Summary Table

Basin ID	Total Area (ac)	Total Proposed Disturbed Area (ac)	Area Trib to Pond J (ac)	Area Trib to Pond 13 (ac)	Area Trib. to Cathedral Pines Pond B3B (ac)	Disturbed Area Excluded from WQ per ECM App I.7.1.C.5 (ac)	Disturbed Area Excluded from WQ per ECM App I.7.1.B.7 (ac)
I3	9.51	0.00					
I4	2.94	0.29		0.29			
I5	20.40	0.00					
I6	1.69	0.00					
I7	18.90	0.71		0.71			
I8	5.82	0.39		0.39			
I9	0.54	0.00					
J1	25.63	1.44	1.44				
J2	25.08	1.33	1.33				
J3	34.37	2.03	2.03				
J4	1.22	0.66	0.66				
J5	2.53	1.72	1.72				
J6	33.02	3.10	3.10				
J7	1.83	1.83	1.83				
J8	2.05	0.04	0.04				
J9	26.36	1.49	1.49				
J10	2.25	0.00					
J11	3.25	3.25	3.25				
J12	4.94	0.45	0.45				
J13	6.79	5.25	5.25				
OS-1	23.46	0.00					
OS-1	1.55	0.00					
Total	244.62	23.98	22.59	1.39	0.00	0.00	0.00

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)
23.98	23.98	23.98	0.00	0.00

SUMMARY RUNOFF TABLE

BASIN	AREA (ac)	% IMP.	C_5	C_{100}	Q_5 (cfs)	Q_{100} (cfs)
I3	9.51	11.0	0.17	0.42	6.3	26.0
I4	2.94	11.0	0.17	0.42	1.8	7.4
I5	20.40	18.9	0.22	0.45	15.0	51.9
I6	1.69	11.0	0.17	0.42	1.1	4.6
I7	18.90	11.0	0.17	0.42	10.5	43.2
I8	5.82	11.0	0.17	0.42	3.6	14.8
I9	0.54	2.0	0.08	0.35	0.2	1.4
J1	25.63	8.6	0.15	0.40	13.7	61.6
J2	25.08	9.1	0.15	0.41	13.2	58.4
J3	34.37	8.1	0.14	0.40	15.2	70.2
J4	1.22	11.0	0.17	0.42	0.9	3.5
J5	2.53	11.0	0.17	0.42	1.6	6.4
J6	33.02	11.0	0.17	0.42	18.5	76.2
J7	1.83	11.0	0.17	0.42	1.1	4.7
J8	2.05	11.0	0.17	0.42	1.3	5.5
J9	26.36	11.0	0.17	0.42	13.8	56.9
J10	2.25	11.0	0.17	0.42	1.4	5.9
J11	3.25	11.0	0.17	0.42	1.7	7.1
J12	4.94	11.0	0.17	0.42	3.3	13.4
J13	6.79	2.0	0.08	0.35	1.9	14.2
OS-1	23.46	6.9	0.13	0.39	10.7	53.7
OS-2	1.55	2.0	0.08	0.35	0.5	3.4

CUMULATIVE DESIGN POINT SUMMARY TABLE

DESIGN POINT	CONTRIBUTING BASINS	ΣQ_5 (cfs)	ΣQ_{100} (cfs)	Tributary Area (ac.)	Weighted % Impervious
I3	I3	6.3	26.0	9.5	11.0
I4	I4	1.8	7.4	2.9	11.0
I5	I4, I5	16.7	58.7	23.3	17.9
I6	I6	1.1	4.6	1.7	11.0
I7	I7	10.5	43.2	18.9	11.0
I8	I8	3.6	14.8	5.8	11.0
I9	I3, I4, I5, I6, I7, I9	33.2	127.5	0.5	2.0
J1	J1	13.7	61.6	25.6	8.6
J2	J2	13.2	58.4	25.1	9.1
J3	J3	15.2	70.2	34.4	8.1
J4	J4	0.9	3.5	1.2	11.0
J5	J5	1.6	6.4	2.5	11.0
J6	J1, J2, J4, J5, J6, J7	47.1	202.3	89.3	9.8
J7	J7	1.1	4.7	1.8	11.0
J8	J8	1.3	5.5	2.1	11.0
J9	J3, J9	28.9	126.5	60.7	9.3
J10	J10	1.4	5.9	2.3	11.0
J11	J10, J11	2.9	12.1	5.5	11.0
J12	J12	3.3	13.4	4.9	11.0
J13	J6, J8, J9, J11, J12, J13	64.9	280.4	76.4	10.2
OS-1	OS-1	10.7	53.7	23.5	6.9
OS-2	OS-2	0.5	3.4	1.6	2.0

NORTH
0 400
200

PCD FILE NO.: SF2531

DRAWN BY: CVW | JOB DATE: 4/2/2026
APPROVED: RDL | JOB NUMBER: 211030.270
CAD DATE: 4/3/2026
CAD FILE: J:\2021\211030\CAD\Dwgs\C\Drainage\FDR Filing 8 - South\Pr_Drainage_Map_FHNF8

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NO.	DATE	BY	REVISION DESCRIPTION

HR GREEN - COLORADO SPRINGS
1975 RESEARCH PARKWAY SUITE 160
COLORADO SPRINGS, CO 80920
PHONE: 719.300.4140
FAX: 713.965.0044

FLYING HORSE NORTH FILING NO. 8
PRI #2, LLC.
EL PASO COUNTY, CO

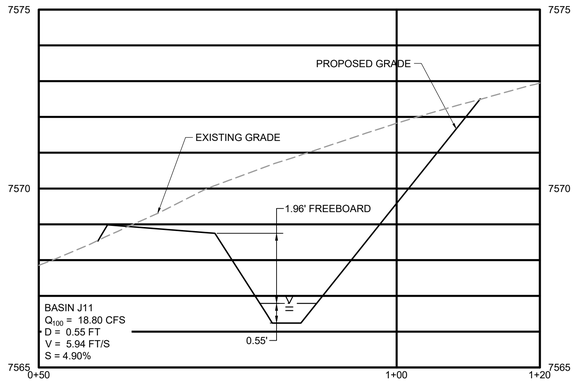
DRAINAGE MAPS
PROPOSED DRAINAGE MAP

SHEET PR 02

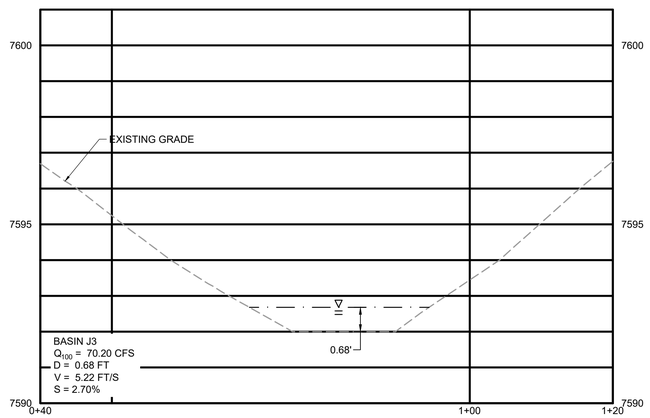
DOMBROWSKI, COLIN, 4/2/2026 10:43 AM

HR GREEN Xrefs: xc-dsgn-270; xc-row-030.270; xv-dsgn-1030; xc-row-030.202; xc-dsgn-030.250; xc-dsgn-250; xv-row-1030; xc-row-030.240; xc-dsgn-240; XC_DSGN_2502010; xc-dsgn-260-Trisha; xgt-1-dn01-1030.270

SECTION H-H



SECTION I-I



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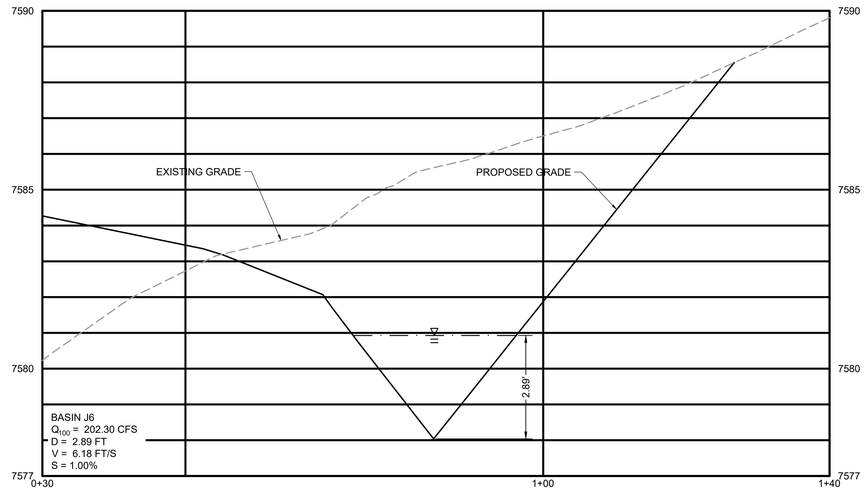

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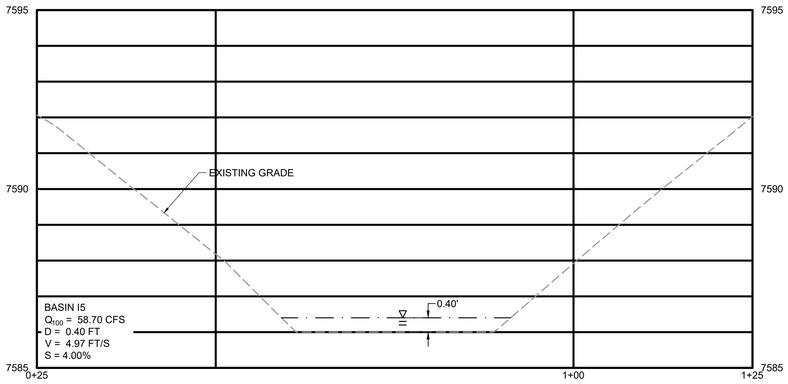

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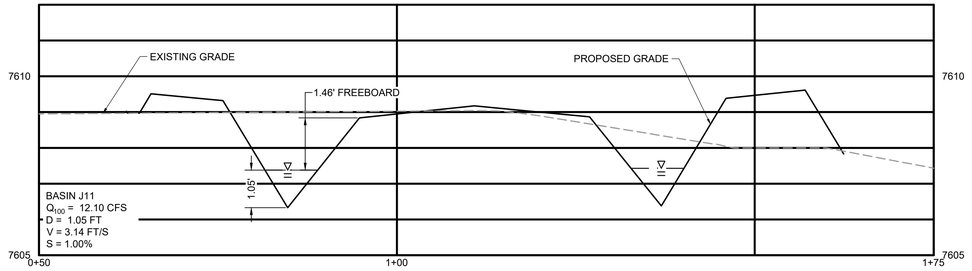

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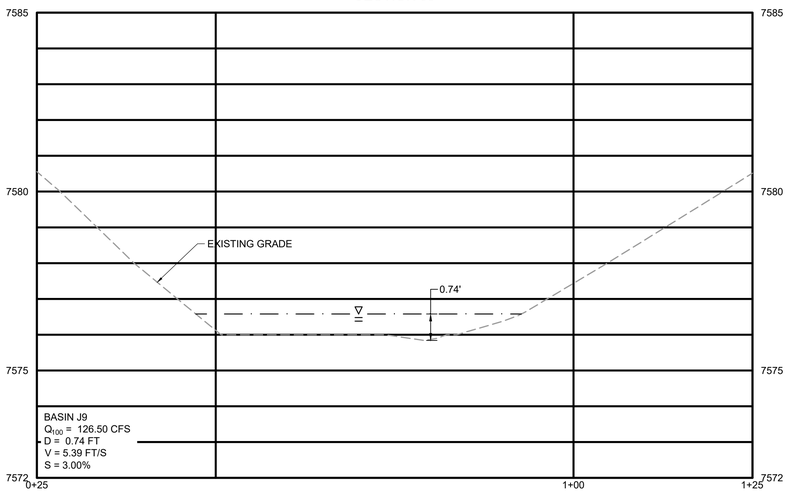
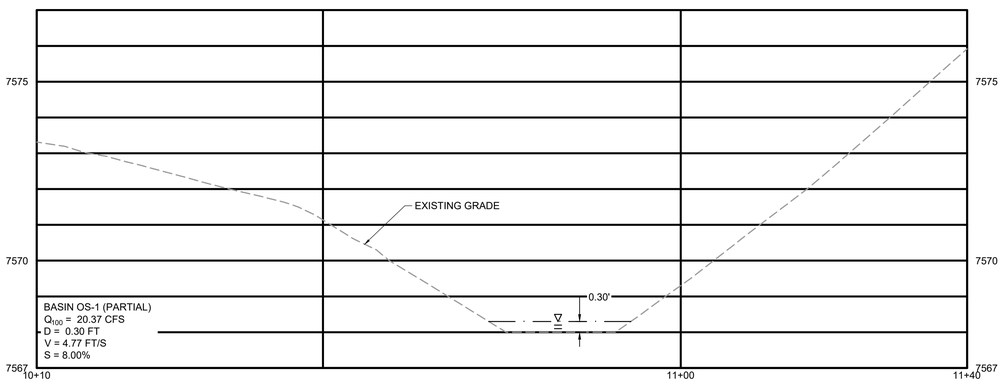
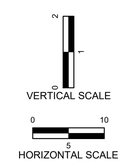


SECTION S1





PCD FILE NO.: SF2531

DRAWN BY: EB JOB DATE: 12/16/2025
APPROVED: RDL JOB NUMBER: 211030.270
CAD DATE: 4/2/2026
CAD FILE: J:\2021\211030\CAD\Dwgs\C\Drainage\FDR Filing 8 - South\Sections_FHNF8_FDR

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NO.	DATE	BY	REVISION DESCRIPTION

HRGreen

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1975 RESEARCH PARKWAY SUITE 160
COLORADO SPRINGS, CO 80920
PHONE: 719.300.4140
FAX: 713.965.0044

FLYING HORSE NORTH FILING NO. 8
PRI #2, LLC.
EL PASO COUNTY, CO

DRAINAGE MAPS
CROSS SECTIONS

SHEET SV

03