MAYBERRY COMMUNITIES
MASTER DEVELOPMENT DRAINAGE PLAN

FOR

MAYBERRY, COLORADO SPRINGS

PREPARED FOR:

COLORADO SPRINGS MAYBERRY, LLC
3296 DEVINE HEIGHTS #208
COLORADO SPRINGS, CO 80922

PREPARED BY:

R & R ENGINEERS - SURVEYORS, INC.
1635 W. 13TH AVE, SUITE 310
DENVER, CO 80204
CONTACT: TIM STACKHOUSE, P.E.
(303) 753-6730

R&R JOB #MC22208
EPC PROJECT NO. SKP236

ORIGINAL SUBMITTAL DATE: JULY 2023
SUBMITTAL: SEPTEMBER 2024

ENGINEER'S STATEMENT:

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

SIGNATURE: _____

Tim Stackhouse, P.E.
Registered Professional Engineer
State of Colorado No. 0061924

DEVELOPER'S STATEMENT:

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

SIGNATURE: _____

John Mick
Colorado Springs Mayberry, LLC
3296 Devine Heights #208
Colorado Springs, CO 80922

EL PASO COUNTY'S STATEMENT:

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

SIGNATURE: _____

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

TABLE OF CONTENTS

I. GENERAL LOCATION AND DESCRIPTION

A. Background

Mayberry, Colorado Springs (formerly known as "Ellicott Town Center") is a proposed subdivision located west of Ellicott, Colorado in El Paso County. The development is located on the south side of State Highway 94, approximately 1-1/2 miles west of Ellicott Highway, as shown in Figure 1.

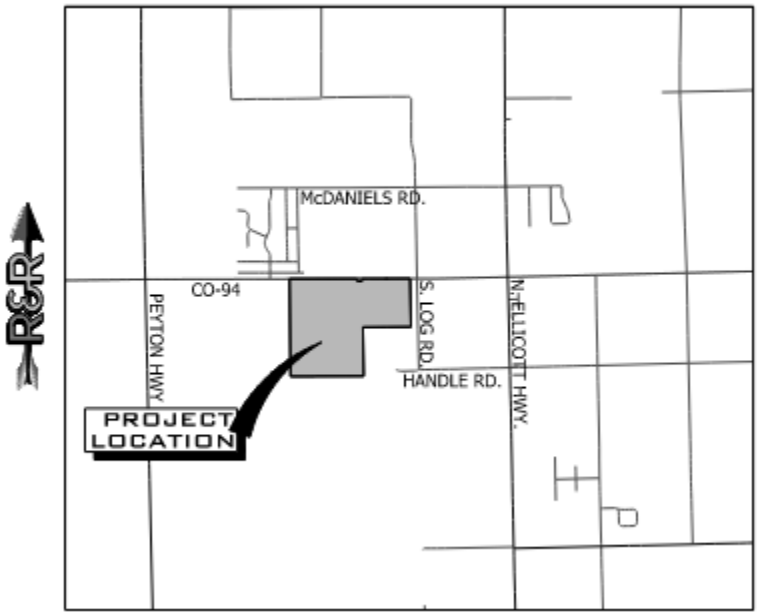


Figure 1: Vicinity Map

There is an existing Master Development Drainage Plan (MDDP) for Ellicott Town Center that was approved in December of 2005. This new MDDP will supersede the previous report and is being prepared as part of the Sketch Plan submittal.

B. Scope

This report has been prepared in support of the Sketch Plan application for Mayberry, Colorado Springs. The report is intended to fulfill the El Paso County requirements for an MDDP.

The report will provide a summary of site drainage issues impacting the proposed development, including analysis of impacts from upstream drainage patterns, site-specific developed drainage patterns, and impacts on downstream facilities. This drainage report was prepared based on the guidelines and criteria presented in the El Paso County Drainage Criteria Manual.

C. Site Location and Description

The Mayberry, Colorado Springs development (hereon called the site) is approximately 632 acres and comprises the northern half and southwest quadrant of Section 14 along with the eastern quarter of Section 15. More specifically, the site lies within portions of Sections 14 and 15, Township 14 South, Range 63 West of the 6th Principal Meridian. The site is located at an elevation of approximately 6,060 feet.

State Highway 94 borders the Site to the north and unplatted agricultural properties border the Site on the west, south, and east sides. Properties to the west and southwest are zoned RR-5 and properties to the east/southeast are zoned A-35. Log Road borders the northeastern portion of the site to the east.

The master plan proposes single-family lots, multifamily development, commercial/mixed-use development, parks and open space, and an elementary school.

The primary access to the Site will be provided by newly constructed roads off Highway 94 and Log Road. The new roads, Springs Road and Mayberry Drive, will run through the site from north to south. Additionally, a new road will be constructed to run east west and will be an extension of the existing Handle Road located to the east of the Site.

The intermittent streams throughout this area drain into the Black Squirrel Creek Basin which ultimately outfalls into the Arkansas River. A majority of the site is located within the Ellicott Consolidated Drainage Basin (CHBS1200). This basin conveys surface drainage to the West Fork of Black Squirrel Creek, which is located east of this parcel between the site and Ellicott Highway. The Southwest Corner of the site is located within the Telephone Exchange Drainage Basin (CHW0200)

The terrain is generally flat with gentle northwest to southeast slopes ranging from one to two percent. Historic drainage patterns from the site are conveyed overland to the south and east boundaries of the site. Construction of roadways and single-family homes has begun within Filing 1, Filing 2, and Filing 3 while the remainder of the site is covered with native grasses. For the purpose of this MDDP, Filings 4 and 5 are assumed to be existing as these projects are currently under review.

D. General Soil Conditions

According to the Soil Survey of El Paso County prepared by the Soil Conservation Service, on-site soils are comprised primarily of “Blakeland Loamy Sand (type 8)” soils and “Truckton Loamy Sand (map symbol 95) (see Appendix). The onsite soils are

characterized as well-drained sandy soils with low runoff rates and low erosion potential. These soils are classified as hydrologic soils group "A" for drainage analysis purposes.

E. References

David R. Sellon & Associates Inc., "Antelope Park Ranchettes Interior Drainage Plan," March, 1972.

El Paso County "Drainage Criteria Manual County of El Paso, Colorado – Volumes 1 and 2" dated October 31, 2018. (Referred to throughout as EPC DCM)

El Paso County Planning Department, "Ellicott Valley Comprehensive Plan," March, 1989.

El Paso County "Engineering Criteria Manual," January 9, 2006.

El Paso County Resolution No. 15-042 (El Paso County adoption of "Chapter 6: Hydrology" and "Chapter 13, Section 3.2.1: Full Spectrum Detention" of the City of Colorado Springs Drainage Criteria Manual dated May 2014).

JPS Engineering, "Master Development Drainage Plan for Ellicott Town Center," November 22, 2005 (approved by El Paso County 12/02/05).

JPS Engineering, "Master Development Drainage Plan and Preliminary Drainage Report for Springs East Village," March 21, 2002 (approved by El Paso County 10/23/02).

JPS Engineering, "Master Development Drainage Plan and Preliminary Drainage Report for Viewpoint Village," January 28, 2002 (approved by El Paso County 9/11/02).

JPS Engineering, "Preliminary Drainage Report for Ellicott Town Center - Phase 1," January 15, 2007.

JPS Engineering, "Preliminary Drainage Report Amendment for Mayberry, Colorado Springs – Phase 1 PUD," revised February 2022

JPS Engineering, "Final Drainage Report for Mayberry, Colorado Springs – Filing No. 1A Replat," approved June 2022.

Leigh Whitehead & Associates, Inc., "Master Development Drainage Plan for Sunset Village," May, 2000 (approved by El Paso County 8/31/00).

Pacific Summits Engineering, "Final Drainage Report for Viewpoint Estates," January 6, 1998 (approved by El Paso County 10/6/99).

United Planning and Engineering, "Preliminary Drainage Plan & Report for Springs East," November 19, 1999.

United Planning and Engineering, "Drainage Plan & Report for Viewpoint Subdivision," May, 2000.

USDA/NRCS, "Soil Survey of El Paso County Area, Colorado," June, 1981.

Federal Emergency Management Agency, Map Number 08041C0810G, Panel 810 of 1300, December 7, 2018

R&R Engineers-Surveyors, "Final Drainage Report for Mayberry, Colorado Springs – Filing No. 3," Approved May 2023

II. DRAINAGE BASINS AND SUB-BASINS

A. Major Drainage Basins

The proposed development lies primarily within the Ellicott Consolidated Drainage Basin (CHBS1200) and the Telephone Exchange Drainage Basin (CHWS0200) as classified by El Paso County. These basins are comprised of the area tributary to the West Fork of Black Squirrel Creek, with the majority of the basins are bounded by SH94 to the north, Ellicott Highway to the east, and North Peyton Highway to the west. No drainage planning study has been completed for the Ellicott Consolidated Drainage Basin or the Telephone Exchange Drainage Basin. Drainage patterns of these basins will remain constant with the proposed drainage patterns of this master study.

El Paso County approved the "Sunset Village Master Development Drainage Plan (MDDP)" prepared by Leigh Whitehead & Associates. This MDDP borders the Mayberry parcel to the west. Based on the Drainage Report for Viewpoint Estates, stormwater detention ponds were constructed to maintain historic flows leaving the upstream developed areas. As such, the drainage analysis for major basins impacting the site will assume that historic flows enter this parcel from upstream.

The major drainage basins lying in and around the proposed development are depicted in the appendix. Mayberry, Colorado Springs is located primarily within the Ellicott Consolidated Drainage Basin, which comprises a tributary area of about 13 square miles, or 8,320 acres. The proposed subdivision represents a total of approximately 632 acres of development, or 7 percent of the total basin area. An "on-site" drainage planning approach has been proposed based on the relatively small developed area in comparison to the remaining undeveloped basin area, which is primarily agricultural land.

The existing site topography has several off-site drainage basins that enter the north and west boundaries of the Mayberry parcel. Triple 30-inch CMP culverts cross SH94 at several locations along the north boundary of the site. These off-site basins combine with on-site flows, following existing grass-lined swales southeasterly through the site. The site historically consists of six major basins conveying flows towards the south and eastern boundaries of the site, as shown in Figure DR1 in Appendix D.

B. Floodplain Impacts

Mayberry, Colorado Springs is located approximately one mile southwest of the 100-year floodplain limits for the West Fork of Black Squirrel Creek, as delineated by the Federal Emergency Management Agency (FEMA). The floodplain limits in the vicinity of the site are shown in Flood Insurance Rate Map (FIRM) Number 08041C0810G, dated December 7, 2018 (see Appendix A).

C. Sub-Basin Description

The developed drainage basins lying within the site are depicted on the proposed drainage maps in Appendix D. The interior site layout has been delineated into several major drainage basins (A, B, D, E, F, and G) based on the anticipated proposed interior road layout and grading scheme. The natural drainage patterns were held to decrease the impact on downstream properties. Each of these sub-basins drain towards the southeast and sheet-flow onto neighboring properties to the east and south.

III. DRAINAGE CRITERIA

A. Hydrologic Criteria

Rational method procedures were utilized for calculations of peak flows within the existing and proposed on-site drainage basins. Rational method hydrologic calculations were based on the following assumptions:

• Design storm (minor)	5-year	
• Design storm (major)	100-year	
• Rainfall Intensities	El Paso County I-D-F Curve	
• Hydrologic soil type	A	
	C5	C100
• Runoff Coefficients - undeveloped:		
Existing pasture/meadow areas	0.04	0.35
• Runoff Coefficients - developed:		
Proposed Residential (1/8-1/4 acre lots)	0.375	0.545
Proposed Neighborhood Commercial	0.81	0.88
Proposed Multi-Family	0.81	0.88

Composite runoff coefficients for the developed residential areas have been calculated based on average lot sizes between 1/8-acre and 1/4-acre. A rational method spreadsheet was utilized for modeling these flows and can be found in Appendix B.

Two offsite drainage basins to the north of State Highway 94 will be routed through the development as intended in the Mayberry Filing No. 1 Final Drainage Report (FDR) and the Mayberry Filing No. 3 Final Drainage Report. The SCS method was used for both offsite basins, EC10 and EC11, to identify the peak flows within the referenced FDRs. Please refer to Appendix E for supporting calculations.

B. Detention and Water Quality Criteria

This MDDP anticipates six full spectrum extended detention basins (EDB) to accommodate the entire master development. Basin volumes have been calculated using the Mile High Flood District (MHFD) spreadsheet and incorporated into the preliminary overlot grading surface to ensure a minimum 3% pond bottom can be satisfied and to identify pond outfall locations. The MHFD worksheets can be found in Appendix C. It is the responsibility of the individual Final Drainage Reports for future Mayberry filings to design an outlet structure which accommodate required release rates. The future facilities shall be designed to pass and release the water quality capture volume (WQCV), excess urban runoff volume (EURV), and the 100-year storm to meet all local and state regulations by means of a multi-stage outlet structure.

IV. DRAINAGE DESIGN

A. General Concept

The drainage design intent is to maintain existing drainage patterns while protecting downstream properties and infrastructure from this development. This master drainage plan delineates six drainage basins, therefore six full spectrum extended detention basins are proposed. Open channels and future storm infrastructure are anticipated to route stormwater to the EDBs. For the purpose of this overview approach, only major roadways have been detail graded into the proposed overlot surface to demonstrate how these drainage basin divides will be accomplished.

As there is no existing stormwater infrastructure to the south and east of this development, the ultimate stormwater discharge from the proposed EDBs will first enter a plunge pool before exiting the site. The recommended plunge pools will decrease the velocity and act as a level spreader to convert point discharges to a sheet-flow condition leaving the site.

Three offsite basins will impact this master development. Basin EC12 is conveyed under SH94 through culverts (DP ec12) and combines with basin OFF-1 which historically flows in and out of the western property line. To maintain the ultimate drainage pattern destination and protect the future development, a height varying berm has been recommended along the western property line to direct flows south. This will slightly alter drainage paths, however the ultimate discharge point, design point o1, will remain constant with historic flows. To avoid erosion and downstream impacts, it is recommended to install check dams and a riprap lined plunge pool at the southern limit of the berm, as this condition will cause channelized flow.

Basin EC11 is conveyed through culverts under SH94 (DP ec11), north of Filing No. 1. The Mayberry Filing No. 1A FDR continues this offsite flow south through an RCP pipe under Atchison Way. This master drainage plan recommends continuing this flow south until it reaches a defined open-channel (Channel B) where it will discharge with Pond A and Pond B's outfall points to Plunge Pool 3.

Basin EC10 is conveyed through culverts under SH94 (DP ec10), north of Filing No. 3. The Mayberry Filing No. 3 FDR continues this offsite flow via an open channel, Channel E per the Filing 3 FDR and a series of culverts, to the south where the ultimate discharge point enters the existing Log Road roadside ditch with the outfall of Pond D. This master drainage plan recommends continuing this flow via storm pipe along the same alignment as the existing Filing 3 channel, Channel F, to support the proposed development. The discharge location will remain the same.

B. Existing Basins

Historic drainage conditions for this MDDP assume Mayberry Filings 1, 2, 3, 4, and 5 are to exist. This will include single family homes, apartment buildings, townhomes, parks, roadways, and commercial lots. The remaining undeveloped land to the south of these filings are depicted as pastures. Existing basins EX-A and EX-B depict the developed Mayberry Filings approved or currently under review with El Paso County as forementioned. Existing Basins EX-C, EX-D, EX-E, and EX-F depict the areas undeveloped on the Mayberry property. The general flow pattern of the entire site gradually falls from the northwest to the southeast at slopes ranging from one to two percent. Stormwater currently sheetflows across the eastern and southern property boundaries.

C. Developed Drainage Basins

The developed drainage basins and projected flows are shown in the proposed drainage maps in Appendix D. A description of each basin is as follows:

Drainage Basin A is a total of 95 acres consisting of multifamily development, a small

portion of single-family development, and commercial development located in the northwest portion of the site. Stormwater is anticipated to be routed via curb and gutter, storm pipe, and Channel A to ultimately be detained by Pond A in the lower southeast corner of the basin. The Pond A discharge will enter the storm network within Boulevard A and continue east until it is discharged into Plunge Pool 3 before exiting the site.

Drainage Basin B is a total of 49 acres consisting of single-family homes, multifamily development, and commercial development. Basin B encompasses the area south of Mayberry Filing 1. Stormwater is anticipated to be routed via curb and gutter and storm pipe to ultimately be detained by Pond B in the lower southeast corner of the basin. The Pond B discharge will enter Channel B and ultimately outfall into Plunge Pool 3 before exiting the site.

Drainage Basin C is a total of 43 acres consisting of single-family homes and multifamily development. Basin C encompasses the entirety of Mayberry Filing 1. The existing Pond C will be re-shaped from what was designed and constructed within Mayberry Filing 1. Stormwater is anticipated to be routed via curb and gutter and storm pipe to ultimately be detained by Pond C in the lower southeast corner of the basin. The Pond C discharge will enter Channel B and ultimately outfall into Plunge Pool 3 before exiting the site.

Drainage Basin D is a total of 110 acres consisting of single-family homes, multifamily development, and commercial development. Basin D encompasses Mayberry Filings 2, 3, and 4. Stormwater is anticipated to be routed via curb and gutter, storm pipe, and Channel D to ultimately be detained by Pond D in the lower southeast corner of the basin. The Pond D discharge will enter Channel F and ultimately outfall into Plunge Pool 4 before exiting the site.

Drainage Basin E is a total of 73 acres consisting of single-family homes, multifamily development, and commercial development located in the northeast portion of the site. Stormwater is anticipated to be routed via curb and gutter and storm pipe to ultimately be detained by Pond E in the lower southeast corner of the basin. The Pond E discharge will enter Plunge Pool 4 before exiting the site.

Drainage Basin F is a total of 75 acres consisting of single-family homes and multifamily development located in the southwest portion of the site. Stormwater is anticipated to be routed via curb and gutter, storm pipe, and Channel H to ultimately be detained by Pond F in the lower south side of the basin. The Pond F discharge will enter Plunge Pool 5 before exiting the site.

Drainage Basin G is a total of 160 acres consisting of single-family homes and multifamily development located in the southeast portion of the site. Stormwater is anticipated to be routed via curb and gutter, storm pipe, and Channel G to ultimately

be detained by Pond G in the lower southeast corner of the basin. The Pond G discharge will enter Plunge Pool 6 before exiting the site.

Each proposed drainage basin has a specific design point relative to the overall discharge location of the basin. Please see the chart below indicating the 5-year and 100-year flows for each design point:

DESIGN POINT SUMMARY TABLE				
Design Point	**Contributing Basins**	**Area (acres)**	**5-yr (cfs)**	**100-yr (cfs)**
1	A	95.00	147.81	273.86
2	B	49.00	64.15	136.63
3	C	43.00	56.01	115.33
4	D	110.00	138.30	293.42
5	E	73.00	101.07	204.91
6	F	75.00	70.97	145.03
7	G	160.00	166.68	350.13

D. Detention Design

An extended detention basin is proposed for each major drainage basin to mitigate developed stormwater flows leaving the site. The total volume requiring storage is equivalent to the 100 Year + ½ WQCV produced by the onsite developed area. See Appendix C for each respective MHFD worksheet. A description of each EDB is as follows:

Pond A is located at the southeast corner of drainage Basin A. Based on the tributary land-use, the required volume for the pond is 16.5 acre-feet. Pond A will discharge into an underground RCP pipe that will continue east under Boulevard A until the flow ultimately discharges into a channel combined with the Pond B outfall and the offsite basin EC11 at Plunge Pool 3.

Pond B is located at the southeast corner of drainage Basin B. Based on the tributary land-use, the required volume for the pond is 6.4 acre-feet. Pond B will discharge into Channel B, combining with the flow from offsite basin EC11 and the discharge from Pond C at Plunge Pool 3.

Pond C is located at the southeast corner of drainage Basin C. Based on the tributary land-use, the required volume for the pond is 6.0 acre-feet. Pond C has been designed and constructed with Mayberry Filing 1. In the ultimate buildout, Pond C will be reshaped as

preliminarily depicted in the drainage map. Pond C will discharge into Channel B, combining with the flow from offsite basin EC11 and the discharge from Pond B at Plunge Pool 3.

Pond D is located at the southeast corner of drainage Basin D. Based on the tributary land-use, the required volume for the pond is 15.3 acre-feet. Pond D has been designed and approved in the Filing No. 3 Final Drainage Report. Although the approved Filing No. 3 Pond design is sufficient for this full development, the configuration will be revised to accommodate this future layout of single-family lots. Pond D will discharge into Channel F, combining with the flow from offsite basin EC10. This flow will ultimately discharge into Plunge Pool 4.

Pond E is located at the southeast corner of drainage Basin E. Based on the tributary land-use, the required volume for the pond is 13.5 acre-feet. Pond E will discharge directly into Plunge Pool 4 located within Channel F, combining with the flow from Pond D and the offsite basin, EC10.

Pond F is located at the southern boundary of drainage Basin F. Based on the tributary land-use, the required volume for the pond is 11.3 acre-feet. Pond F will discharge into Plunge Pool 1, where stormwater flow will slow down and sheet-flow onto the adjacent property.

Pond G is located at the southeast corner of drainage Basin G. Based on the tributary land-use, the required volume for the pond is 22.6 acre-feet. Pond G will discharge into Plunge Pool 2, where stormwater flow will slow down and sheet-flow onto the adjacent property.

E. Open Channels

Six open channels are proposed as part of this master development: A, B, D, F, H, and G. These channels will generally be designed as stable native grass-lined channels with subcritical flow regimes. Drainage channels have been designed to convey the 100-year flows, with trapezoidal cross-sections, side slopes of 4:1, and a minimum freeboard of 1-foot. Channel geometry can be subject to change in the final drainage reports for future filings, however the conservative parameters for the preliminary design is as follows:

Channel A conveys flows from portions of Basin A, with a tributary area of 11.6 acres (see Appendix B). The channel is trapezoidal with a bottom width of 8 feet and a total depth of 2.5’. The channel is recommended to be lined with a native grass mixture.

Channel B conveys flows from the offsite basin, EC11. The flows for EC11 have been taken from the approved Final Drainage Report for Mayberry Filing No. 1A (see Appendix E for referenced calculations). The channel is trapezoidal with a bottom width of 8 feet and a total depth of 3.5’. The channel is recommended to be lined with a native grass mixture.

Channel D conveys flows from the northern portion of Basin D, assumed to be existing as Mayberry Filings 2, 3, and 4. The flows have been taken from the approved Final Drainage Report for Mayberry Filing No. 3 (see Appendix E for referenced calculations). The channel is trapezoidal with a bottom width of 8 feet and a total depth of 4'. The channel is recommended to be lined with a native grass mixture.

Channel F conveys flows from the offsite basin, EC10 and the discharge of Pond D. The flows for EC10 have been taken from the approved Final Drainage Report for Mayberry Filing No. 3 (see Appendix E for referenced calculations). The channel is trapezoidal with a bottom width of 8 feet and a total depth of 3.5'. The channel is recommended to be lined with a native grass mixture.

Channel H conveys flows from portions of Basin F, with a tributary area of 24 acres (see Appendix B). The channel is trapezoidal with a bottom width of 8 feet and a total depth of 2.5'. The channel is recommended to be lined with a native grass mixture.

Channel G conveys flows from portions of Basin G, with a tributary area of 64.4 acres (see Appendix B). The channel is trapezoidal with a bottom width of 8 feet and a total depth of 3'. The channel is recommended to be lined with a native grass mixture.

F. Culverts

Eight culverts are proposed beneath proposed roadways crossing the open channels. The culverts are designed so that during the 100-year storm event, water levels do not exceed 12 inches above finished grade when overtopping the roadway above per Table 6-4 of EPC DCM.

Culverts 1 and 2 will continue the stormwater flows of Channel B, consisting of the offsite basin, EC11 and the Pond B outfall. Culvert 3 will continue the stormwater flows of Channel F, consisting of the offsite basin, EC10 and the Pond D outfall. Culverts 4, 5, and 6 will continue the stormwater flows of Channel G. Lastly, culverts 7 and 8 will continue stormwater flows of Channel H. Refer to Appendix E for supporting calculations of the 5-year and 100-year flows for culverts 1, 2, and 3. Refer to Appendix B for supporting calculations of the 5-year and 100-year flows for culverts 4, 5, 6, 7, and 8.

G. Riprap and Plunge Pools

Rip-Rap and plunge pools are recommended to be sized for the 100-year storm per UDFCD Chapter 9 Section 3.2.1 and 3.2.2. Rip-rap shall be placed where all pipes discharge into channels across the site and is sized to reduce velocities to 5 feet per second (fps). Plunge pools have been proposed where flows from the extended

detention basins discharge before ultimately leaving the property. The plunge pools shall be sized to reduce velocities to 1.3 fps to ensure flows leaving the property are as non-erosive as possible and sheet-flow onto the adjacent properties to maintain historic flow patterns.

Plunge Pool 3, located southeast of Pond B, will mitigate Pond A, B, and C outfalls, and the offsite flow of Basin EC11. Plunge Pool 4, located south of Pond E and west of Log Road, will mitigate Pond D and E outfalls, and the offsite flow of Basin EC10 before discharging to the existing roadside ditch along Log Road. Plunge Pool 1 is located south of Pond F and will mitigate the Pond F outfall. Plunge Pool 2 is located south of Pond G and will mitigate the Pond G outfall.

H. Analysis of Existing and Proposed Downstream Facilities

The general concept of the proposed master drainage plan is to attenuate peak flows from the developed site by routing flows through proposed on-site detention ponds. The onsite detention ponds are designed to convert the developed flows from the Mayberry Communities master plan to historic levels before discharging to the adjacent property. The historic drainage patterns show stormwater sheet-flowing across the project boundaries along the southern and eastern property lines. As the proposed detention ponds will create a point discharge condition, plunge pools are recommended to slow down the stormwater flow, and convert the point discharge to a sheet-flow condition as the plunge pools will allow the stormwater to slowly spill over. A detail of a plunge pool has been added to Appendix C.

As the stormwater runoff overtops each plunge pool and enters the downstream property, the water will sheet flow to its historic destination. Plunge pools o1, 1, 2, and 3 will direct flows to the southern property, where the runoff will sheet flow southeasterly, until it ultimately enters the Lower Black Squirrel (CHBS0600) drainage basin per El Paso County. Plunge Pool 4 will discharge into the existing Log Road roadside ditch. This roadside ditch shall be evaluated for future improvements in the final drainage report pertaining to Basin E. Runoff from the roadside ditch will continue south until it is ultimately discharged into the Black Squirrel Creek. Conditions of each plunge pool shall be regularly inspected and cleared of sediment and debris to maintain the functionality to prohibit adverse effects to the downstream properties.

I. Anticipated Drainage Problems and Solutions

The proposed stormwater detention ponds are designed to mitigate the impacts of developed drainage from this master planned development. The overall drainage plan anticipates a system of improved public streets with curb and gutter, storm inlets, and storm sewers conveying developed flows to improved drainage channels running throughout the site. The primary drainage problems anticipated within this development will consist of maintenance of these storm sewer systems, culverts,

drainage channels, and detention pond facilities. Continuing maintenance will need to be implemented for proper erosion control measures in the proposed channels and swales, which will be designed to meet allowable velocity criteria.

A trail system shall be constructed along the major drainage channels to provide maintenance access to the drainage facilities throughout the development. Proper construction and maintenance of the proposed detention facilities will minimize downstream drainage impacts. The proposed detention ponds and channels throughout the site will be privately owned and maintained by the homeowner's association or metropolitan district.

V. WATER QUALITY

Water quality will be provided for all proposed drainage basins of this master planned development. The proposed channels will promote the conveyance of storm water at a slower, controlled rate and will act as a filter medium removing pollutants and allowing stormwater infiltration. The proposed detention ponds will be designed to include an outlet structure with a series of orifices to meet the 40-hour drain time for the water quality capture volumes. This allows sediment to settle prior to stormwater runoff discharging from the ponds.

VI. SUMMARY

The proposed Mayberry Communities master development will generate an increase in developed runoff from the site, which will be mitigated through construction of on-site stormwater detention facilities. The proposed drainage patterns will remain consistent with historic conditions, and new drainage facilities constructed to El Paso County standards will safely convey runoff to adequate outfalls protected by utilizing the design of plunge pools. The proposed detention ponds at the south and east boundaries of the site will ensure that developed flows from Mayberry Communities remain below historic levels. Construction of the proposed drainage facilities will ensure that this subdivision will not adversely affect downstream or surrounding areas.

VII. Appendix

Appendix A – Referenced Maps

- **Vicinity Map**
- **Soils Map**
- **FEMA Map**

Appendix B – Hydrologic Calculations

Appendix C – Hydraulic Calculations

C1. Detention Basin Volumes

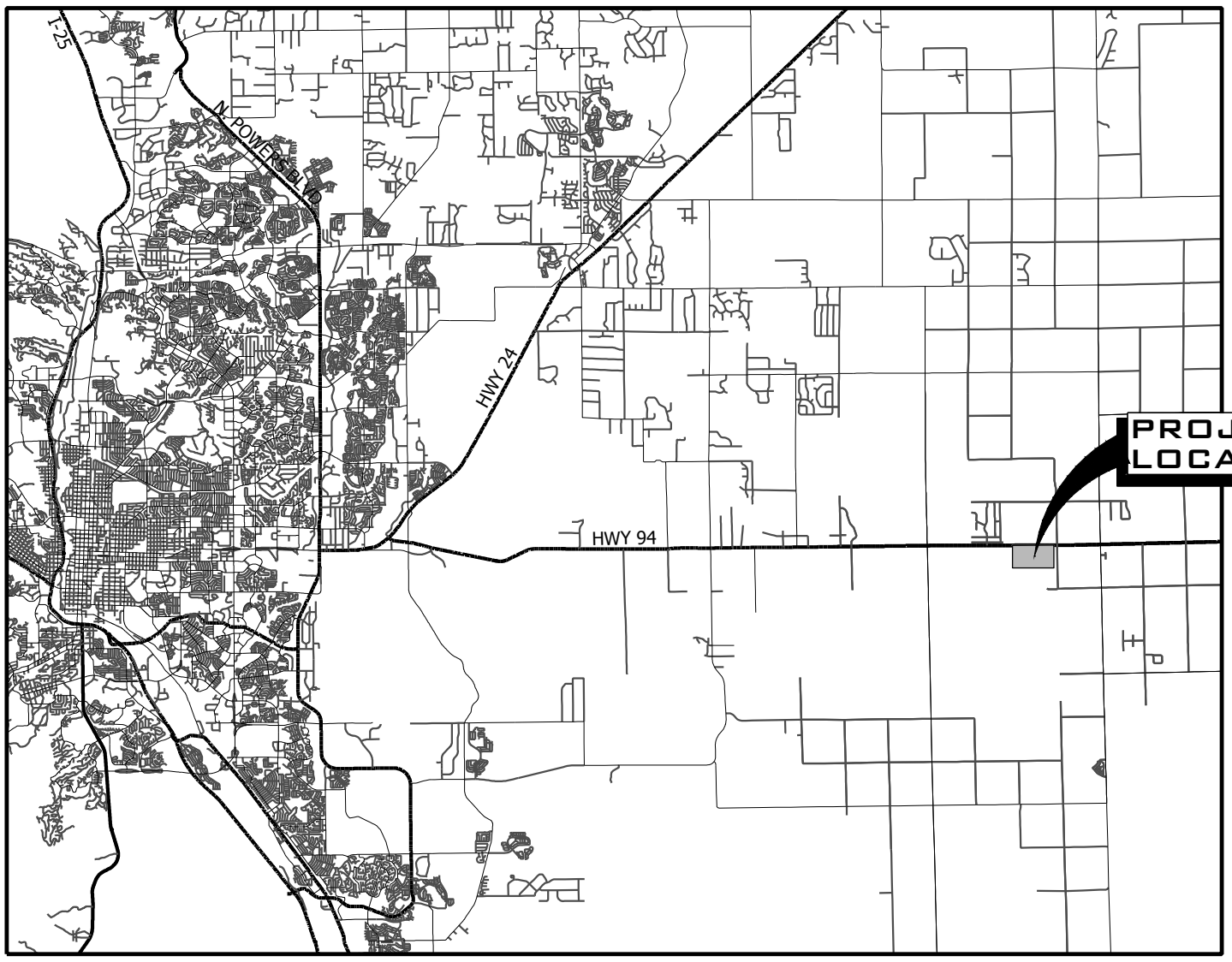
C2. Open Channels

C3. Culvert Sizing

Appendix D – Drainage Maps

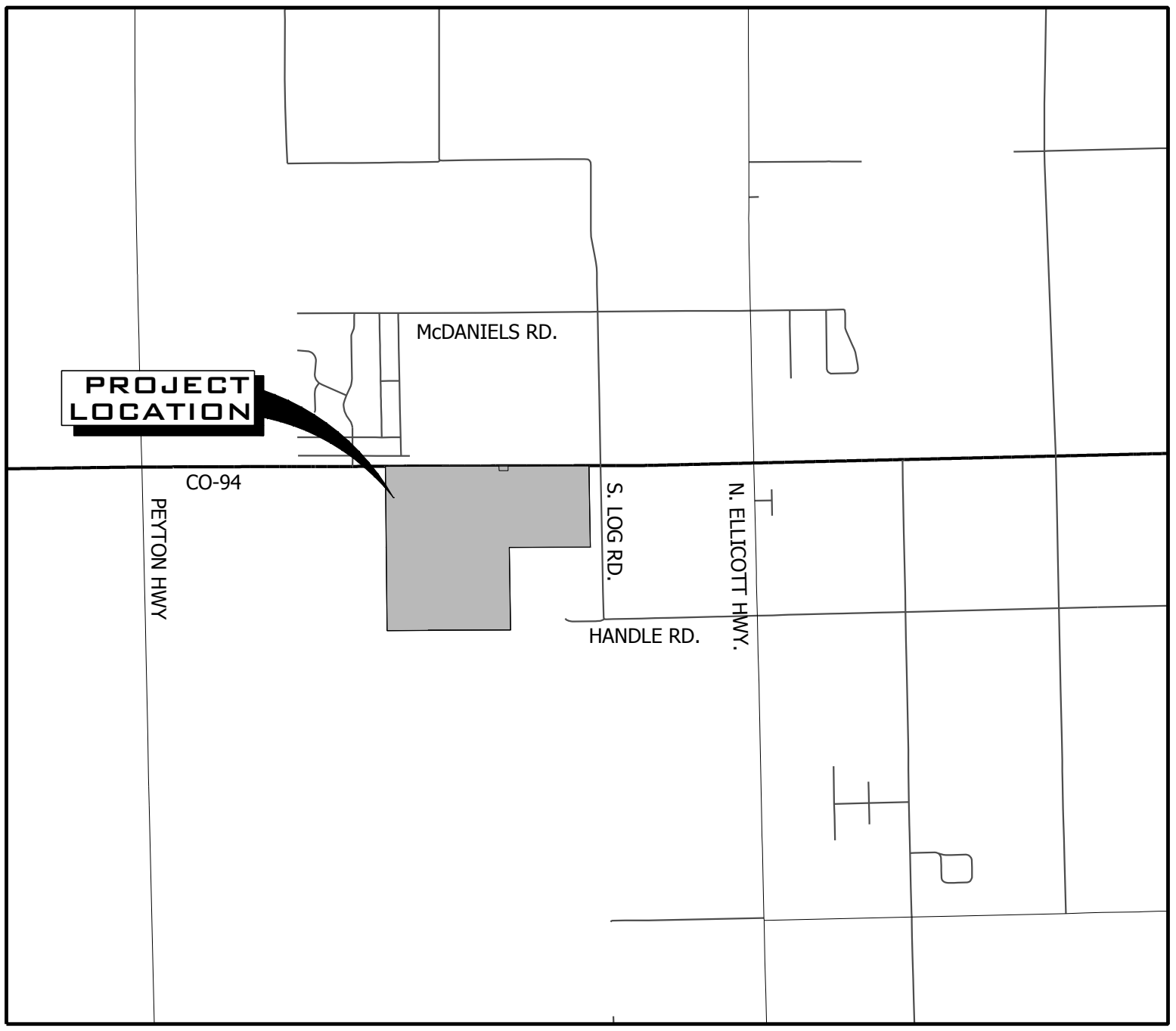
Appendix E – Referenced Drainage Reports

APPENDIX A – REFERENCED MAPS



VICINITY MAP

SCALE 1" = 20,000'



SITE MAP

SCALE 1" = 5000'

REVISIONS

ENGINEERS SURVEYORS INC
WWW.RRENGINEERS.COM

SITE MAP

MAYBERRY MASTER PLAN

3296 DEVINE HEIGHTS #208
COLORADO SPRINGS, CO 80922

JOB NO.	MC22110
DATE	05-03-2023
DRN LAO	CHK CD
EXHIBIT NAME	SITE MAP
SHEET NO.	1 OF 1

United States Department of Agriculture

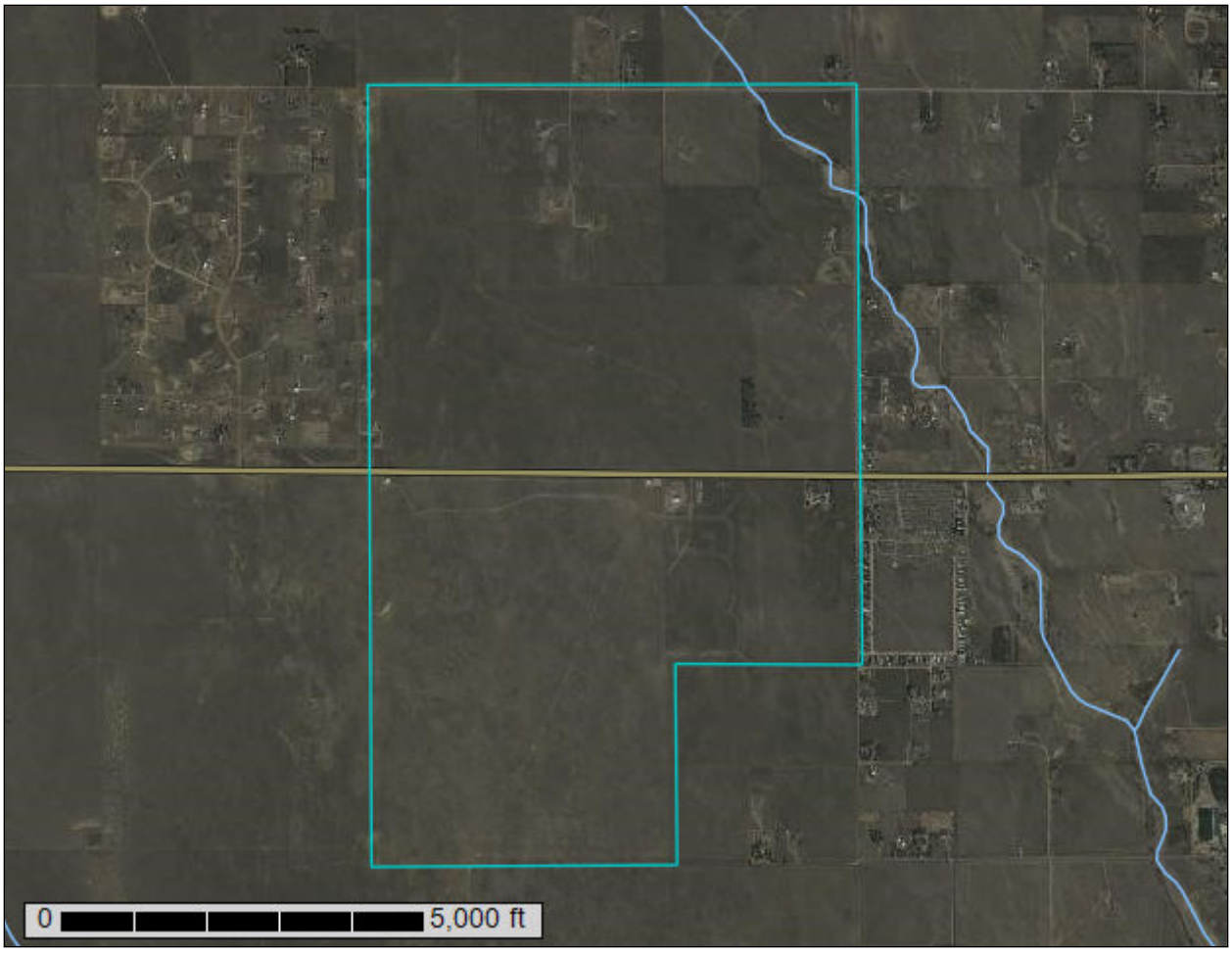
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for El Paso County Area, Colorado

Mayberry Colorado Springs - MDDP



January 10, 2023

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

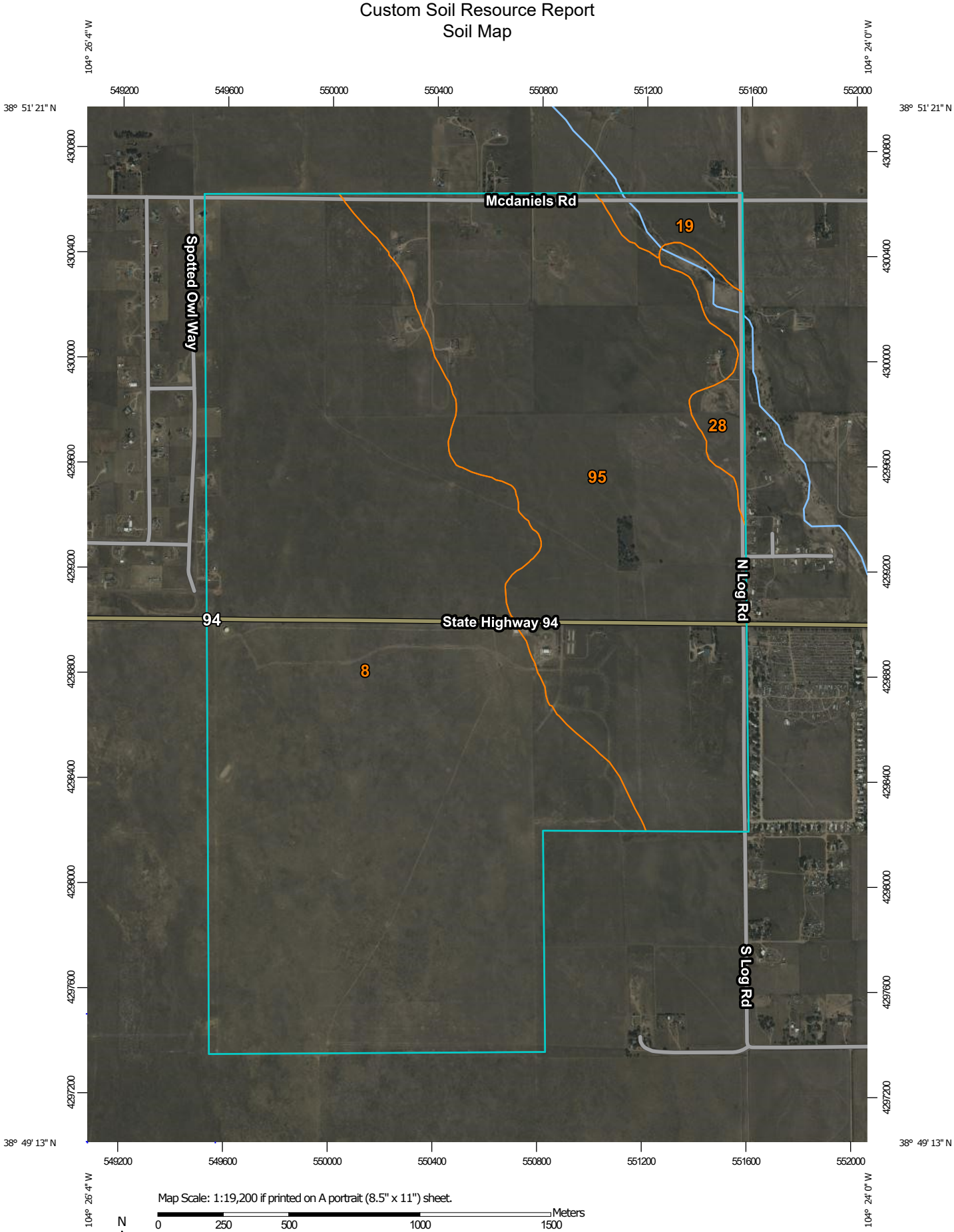
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:19,200 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 250 500 1000 1500

Feet
0 500 1000 2000 3000

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

MAP LEGEND

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

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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 20, Sep 2, 2022

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

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

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
8	Blakeland loamy sand, 1 to 9 percent slopes	930.4	61.7%
19	Columbine gravelly sandy loam, 0 to 3 percent slopes	29.7	2.0%
28	Ellicott loamy coarse sand, 0 to 5 percent slopes	29.4	1.9%
95	Truckton loamy sand, 1 to 9 percent slopes	519.2	34.4%
Totals for Area of Interest		**1,508.7**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

El Paso County Area, Colorado

8—Blakeland loamy sand, 1 to 9 percent slopes

Map Unit Setting

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

Map Unit Composition

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

Description of Blakeland

Setting

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

Typical profile

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

Properties and qualities

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

Interpretive groups

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

Minor Components

Other soils

Percent of map unit: 1 percent

Hydric soil rating: No

Pleasant

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

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

Map Unit Setting

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

Map Unit Composition

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

Description of Columbine

Setting

Landform: Fans, fan terraces, flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

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

Properties and qualities

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

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: R049XY214CO - Gravelly Foothill

Hydric soil rating: No

Minor Components

Fluvaquentic haplaquolls
Percent of map unit: 1 percent
Landform: Swales
Hydric soil rating: Yes

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

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

28—Ellicott loamy coarse sand, 0 to 5 percent slopes

Map Unit Setting
National map unit symbol: 3680
Elevation: 5,500 to 6,500 feet
Mean annual precipitation: 13 to 15 inches
Mean annual air temperature: 47 to 50 degrees F
Frost-free period: 125 to 145 days
Farmland classification: Not prime farmland

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

Description of Ellicott

Setting
Landform: Stream terraces, flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy alluvium

Typical profile
A - 0 to 4 inches: loamy coarse sand
C - 4 to 60 inches: stratified coarse sand to sandy loam

Properties and qualities
Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Very low

Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: NoneFrequent
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A
Ecological site: R069XY031CO - Sandy Bottomland
Other vegetative classification: SANDY BOTTOMLAND (069AY031CO)
Hydric soil rating: No

Minor Components

Fluvaquentic haplaquoll

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

Other soils

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

Pleasant

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

95—Truckton loamy sand, 1 to 9 percent slopes

Map Unit Setting

National map unit symbol: 2yvrm
Elevation: 5,800 to 7,100 feet
Mean annual precipitation: 12 to 19 inches
Mean annual air temperature: 46 to 50 degrees F
Frost-free period: 90 to 155 days
Farmland classification: Not prime farmland

Map Unit Composition

Truckton and similar soils: 87 percent
Minor components: 13 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Truckton

Setting

Landform: Interfluves, fan remnants
Down-slope shape: Linear

Across-slope shape: Linear
Parent material: Wind re-worked alluvium derived from arkose

Typical profile

A - 0 to 4 inches: loamy sand
Bt1 - 4 to 12 inches: sandy loam
Bt2 - 12 to 19 inches: sandy loam
C - 19 to 80 inches: sandy loam

Properties and qualities

Slope: 1 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Maximum salinity: Nonsaline to very slightly saline (0.1 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 6.5 inches)

Interpretive groups

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

Minor Components

Blakeland

Percent of map unit: 5 percent
Landform: Interfluves, hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Ecological site: R049XB210CO - Sandy Foothill
Hydric soil rating: No

Bresser

Percent of map unit: 5 percent
Landform: Interfluves, terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R049XB210CO - Sandy Foothill
Hydric soil rating: No

Urban land

Percent of map unit: 2 percent
Hydric soil rating: No

Ellicott, occasionally flooded

Percent of map unit: 1 percent
Landform: Flood plains, drainageways

Down-slope shape: Linear
Across-slope shape: Linear, concave
Ecological site: R067BY031CO - Sandy Bottomland
Hydric soil rating: No

Soil Information for All Uses

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Erosion Factors

Soil Erosion Factors are soil properties and interpretations used in evaluating the soil for potential erosion. Example soil erosion factors can include K factor for the whole soil or on a rock free basis, T factor, wind erodibility group and wind erodibility index.

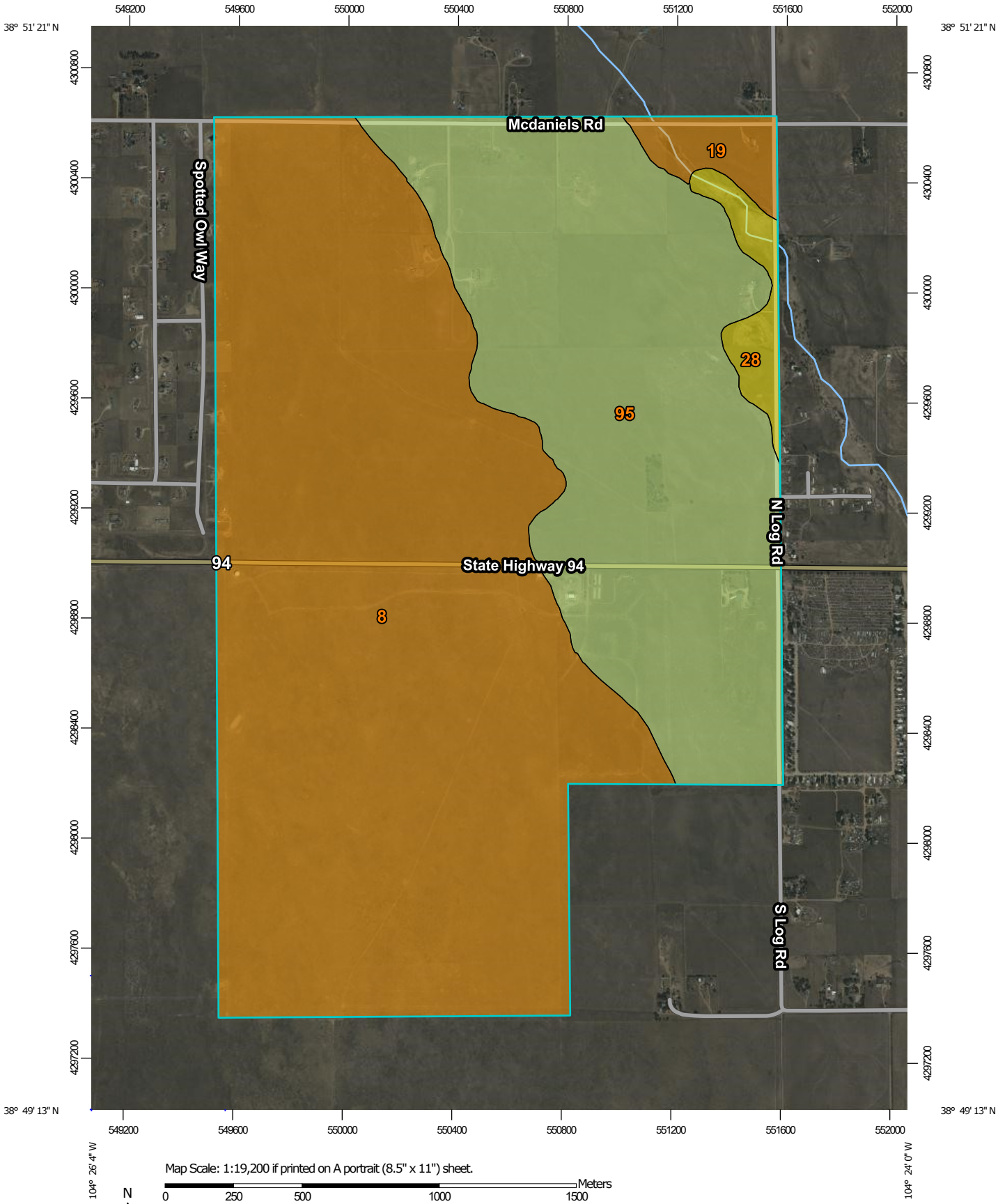
K Factor, Whole Soil (Mayberry Master Drainage Plan)

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and saturated hydraulic conductivity (Ksat). Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

"Erosion factor Kw (whole soil)" indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Factor K does not apply to organic horizons and is not reported for those layers.

Custom Soil Resource Report
Map—K Factor, Whole Soil (Mayberry Master Drainage Plan)



Map Scale: 1:19,200 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 250 500 1000 1500

Feet
0 500 1000 2000 3000

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

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

.02
.05
.10
.15
.17
.20
.24
.28
.32
.37
.43
.49
.55
.64
Not rated or not available

Soil Rating Lines

.02
.05
.10
.15
.17
.20
.24
.28
.32
.37
.43
.49
.55
.64
Not rated or not available

Soil Rating Points

.02
.05
.10
.15
.17
.20
.24
.28
.32
.37
.43
.49
.55
.64
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 20, Sep 2, 2022

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

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

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

Table—K Factor, Whole Soil (Mayberry Master Drainage Plan)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
8	Blakeland loamy sand, 1 to 9 percent slopes	.10	930.4	61.7%
19	Columbine gravelly sandy loam, 0 to 3 percent slopes	.10	29.7	2.0%
28	Ellicott loamy coarse sand, 0 to 5 percent slopes	.17	29.4	1.9%
95	Truckton loamy sand, 1 to 9 percent slopes	.24	519.2	34.4%
Totals for Area of Interest			**1,508.7**	**100.0%**

Rating Options—K Factor, Whole Soil (Mayberry Master Drainage Plan)

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Layer Options (Horizon Aggregation Method): Surface Layer (Not applicable)

Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Hydrologic Soil Group (Mayberry Master Drainage Plan)

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

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

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

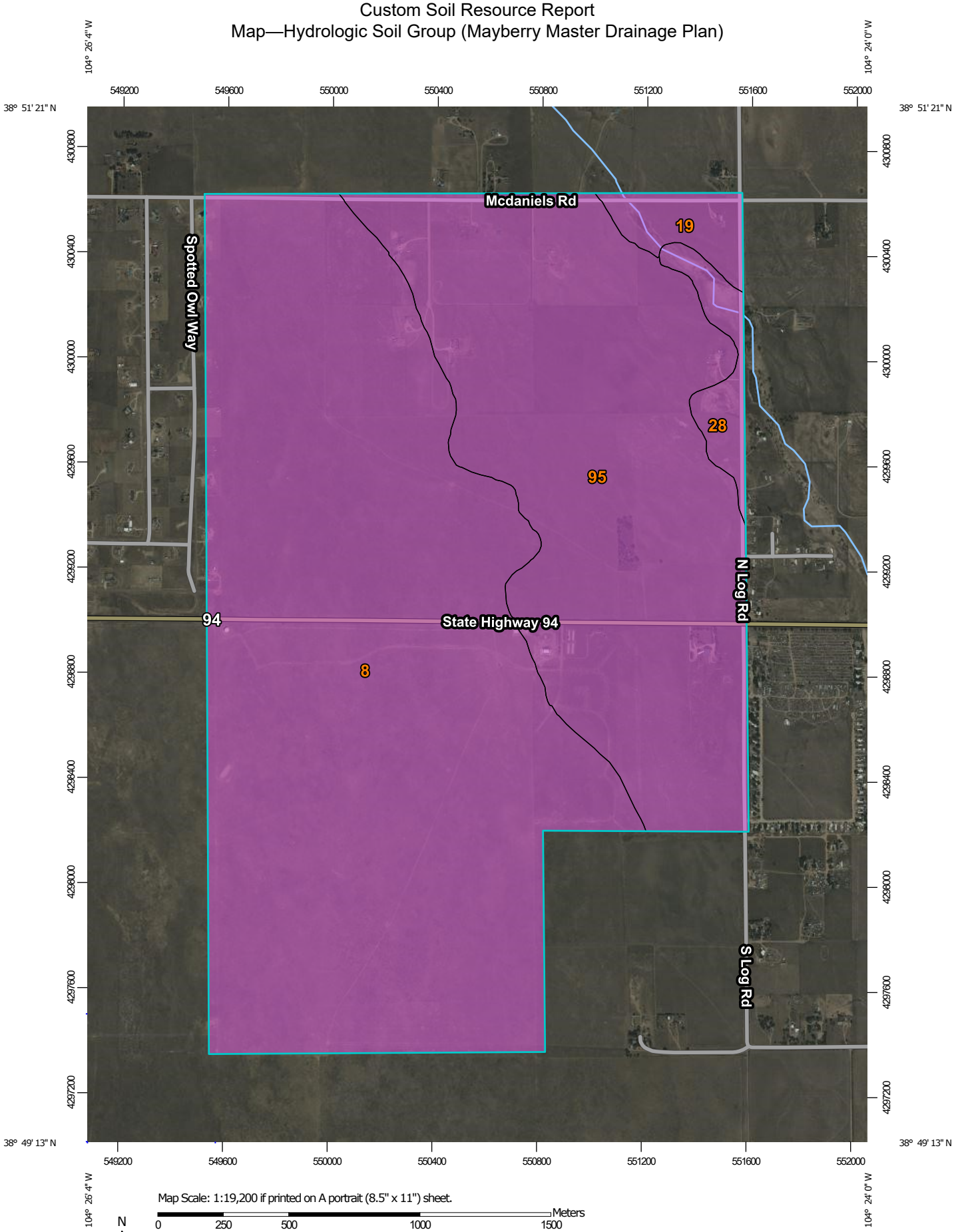
Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

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

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

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

Custom Soil Resource Report
Map—Hydrologic Soil Group (Mayberry Master Drainage Plan)



Map Scale: 1:19,200 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 250 500 1000 1500

Feet: 0 500 1000 2000 3000

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

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

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

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

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

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

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

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 20, Sep 2, 2022

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

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

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

Table—Hydrologic Soil Group (Mayberry Master Drainage Plan)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
8	Blakeland loamy sand, 1 to 9 percent slopes	A	930.4	61.7%
19	Columbine gravelly sandy loam, 0 to 3 percent slopes	A	29.7	2.0%
28	Ellicott loamy coarse sand, 0 to 5 percent slopes	A	29.4	1.9%
95	Truckton loamy sand, 1 to 9 percent slopes	A	519.2	34.4%
Totals for Area of Interest			**1,508.7**	**100.0%**

Rating Options—Hydrologic Soil Group (Mayberry Master Drainage Plan)

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

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, and Anderson Consulting Engineers, Inc. These data are current as of 2008.

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/.

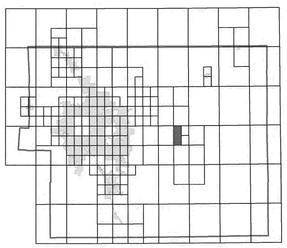
If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip.

El Paso County Vertical Datum Offset Table

Flooding Source	Vertical Datum Offset (ft)

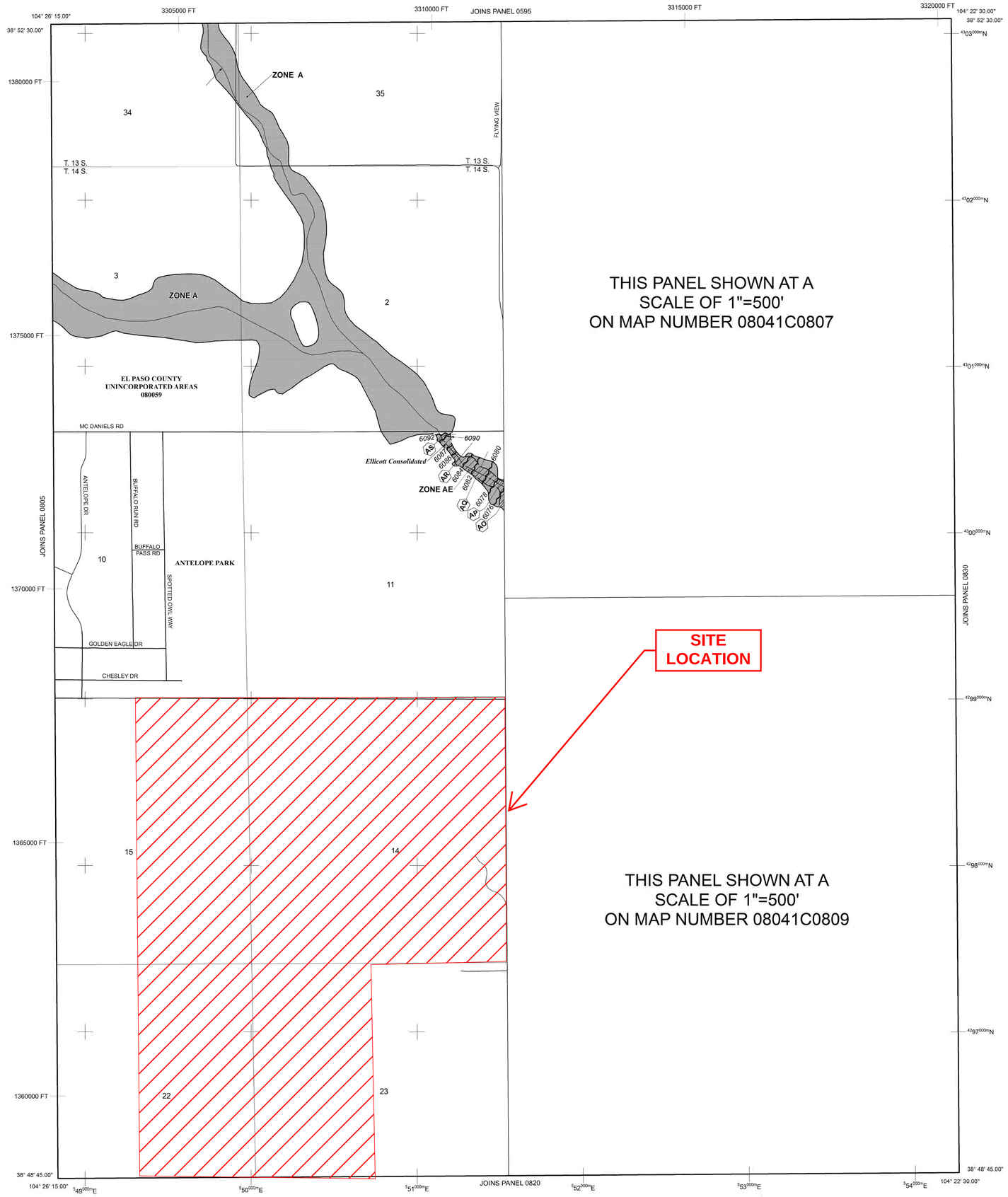
REFER TO SECTION 3.3 OF THE EL PASO COUNTY FLOOD INSURANCE STUDY FOR STREAM BY STREAM VERTICAL DATUM CONVERSION INFORMATION

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.



THIS PANEL SHOWN AT A
SCALE OF 1"=500'
ON MAP NUMBER 08041C0807

SITE LOCATION

THIS PANEL SHOWN AT A
SCALE OF 1"=500'
ON MAP NUMBER 08041C0809

NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 13 SOUTH, RANGE 63 WEST, AND TOWNSHIP 14 SOUTH, RANGE 63 WEST.

LEGEND

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

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

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

FLOODWAY AREAS IN ZONE AE

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

OTHER FLOOD AREAS

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

OTHER AREAS

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

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

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

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

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

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

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 0810G

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

EL PASO COUNTY, COLORADO
AND INCORPORATED AREAS

PANEL 810 OF 1300

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
EL PASO COUNTY	080059	0810	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
08041C0810G

MAP REVISED
DECEMBER 7, 2018

Federal Emergency Management Agency

APPENDIX B – HYDROLOGIC CALCULATIONS

EXISTING C VALUES

Designer: LAO
Company: R&R Engineers-Surveyors
Date: 7/23/2024
Project: MAYBERRY SKETCH PLAN
Location: EL PASO COUNTY, COLORADO

Global Parameters[1]			
Land Use	% Imp.	C_5	C_{100}
SF LOTS (1/6 AC)*	65	0.45	0.59
Commercial	95	0.81	0.88
Multi-Family	95	0.81	0.88
Pasture/Meadows	1	0.08	0.35

*Using 1/8 fo

Summary	
Total Area (ac)	589.00
Composite Impervious	12.6%

Cells of this color are for required user-input
Cells of this color are for optional user-input

[1] From Table 6-3 in MHFD Volume 1
[2] From Table 6-4 in MHFD Volume 1

Basin Name	Area (ac)	NRCS Hydrologic Soil Group	SF LOTS (1/6 AC)*		Commercial		Multi-Family		Pasture/Meadows		% Check	Percent Imperviousness	Runoff Coefficient, C[2]			
			Area (ac)	%	Area (ac)	%	Area (ac)	%	Area (ac)	%			2-yr	5-yr	10-yr	100-yr
OFF-1	44.00	A	0.00	0.0%	0.00	0.0%	0.00	0.0%	44.00	100.0%	100.00%	1.0%		0.08		0.35
EX-A	44.00	A	31.69	72.0%	0.00	0.0%	12.31	28.0%	0.00	0.0%	100.00%	73.4%		0.55		0.67
EX-B	100.00	A	36.80	36.8%	14.20	14.2%	0.00	0.0%	49.00	49.0%	100.00%	37.9%		0.32		0.51
EX-C	135.00	A	0.00	0.0%	0.00	0.0%	0.00	0.0%	135.00	100.0%	100.00%	1.0%		0.08		0.35
EX-D	185.00	A	0.00	0.0%	0.00	0.0%	0.00	0.0%	185.00	100.0%	100.00%	1.0%		0.08		0.35
EX-E	59.00	A	0.00	0.0%	0.00	0.0%	0.00	0.0%	59.00	100.0%	100.00%	1.0%		0.08		0.35
EX-F	22.00	A	0.00	0.0%	0.00	0.0%	0.00	0.0%	22.00	100.0%	100.00%	1.0%		0.08		0.35

TIME OF CONCENTRATION

Designer:	LAO
Company:	R&R Engineers-Surveyors
Date:	7/23/2024
Project:	MAYBERRY SKETCH PLAN
Location:	EL PASO COUNTY, COLORADO

$$t_i = \frac{0.395(1.1 - C_5)\sqrt{L_i}}{S_i^{0.33}}$$

$$t_t = \frac{L_t}{60K\sqrt{S_t}} = \frac{L_t}{60V_t}$$

$$\text{Regional } t_c = (26 - 17i) + \frac{L_t}{60(14i + 9)\sqrt{S_t}}$$

$$\text{Computed } t_c = t_i + t_t$$

$$\text{Selected } t_c = \max\{t_{minimum}, \min(\text{Computed } t_c, \text{Regional } t_c)\}$$

$t_{minimum}$ = 5 (urban)
$t_{minimum}$ = 10 (non-urban)

Cells of this color are for required user-input

Subbasin Data				Overland (Initial) Flow Time			Channelized (Travel) Flow Time					Time of Concentration			
Basin	Area	% Impervious	C5	Overland Flow Length L_i (ft)	Overland Flow Slope S_i (ft/ft)	Overland Flow Time t_i (min)	Channelized Flow Length L_t (ft)	Channelized Flow Slope S_t (ft/ft)	NRCS Conveyance Factor K	Channelized Flow Velocity V_t (ft/sec)	Channelized Flow Time t_t (min)	Computed t_c (min)	Regional t_c (min)	Selected t_c (min)	Remarks
EX-A	44.00	73.4%	0.55	36.00	0.020	4.73	1000.00	0.010	20	2.00	8.33	13.07	22.17	13.07	
EX-B	100.00	37.9%	0.32	36.00	0.020	6.72	1500.00	0.010	20	2.00	12.50	19.22	37.03	19.22	
EX-C	135.00	1.0%	0.08	500.00	0.010	41.18	1000.00	0.010	7	0.70	23.81	64.99	44.06	44.06	
EX-D	185.00	1.0%	0.08	500.00	0.010	41.18	1500.00	0.010	7	0.70	35.71	76.89	53.18	53.18	
EX-E	59.00	1.0%	0.08	500.00	0.010	41.18	1200.00	0.010	7	0.70	28.57	69.75	47.71	47.71	
EX-F	22.00	1.0%	0.08	200.00	0.010	26.04	500.00	0.010	7	0.70	11.90	37.95	34.95	34.95	
OFF-1	44.00	1.0%	0.08	300.00	0.010	31.90	3000.00	0.010	7	0.70	71.43	103.33	80.53	80.53	

STORM DRAINAGE SYSTEM DESIGN - 5-YEAR DESIGN STORM

Designer:	LAO
Company:	R&R Engineers-Surveyors
Date:	7/23/2024
Project:	MAYBERRY SKETCH PLAN
Location:	EL PASO COUNTY, COLORADO

Cells of this color are for required user-input

Cells of this color are for optional user-input

$I_5 = -1.50 \ln(D) + 7.583$

DESGIN POINT	STREET/ CONTRIBUTING BASINS	DIRECT RUNOFF							TOTAL RUNOFF					STREET BYPASS				PIPE			TRAVEL TIME			
		Basin Name	Area (ac)	Coeff C	Tc (min)	C*A (ac)	I	Q (cfs)	Tc (min)	Sum Area (ac)	Sum C*A (ac)	I in/hr	Q cfs	Street Q cfs	Street Slope %	Length ft	Street Tt min	Design Q cfs	Slope %	PIPE SIZE	L ft	VEL ft/sec	Tt min	Remarks
		EX-A	44	0.55	13.1	24.23	6.26	151.7																
1	Ex-A								13.1	44.0	24.2	3.63	87.9											
		EX-B	100	0.32	19.2	31.98	5.29	169.0																
2	EX-B								19.2	100.0	32.0	3.01	96.3											
		EX-C	135	0.08	44.1	10.80	3.20	34.5																
3	EX-C								44.1	135.0	10.8	1.86	20.1											
		EX-D	185	0.08	53.2	14.80	2.72	40.3																
4	EX-D								53.2	185.0	14.8	1.64	24.3											
		EX-E	59	0.08	47.7	4.72	2.99	14.1																
5	EX-E								47.7	59.0	4.7	1.76	8.3											
		EX-F	22	0.08	34.9	1.76	3.78	6.7																
6	EX-F								34.9	22.0	1.8	2.15	3.8											
		OFF-1	44	0.08	80.5	3.52	1.68	5.9																
o1	OFF-1								80.5	44.0	3.5	1.24	4.4											

STORM DRAINAGE SYSTEM DESIGN - 100-YEAR DESIGN STORM

Designer:	LAO
Company:	R&R Engineers-Surveyors
Date:	7/23/2024
Project:	MAYBERRY SKETCH PLAN
Location:	EL PASO COUNTY, COLORADO

Cells of this color are for required user-input

Cells of this color are for optional user-input

$I_{100} = -2.52 \ln(D) + 12.735$

R&R ENGINEERS SURVEYORS INC

DESGIN POINT	STREET/ CONTRIBUTING BASINS	DIRECT RUNOFF							TOTAL RUNOFF					STREET BYPASS				PIPE			TRAVEL TIME			
		Basin Name	Area (ac)	Coeff C	Tc (min)	C*A (ac)	I	Q (cfs)	Tc (min)	Sum Area (ac)	Sum C*A (ac)	I in/hr	Q cfs	Street Q cfs	Street Slope %	Length ft	Street Tt min	Design Q cfs	Slope %	PIPE SIZE	L ft	VEL ft/sec	Tt min	Remarks
		EX-A	44	0.67	13.1	29.53	6.26	184.8																
1	Ex-A								13.1	44.0	29.5	6.09	180.0											
		EX-B	100	0.51	19.2	51.36	5.29	271.5																
2	EX-B								19.2	100.0	51.4	5.06	259.9											
		EX-C	135	0.35	44.1	47.25	3.20	151.0																
3	EX-C								44.1	135.0	47.3	3.12	147.4											
		EX-D	185	0.35	53.2	64.75	2.72	176.2																
4	EX-D								53.2	185.0	64.8	2.76	178.7											
		EX-E	59	0.35	47.7	20.65	2.99	61.8																
5	EX-E								47.7	59.0	20.7	2.96	61.2											
		EX-F	22	0.35	34.9	7.70	3.78	29.1																
6	EX-F								34.9	22.0	7.7	3.61	27.8											
		OFF-1	44	0.35	80.5	15.40	1.68	25.8																
o1	OFF-1								80.5	44.0	15.4	2.08	32.0											

POST-DEVELOPMENT C VALUES

Designer: LAO
Company: R&R Engineers-Surveyors
Date: 7/23/2024
Project: MAYBERRY SKETCH PLAN
Location: EL PASO COUNTY, COLORADO

Global Parameters[1]			
Land Use	% Imp.	C_5	C_{100}
SF LOTS (1/6 AC)*	65	0.45	0.59
Commercial	95	0.81	0.88
Multi-Family	95	0.81	0.88
Neighborhood Areas	70	0.49	0.62
Park/Pond	7	0.12	0.39

*Using 1/8 for conservativeness

Summary	
Total Area (ac)	605.00
Composite Impervious	74.4%

Cells of this color are for required user-input
Cells of this color are for optional user-input

[1] From Table 6-3 in MHFD Volume 1
[2] From Table 6-4 in MHFD Volume 1

Basin Name	Area (ac)	NRCS Hydrologic Soil Group	SF LOTS (1/6 AC)*		Commercial		Multi-Family		Neighborhood Areas		Park/Pond		% Check	Percent Imperviousness	Runoff Coefficient, C^2			
			Area (ac)	%	Area (ac)	%	Area (ac)	%	Area (ac)	%	Area (ac)	%			2-yr	5-yr	10-yr	100-yr
A	95.00	A	1.00	1.1%	14.80	15.6%	57.71	60.7%	14.49	15.3%	7.00	7.4%	100.00%	84.4%		0.73		0.80
B	49.00	A	41.00	83.7%	2.00	4.1%	2.00	4.1%	2.00	4.1%	2.00	4.1%	100.00%	65.3%		0.48		0.61
C	43.00	A	30.00	69.8%	0.00	0.0%	9.00	20.9%	2.00	4.7%	2.00	4.7%	100.00%	68.8%		0.52		0.64
D	110.00	A	95.50	86.8%	14.50	13.2%	0.00	0.0%	0.00	0.0%	0.00	0.0%	100.00%	69.0%		0.50		0.63
E	73.00	A	14.47	19.8%	23.71	32.5%	34.82	47.7%	0.00	0.0%	0.00	0.0%	100.00%	89.1%		0.74		0.82
F	75.00	A	53.40	71.2%	0.00	0.0%	21.60	28.8%	0.00	0.0%	0.00	0.0%	100.00%	73.6%		0.55		0.67
G	160.00	A	132.70	82.9%	27.30	17.1%	0.00	0.0%	0.00	0.0%	0.00	0.0%	100.00%	70.1%		0.51		0.64
Channel G	64.40	A	46.10	71.6%	0.00	0.0%	18.30	28.4%	0.00	0.0%	0.00	0.0%	100.00%	73.5%		0.55		0.67
Channel A	11.60	A	0.00	0.0%	0.00	0.0%	11.60	100.0%	0.00	0.0%	0.00	0.0%	100.00%	95.0%		0.81		0.88
Channel H	24.00	A	24.00	100.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	100.00%	65.0%		0.45		0.59
Culvert 4	7.80	A	0.00	0.0%	0.00	0.0%	7.80	100.0%	0.00	0.0%	0.00	0.0%	100.00%	95.0%		0.81		0.88
Culvert 5	36.50	A	22.00	60.3%	0.00	0.0%	14.50	39.7%	0.00	0.0%	0.00	0.0%	100.00%	76.9%		0.59		0.71
Culvert 6	64.40	A	49.90	77.5%	0.00	0.0%	14.50	22.5%	0.00	0.0%	0.00	0.0%	100.00%	71.8%		0.53		0.66
Culvert 7	15.70	A	15.70	100.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	100.00%	65.0%		0.45		0.59
Culvert 8	19.70	A	19.70	100.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	100.00%	65.0%		0.45		0.59

TIME OF CONCENTRATION

Designer: LAO
Company: R&R Engineers-Surveyors
Date: 7/23/2024
Project: MAYBERRY SKETCH PLAN
Location: EL PASO COUNTY, COLORADO

$$t_i = \frac{0.395(1.1 - C_5)\sqrt{L_i}}{S_i^{0.33}}$$

Computed $t_c = t_i + t_t$

$t_{minimum}$ = 5 (urban)
$t_{minimum}$ = 10 (non-urban)

$$t_t = \frac{L_t}{60K\sqrt{S_t}} = \frac{L_t}{60V_t}$$

Selected $t_c = \max\{t_{minimum}, \min(\text{Computed } t_c, \text{Regional } t_c)\}$

$$\text{Regional } t_c = (26 - 17i) + \frac{L_t}{60(14i + 9)\sqrt{S_t}}$$

Cells of this color are for required user-input

Subbasin Data				Overland (Initial) Flow Time			Channelized (Travel) Flow Time					Time of Concentration			
Basin	Area	% Impervious	C5	Overland Flow Length L_i (ft)	Overland Flow Slope S_i (ft/ft)	Overland Flow Time t_i (min)	Channelized Flow Length L_t (ft)	Channelized Flow Slope S_t (ft/ft)	NRCS Conveyance Factor K	Channelized Flow Velocity V_t (ft/sec)	Channelized Flow Time t_t (min)	Computed t_c (min)	Regional t_c (min)	Selected t_c (min)	Remarks
A	95.00	84.4%	0.73	36.00	0.020	3.22	2705.00	0.005	20	1.41	31.88	35.10	42.29	35.10	
B	49.00	65.3%	0.48	36.00	0.020	5.36	1500.00	0.005	20	1.41	17.68	23.03	34.39	23.03	
C	43.00	68.8%	0.52	36.00	0.020	4.96	1900.00	0.005	20	1.41	22.39	27.35	38.33	27.35	
D	110.00	69.0%	0.50	36.00	0.020	5.19	1358.00	0.005	15	1.06	21.34	26.53	31.44	26.53	
E	73.00	89.1%	0.74	36.00	0.020	3.11	1500.00	0.005	15	1.06	23.57	26.68	27.33	26.68	
F	75.00	73.6%	0.55	36.00	0.020	4.71	3000.00	0.005	15	1.06	47.14	51.85	50.10	50.10	
G	160.00	70.1%	0.51	36.00	0.020	5.07	2100.00	0.005	15	1.06	33.00	38.07	40.38	38.07	
Channel G	64.40	73.5%	0.55	300.00	0.020	13.63	3200.00	0.005	20	1.41	37.71	51.34	52.59	51.34	
Channel H	24.00	65.0%	0.45	300.00	0.010	20.33	1680.00	0.005	20	1.41	19.80	40.13	36.83	36.83	
Channel A	11.60	95.0%	0.81	300.00	0.010	9.07	1800.00	0.010	20	2.00	15.00	24.07	23.30	23.30	
Culvert 4	7.80	95.0%	0.81	300.00	0.010	9.07	617.00	0.005	20	1.41	7.27	16.34	16.37	16.34	
Culvert 5	36.50	76.9%	0.59	300.00	0.010	15.85	2200.00	0.005	20	1.41	25.93	41.78	39.15	39.15	
Culvert 6	64.40	71.8%	0.53	300.00	0.010	17.79	2200.00	0.005	20	1.41	25.93	43.72	41.03	41.03	
Culvert 7	15.70	65.0%	0.45	300.00	0.010	20.33	1200.00	0.005	20	1.41	14.14	34.47	30.58	30.58	
Culvert 8	19.70	65.0%	0.45	300.00	0.010	20.33	2000.00	0.005	20	1.41	23.57	43.90	40.99	40.99	

STORM DRAINAGE SYSTEM DESIGN - 5-YEAR DESIGN STORM

Designer:	LAO
Company:	R&R Engineers-Surveyors
Date:	7/23/2024
Project:	MAYBERRY SKETCH PLAN
Location:	EL PASO COUNTY, COLORADO

Cells of this color are for required user-input

Cells of this color are for optional user-input

$I_5 = -1.50 \ln(D) + 7.583$

DESGIN POINT	STREET/ CONTRIBUTING BASINS	DIRECT RUNOFF							TOTAL RUNOFF					STREET BYPASS				PIPE			TRAVEL TIME			
		Basin Name	Area (ac)	Coeff C	Tc (min)	C*A (ac)	I	Q (cfs)	Tc (min)	Sum Area (ac)	Sum C*A (ac)	I in/hr	Q cfs	Street Q cfs	Street Slope %	Length ft	Street Tt min	Design Q cfs	Slope %	PIPE SIZE	L ft	VEL ft/sec	Tt min	Remarks
		A	95	0.73	35.1	69.01	2.25	155.0										155.0						
1	A								35.1	95.0	69.0	2.14	147.8					147.8						
		B	49	0.48	23.0	23.45	2.88	67.5										67.5						
2	B								23.0	49.0	23.5	2.74	64.1					64.1						
		C	43	0.52	27.4	22.55	2.62	59.1										59.1						
3	C								27.4	43.0	22.6	2.48	56.0					56.0						
		D	110	0.50	26.5	54.72	2.67	145.9										145.9						
4	D								26.5	110.0	54.7	2.53	138.3					138.3						
		E	73	0.74	26.7	53.92	2.66	143.3										143.3						
5	E								26.7	73.0	53.9	2.52	135.8					135.8						
		F	75	0.55	50.1	41.53	1.71	71.1										71.1						
6	F								50.1	75.0	41.5	1.71	71.0					71.0						
		G	160	0.51	38.1	81.83	2.12	173.8										173.8						
7	G								38.1	160.0	81.8	2.04	166.7					166.7						
		Channel G	64.4	0.55	51.3	35.57	1.68	59.6										59.6						
									51.3	64.4	35.6	1.68	59.8					59.8						
		Channel H	24	0.45	36.8	10.80	2.17	23.5										23.5						
									36.8	24.0	10.8	2.08	22.5					22.5						
		Channel A	11.6	0.81	23.3	9.40	2.86	26.9										26.9						
									23.3	11.6	9.4	2.72	25.5					25.5						
		Culvert 4	7.8	0.81	16.3	6.32	3.39	21.4										21.4						
									16.3	7.8	6.3	3.27	20.6					20.6						
		Culvert 5	36.5	0.59	39.2	21.65	2.08	45.1										45.1						
									39.2	36.5	21.6	2.00	43.3					43.3						
		Culvert 6	64.4	0.53	41.0	34.20	2.01	68.8										68.8						
									41.0	64.4	34.2	1.94	66.5					66.5						
		Culvert 7	15.7	0.45	30.6	7.07	2.45	17.3										17.3						
									30.6	15.7	7.1	2.33	16.4					16.4						
		Culvert 8	19.7	0.45	41.0	8.87	2.01	17.8										17.8						
									41.0	19.7	8.9	1.94	17.2					17.2						

STORM DRAINAGE SYSTEM DESIGN - 100-YEAR DESIGN STORM

Designer: LAO
Company: R&R Engineers-Surveyors
Date: 7/23/2024
Project: MAYBERRY SKETCH PLAN
Location: EL PASO COUNTY, COLORADO

Cells of this color are for required user-input
Cells of this color are for optional user-input

$I_{100} = -2.52 \ln(D) + 12.735$

DESGIN POINT	STREET/ CONTRIBUTING BASINS	DIRECT RUNOFF							TOTAL RUNOFF					STREET BYPASS				PIPE			TRAVEL TIME			Remarks
		Basin Name	Area (ac)	Coeff C	Tc (min)	C*A (ac)	I	Q (cfs)	Tc (min)	Sum Area (ac)	Sum C*A (ac)	I in/hr	Q cfs	Street Q cfs	Street Slope %	Length ft	Street Tt min	Design Q cfs	Slope %	PIPE SIZE	L ft	VEL ft/sec	Tt min	
		A	95	0.80	35.1	76.11	3.77	286.8										286.8						
1	A								35.1	95.0	76.1	3.60	273.9					273.9						
		B	49	0.61	23.0	29.73	4.83	143.6										143.6						
2	B								23.0	49.0	29.7	4.60	136.6					136.6						
		C	43	0.64	27.4	27.64	4.40	121.5										121.5						
3	C								27.4	43.0	27.6	4.17	115.3					115.3						
		D	110	0.63	26.5	69.11	4.47	309.1										309.1						
4	D								26.5	110.0	69.1	4.25	293.4					293.4						
		E	73	0.82	26.7	60.04	4.46	267.7										267.7						
5	E								26.7	73.0	60.0	4.23	254.1					254.1						
		F	75	0.67	50.1	50.51	2.87	145.1										145.1						
6	F								50.1	75.0	50.5	2.87	145.0					145.0						
		G	160	0.64	38.1	102.32	3.56	364.6										364.6						
7	G								38.1	160.0	102.3	3.42	350.1					350.1						
		Channel G	64.4	0.67	51.3	43.30	2.81	121.7										121.7						
									51.3	64.4	43.3	2.83	122.4					122.4						
		Channel H	24	0.59	36.8	14.16	3.65	51.6										51.6						
									36.8	24.0	14.2	3.49	49.5					49.5						
		Channel A	11.6	0.88	23.3	10.21	4.80	49.0										49.0						
									23.3	11.6	10.2	4.57	46.6					46.6						
		Culvert 4	7.8	0.88	16.3	6.86	5.70	39.1										39.1						
		Culvert 5	36.5	0.71	39.2	25.74	3.49	89.9										89.9						
									39.2	36.5	25.7	3.36	86.6					86.6						
		Culvert 6	64.4	0.66	41.0	42.20	3.38	142.4										142.4						
									41.0	64.4	42.2	3.27	137.8					137.8						
		Culvert 7	15.7	0.59	30.6	9.26	4.12	38.1										38.1						
									30.6	15.7	9.3	3.91	36.2					36.2						
		Culvert 8	19.7	0.59	41.0	11.62	3.38	39.3										39.3						
									41.0	19.7	11.6	3.27	38.0					38.0						

APPENDIX C – HYDRAULIC CALCULATIONS

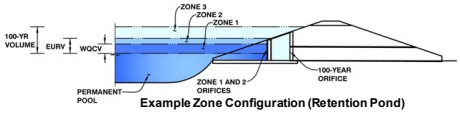
C.1 DETENTION VOLUMES

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)

Project: MAYBERRY SKETCH PLAN

Basin ID: POND A (Stage 0 = 6056.5)



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	**EDB**	
Watershed Area =	95.00	acres
Watershed Length =	2,784	ft
Watershed Length to Centroid =	1,392	ft
Watershed Slope =	0.010	ft/ft
Watershed Imperviousness =	84.40%	percent
Percentage Hydrologic Soil Group A =	100.0%	percent
Percentage Hydrologic Soil Group B =	0.0%	percent
Percentage Hydrologic Soil Groups C/D =	0.0%	percent
Target WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	User Input	

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

			Optional User Overrides
Water Quality Capture Volume (WQCV) =	2.832	acre-feet	acre-feet
Excess Urban Runoff Volume (EURV) =	10.705	acre-feet	acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	7.746	acre-feet	1.19 inches
5-yr Runoff Volume (P1 = 1.5 in.) =	10.013	acre-feet	1.50 inches
10-yr Runoff Volume (P1 = 1.75 in.) =	11.838	acre-feet	1.75 inches
25-yr Runoff Volume (P1 = 2 in.) =	13.905	acre-feet	2.00 inches
50-yr Runoff Volume (P1 = 2.25 in.) =	15.925	acre-feet	2.25 inches
100-yr Runoff Volume (P1 = 2.52 in.) =	18.233	acre-feet	2.52 inches
500-yr Runoff Volume (P1 = 3.14 in.) =	23.375	acre-feet	3.14 inches
Approximate 2-yr Detention Volume =	7.044	acre-feet	
Approximate 5-yr Detention Volume =	9.147	acre-feet	
Approximate 10-yr Detention Volume =	10.892	acre-feet	
Approximate 25-yr Detention Volume =	12.892	acre-feet	
Approximate 50-yr Detention Volume =	14.058	acre-feet	
Approximate 100-yr Detention Volume =	15.105	acre-feet	

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	2.832	acre-feet
Zone 2 Volume (EURV - Zone 1) =	7.872	acre-feet
Zone 3 (100yr + 1 / 2 WQCV - Zones 1 & 2) =	5.816	acre-feet
Total Detention Basin Volume =	16.521	acre-feet
Initial Surcharge Volume (ISV) =	user	ft^3
Initial Surcharge Depth (ISD) =	user	ft
Total Available Detention Depth (H_{total}) =	user	ft
Depth of Trickle Channel (H_{TC}) =	user	ft
Slope of Trickle Channel (S_{TC}) =	user	ft/ft
Slopes of Main Basin Sides (S_{main}) =	user	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	user	

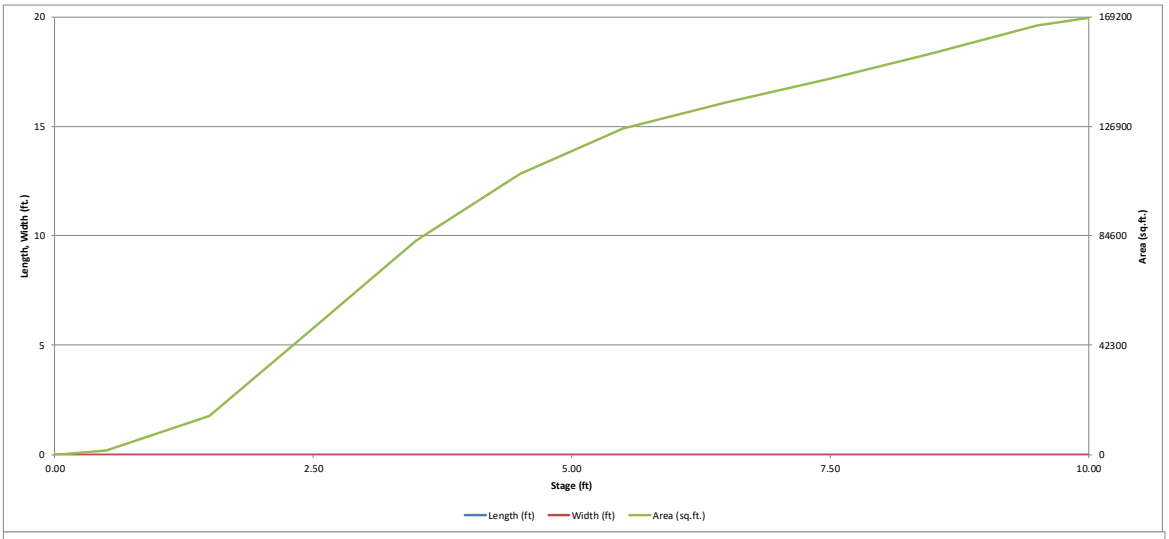
Initial Surcharge Area (A_{ISV}) =	user	ft^2
Surcharge Volume Length (L_{ISV}) =	user	ft
Surcharge Volume Width (W_{ISV}) =	user	ft
Depth of Basin Floor (H_{FLOOR}) =	user	ft
Length of Basin Floor (L_{FLOOR}) =	user	ft
Width of Basin Floor (W_{FLOOR}) =	user	ft
Area of Basin Floor (A_{FLOOR}) =	user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

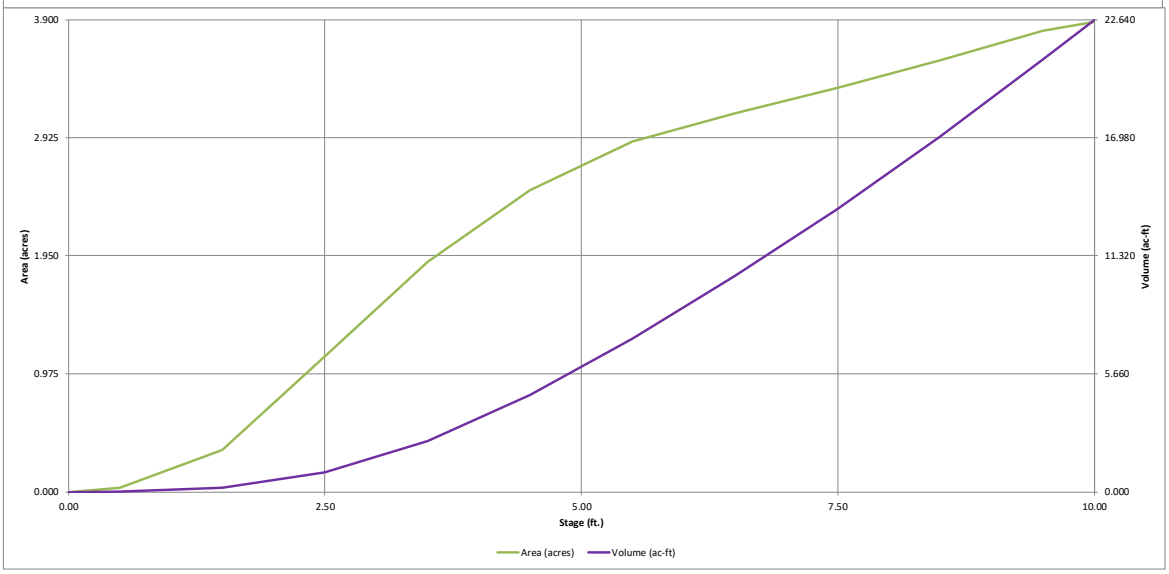
Depth Increment = ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	--	0.00	--	--	--	0	0.000		
6057	--	0.50	--	--	--	1,519	0.035	380	0.009
6058	--	1.50	--	--	--	14,945	0.343	8,612	0.198
6059	--	2.50	--	--	--	48,745	1.119	40,456	0.929
6060	--	3.50	--	--	--	82,812	1.901	106,235	2.439
6061	--	4.50	--	--	--	108,592	2.493	201,937	4.636
6062	--	5.50	--	--	--	126,050	2.894	319,258	7.329
6063	--	6.50	--	--	--	136,124	3.125	450,345	10.338
6064	--	7.50	--	--	--	145,437	3.339	591,125	13.570
6065	--	8.50	--	--	--	155,331	3.566	741,509	17.023
6066	--	9.50	--	--	--	165,808	3.806	902,079	20.709
6066.5	--	10.00	--	--	--	169,063	3.881	985,796	22.631

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)



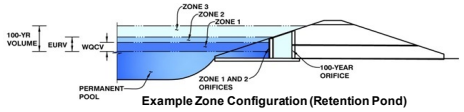


DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)

Project: **Mayberry Sketch Plan**

Basin ID: **Pond B (Stage 0 = 6039.5**



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	**EDB**	
Watershed Area =	49.00	acres
Watershed Length =	2,700	ft
Watershed Length to Centroid =	1,350	ft
Watershed Slope =	0.010	ft/ft
Watershed Imperviousness =	65.30%	percent
Percentage Hydrologic Soil Group A =	100.0%	percent
Percentage Hydrologic Soil Group B =	0.0%	percent
Percentage Hydrologic Soil Groups C/D =	0.0%	percent
Target WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	User Input	

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

		Optional User Overrides	
Water Quality Capture Volume (WQCV) =	1.042 acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	3.976 acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	2.948 acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	3.865 acre-feet	1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	4.601 acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	5.560 acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	6.501 acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	7.644 acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 3.14 in.) =	10.145 acre-feet	3.14	inches
Approximate 2-yr Detention Volume =	2.587 acre-feet		
Approximate 5-yr Detention Volume =	3.382 acre-feet		
Approximate 10-yr Detention Volume =	4.075 acre-feet		
Approximate 25-yr Detention Volume =	4.903 acre-feet		
Approximate 50-yr Detention Volume =	5.400 acre-feet		
Approximate 100-yr Detention Volume =	5.918 acre-feet		

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	1.042	acre-feet
Zone 2 Volume (EURV - Zone 1) =	2.933	acre-feet
Zone 3 (100yr + 1 / 2 WQCV - Zones 1 & 2) =	2.464	acre-feet
Total Detention Basin Volume =	6.439	acre-feet
Initial Surcharge Volume (ISV) =	user	ft^3
Initial Surcharge Depth (ISD) =	user	ft
Total Available Detention Depth (H_{total}) =	user	ft
Depth of Trickle Channel (H_{TC}) =	user	ft
Slope of Trickle Channel (S_{TC}) =	user	ft/ft
Slopes of Main Basin Sides (S_{main}) =	user	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	user	

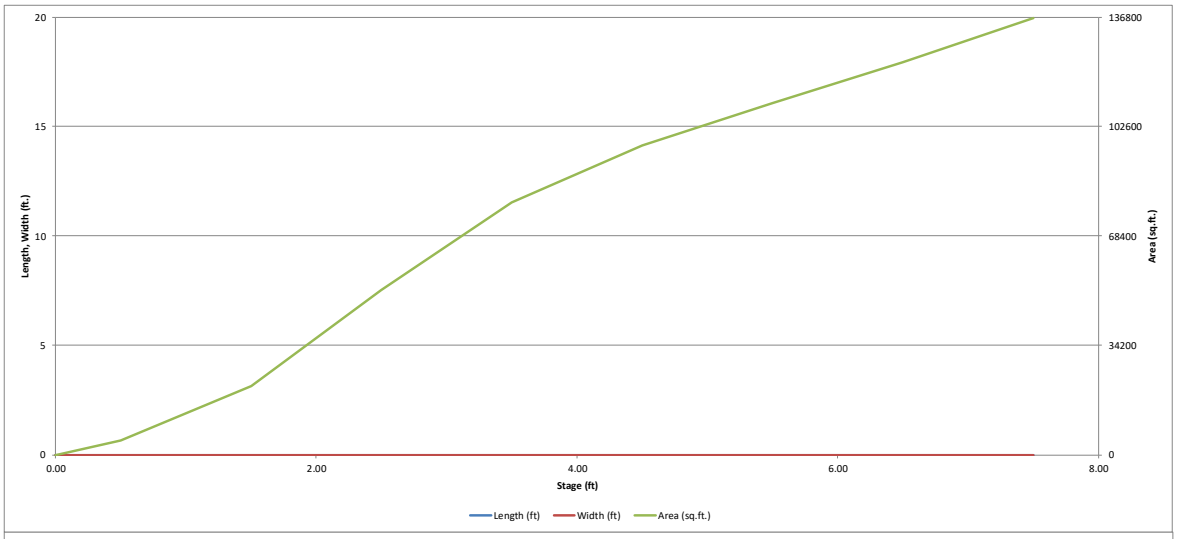
Initial Surcharge Area (A_{ISV}) =	user	ft^2
Surcharge Volume Length (L_{ISV}) =	user	ft
Surcharge Volume Width (W_{ISV}) =	user	ft
Depth of Basin Floor (H_{FLOOR}) =	user	ft
Length of Basin Floor (L_{FLOOR}) =	user	ft
Width of Basin Floor (W_{FLOOR}) =	user	ft
Area of Basin Floor (A_{FLOOR}) =	user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

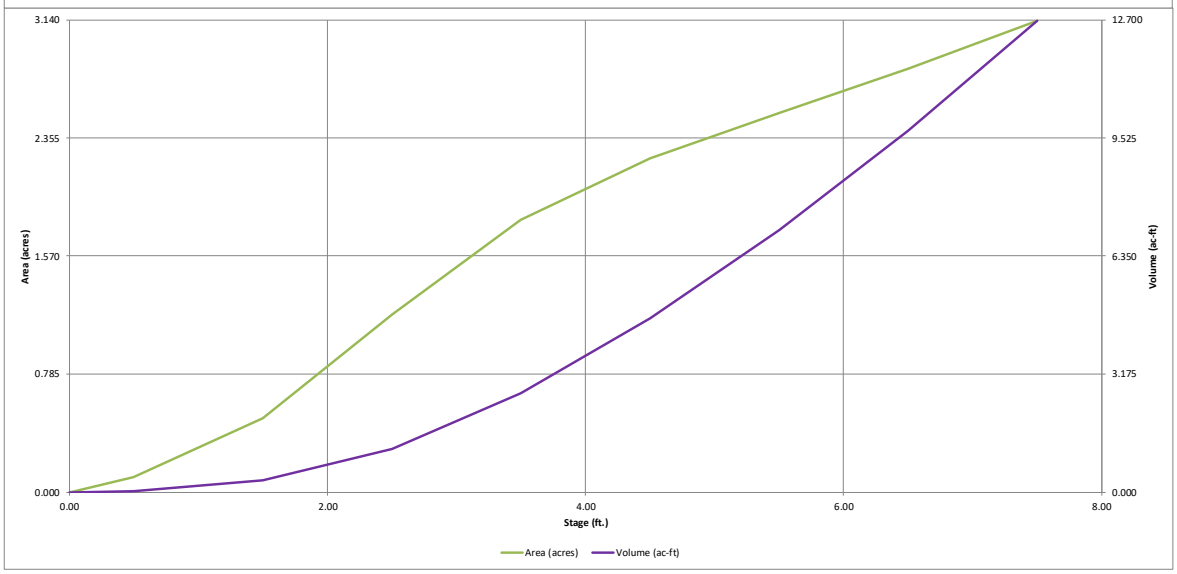
Depth Increment = ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	--	0.00	--	--	--	0	0.000		
6040	--	0.50	--	--	--	4,407	0.101	1,101	0.025
6041	--	1.50	--	--	--	21,367	0.491	13,988	0.321
6042	--	2.50	--	--	--	51,476	1.182	50,410	1.157
6043	--	3.50	--	--	--	78,896	1.811	115,596	2.654
6044	--	4.50	--	--	--	96,691	2.220	203,389	4.669
6045	--	5.50	--	--	--	109,869	2.522	306,669	7.040
6046	--	6.50	--	--	--	122,677	2.816	422,942	9.709
6047	--	7.50	--	--	--	136,501	3.134	552,531	12.684

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)



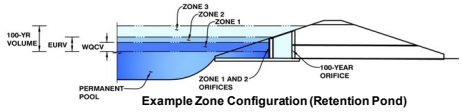


DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)

Project: **Mayberry Sketch Plan**

Basin ID: **Pond C (Stage 0 = 6046.01)**



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	**EDB**	
Watershed Area =	43.00	acres
Watershed Length =	2,700	ft
Watershed Length to Centroid =	1,350	ft
Watershed Slope =	0.010	ft/ft
Watershed Imperviousness =	69.00%	percent
Percentage Hydrologic Soil Group A =	100.0%	percent
Percentage Hydrologic Soil Group B =	0.0%	percent
Percentage Hydrologic Soil Groups C/D =	0.0%	percent
Target 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) =	0.970	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	3.744	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	2.760	acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	3.607	acre-feet	1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	4.287	acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	5.147	acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	5.990	acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	7.001	acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 3.14 in.) =	9.221	acre-feet	3.14	inches
Approximate 2-yr Detention Volume =	2.442	acre-feet		
Approximate 5-yr Detention Volume =	3.188	acre-feet		
Approximate 10-yr Detention Volume =	3.832	acre-feet		
Approximate 25-yr Detention Volume =	4.593	acre-feet		
Approximate 50-yr Detention Volume =	5.048	acre-feet		
Approximate 100-yr Detention Volume =	5.505	acre-feet		

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	0.970	acre-feet
Zone 2 Volume (EURV - Zone 1) =	2.774	acre-feet
Zone 3 (100yr + 1 / 2 WQCV - Zones 1 & 2) =	2.246	acre-feet
Total Detention Basin Volume =	5.990	acre-feet
Initial Surcharge Volume (ISV) =	user	ft^3
Initial Surcharge Depth (ISD) =	user	ft
Total Available Detention Depth (H_{total}) =	user	ft
Depth of Trickle Channel (H_{TC}) =	user	ft
Slope of Trickle Channel (S_{TC}) =	user	ft/ft
Slopes of Main Basin Sides (S_{main}) =	user	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	user	

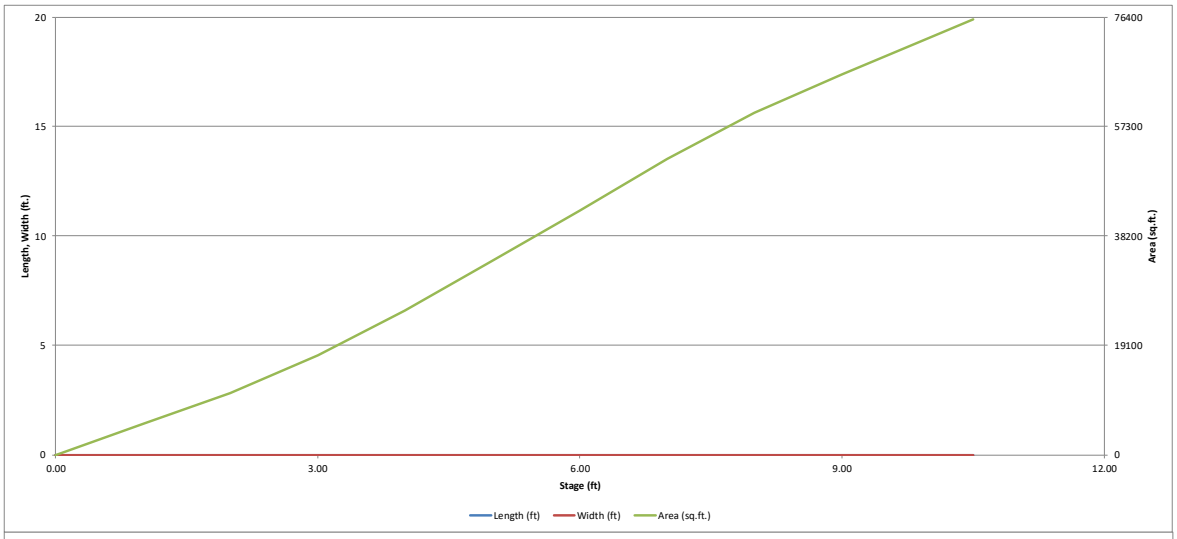
Initial Surcharge Area (A_{ISV}) =	user	ft^2
Surcharge Volume Length (L_{ISV}) =	user	ft
Surcharge Volume Width (W_{ISV}) =	user	ft
Depth of Basin Floor (H_{FLOOR}) =	user	ft
Length of Basin Floor (L_{FLOOR}) =	user	ft
Width of Basin Floor (W_{FLOOR}) =	user	ft
Area of Basin Floor (A_{FLOOR}) =	user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

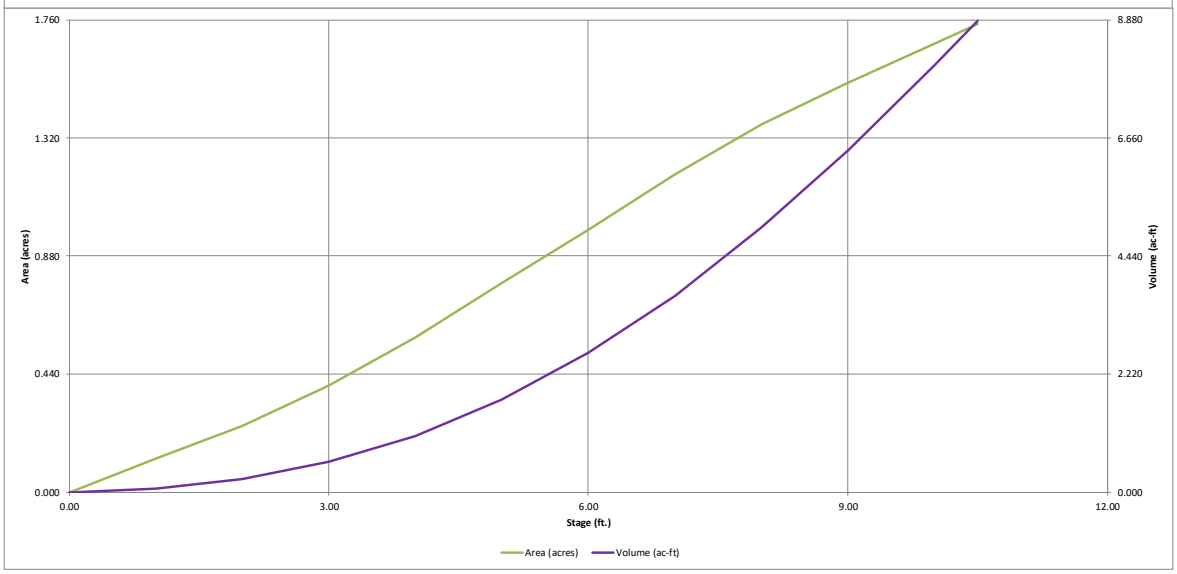
Depth Increment = ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	--	0.00	--	--	--	0	0.000		
6047	--	1.00	--	--	--	5,403	0.124	2,701	0.062
6048	--	2.00	--	--	--	10,745	0.247	10,775	0.247
6049	--	3.00	--	--	--	17,320	0.398	24,808	0.570
6050	--	4.00	--	--	--	25,127	0.577	46,031	1.057
6051	--	5.00	--	--	--	33,873	0.778	75,531	1.734
6052	--	6.00	--	--	--	42,550	0.977	113,743	2.611
6053	--	7.00	--	--	--	51,595	1.184	160,815	3.692
6054	--	8.00	--	--	--	59,721	1.371	216,473	4.970
6055	--	9.00	--	--	--	66,416	1.525	279,542	6.417
6056	--	10.00	--	--	--	72,741	1.670	349,120	8.015
6056.5	--	10.50	--	--	--	76,075	1.746	386,324	8.869

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)



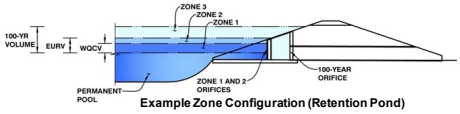


DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)

Project: Mayberry Filing 3

Basin ID: Pond D



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	EDB	
Watershed Area =	110.00	acres
Watershed Length =	2,867	ft
Watershed Length to Centroid =	1,433	ft
Watershed Slope =	0.010	ft/ft
Watershed Imperviousness =	69.00%	percent
Percentage Hydrologic Soil Group A =	100.0%	percent
Percentage Hydrologic Soil Group B =	0.0%	percent
Percentage Hydrologic Soil Groups C/D =	0.0%	percent
Target 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) =	2.480	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	9.577	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	7.035	acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	9.194	acre-feet	1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	10.931	acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	13.128	acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	15.280	acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	17.863	acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 3.14 in.) =	23.531	acre-feet	3.14	inches
Approximate 2-yr Detention Volume =	6.247	acre-feet		
Approximate 5-yr Detention Volume =	8.155	acre-feet		
Approximate 10-yr Detention Volume =	9.802	acre-feet		
Approximate 25-yr Detention Volume =	11.750	acre-feet		
Approximate 50-yr Detention Volume =	12.913	acre-feet		
Approximate 100-yr Detention Volume =	14.083	acre-feet		

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	2.480	acre-feet
Zone 2 Volume (EURV - Zone 1) =	7.097	acre-feet
Zone 3 (100yr + 1 / 2 WQCV - Zones 1 & 2) =	5.746	acre-feet
Total Detention Basin Volume =	15.324	acre-feet
Initial Surcharge Volume (ISV) =	user	ft^3
Initial Surcharge Depth (ISD) =	user	ft
Total Available Detention Depth (H_{total}) =	user	ft
Depth of Trickle Channel (H_{TC}) =	user	ft
Slope of Trickle Channel (S_{TC}) =	user	ft/ft
Slopes of Main Basin Sides (S_{main}) =	user	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	user	

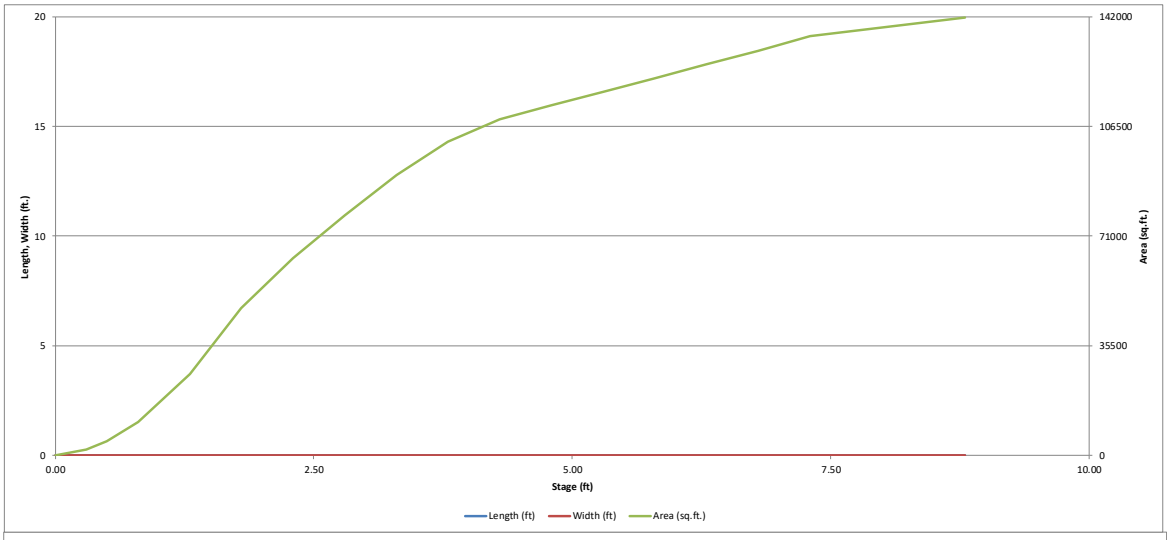
Initial Surcharge Area (A_{ISV}) =	user	ft^2
Surcharge Volume Length (L_{ISV}) =	user	ft
Surcharge Volume Width (W_{ISV}) =	user	ft
Depth of Basin Floor (H_{FLOOR}) =	user	ft
Length of Basin Floor (L_{FLOOR}) =	user	ft
Width of Basin Floor (W_{FLOOR}) =	user	ft
Area of Basin Floor (A_{FLOOR}) =	user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

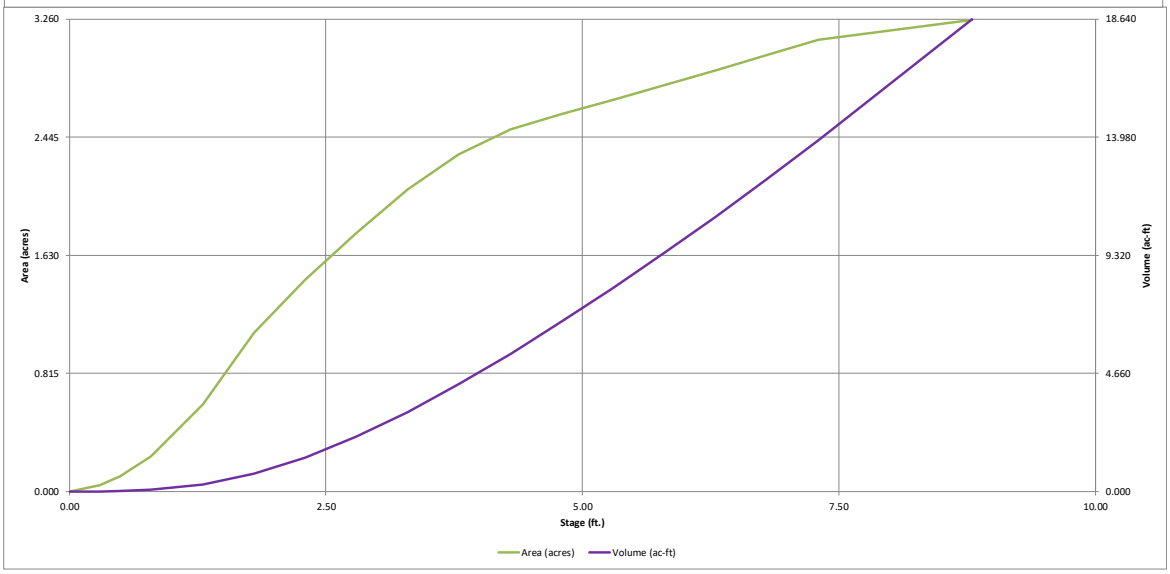
Depth Increment = ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	--	0.00	--	--	--	38	0.001		
6026	--	0.30	--	--	--	1,867	0.043	286	0.007
6026.2	--	0.50	--	--	--	4,584	0.105	931	0.021
6026.5	--	0.80	--	--	--	10,635	0.244	3,213	0.074
6027	--	1.30	--	--	--	26,196	0.601	12,421	0.285
6027.5	--	1.80	--	--	--	47,640	1.094	30,880	0.709
6028	--	2.30	--	--	--	63,718	1.463	58,719	1.348
6028.5	--	2.80	--	--	--	77,666	1.783	94,065	2.159
6029	--	3.30	--	--	--	90,791	2.084	136,180	3.126
6029.5	--	3.80	--	--	--	101,440	2.329	184,237	4.230
6030	--	4.30	--	--	--	108,842	2.499	236,808	5.436
6030.5	--	4.80	--	--	--	113,378	2.603	292,363	6.712
6031	--	5.30	--	--	--	117,742	2.703	350,143	8.038
6031.5	--	5.80	--	--	--	122,145	2.804	410,115	9.415
6032	--	6.30	--	--	--	126,588	2.906	472,298	10.842
6032.5	--	6.80	--	--	--	131,071	3.009	536,713	12.321
6033	--	7.30	--	--	--	135,710	3.115	603,408	13.852
6033.5	--	8.80	--	--	--	141,840	3.256	811,570	18.631

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)



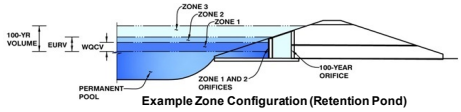


DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)

Project: Pond E

Basin ID:



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	**EDB**	
Watershed Area =	73.00	acres
Watershed Length =	2,800	ft
Watershed Length to Centroid =	1,400	ft
Watershed Slope =	0.010	ft/ft
Watershed Imperviousness =	89.00%	percent
Percentage Hydrologic Soil Group A =	100.0%	percent
Percentage Hydrologic Soil Group B =	0.0%	percent
Percentage Hydrologic Soil Groups C/D =	0.0%	percent
Target 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) =	2.391	acre-feet	acre-feet
Excess Urban Runoff Volume (EURV) =	8.804	acre-feet	acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	6.307	acre-feet	1.19 inches
5-yr Runoff Volume (P1 = 1.5 in.) =	8.128	acre-feet	1.50 inches
10-yr Runoff Volume (P1 = 1.75 in.) =	9.601	acre-feet	1.75 inches
25-yr Runoff Volume (P1 = 2 in.) =	11.214	acre-feet	2.00 inches
50-yr Runoff Volume (P1 = 2.25 in.) =	12.793	acre-feet	2.25 inches
100-yr Runoff Volume (P1 = 2.52 in.) =	14.568	acre-feet	2.52 inches
500-yr Runoff Volume (P1 = 3.14 in.) =	18.554	acre-feet	3.14 inches
Approximate 2-yr Detention Volume =	5.807	acre-feet	
Approximate 5-yr Detention Volume =	7.530	acre-feet	
Approximate 10-yr Detention Volume =	8.944	acre-feet	
Approximate 25-yr Detention Volume =	10.551	acre-feet	
Approximate 50-yr Detention Volume =	11.485	acre-feet	
Approximate 100-yr Detention Volume =	12.298	acre-feet	

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	2.391	acre-feet
Zone 2 Volume (EURV - Zone 1) =	6.412	acre-feet
Zone 3 (100yr + 1 / 2 WQCV - Zones 1 & 2) =	4.690	acre-feet
Total Detention Basin Volume =	13.494	acre-feet
Initial Surcharge Volume (ISV) =	user	ft^3
Initial Surcharge Depth (ISD) =	user	ft
Total Available Detention Depth (H_{total}) =	user	ft
Depth of Trickle Channel (H_{TC}) =	user	ft
Slope of Trickle Channel (S_{TC}) =	user	ft/ft
Slopes of Main Basin Sides (S_{main}) =	user	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	user	

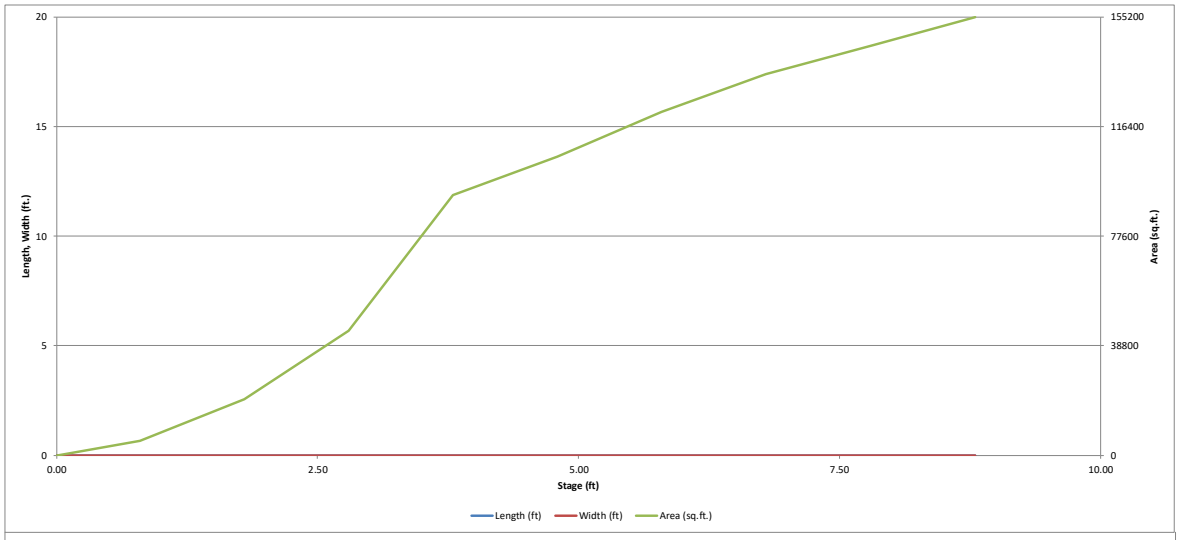
Initial Surcharge Area (A_{ISV}) =	user	ft^2
Surcharge Volume Length (L_{ISV}) =	user	ft
Surcharge Volume Width (W_{ISV}) =	user	ft
Depth of Basin Floor (H_{FLOOR}) =	user	ft
Length of Basin Floor (L_{FLOOR}) =	user	ft
Width of Basin Floor (W_{FLOOR}) =	user	ft
Area of Basin Floor (A_{FLOOR}) =	user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

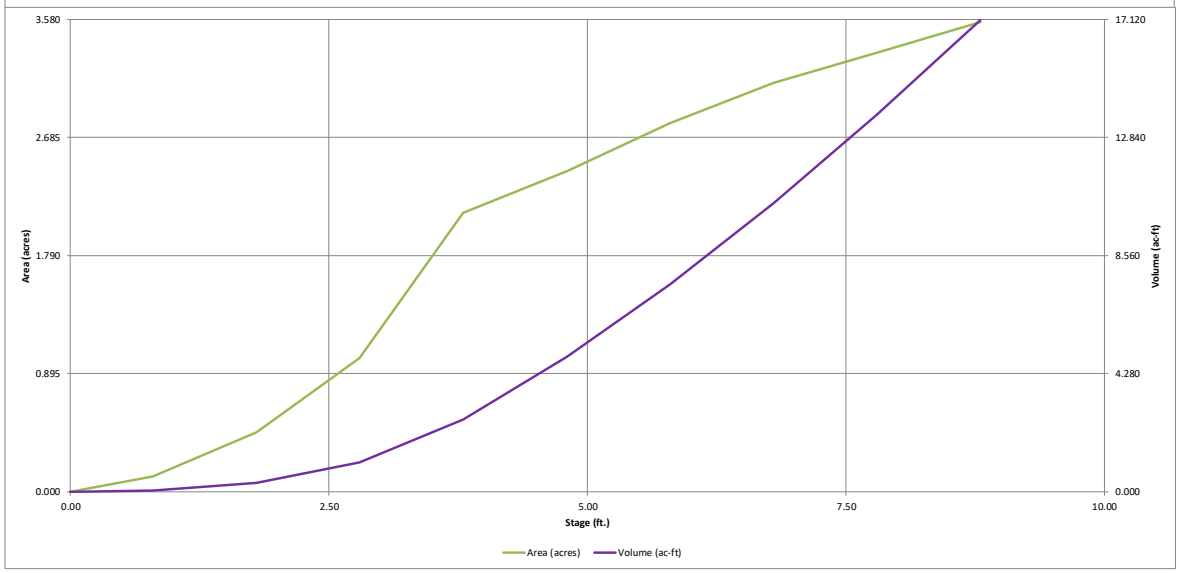
Depth Increment = ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	--	0.00	--	--	--	0	0.000		
6019	--	0.80	--	--	--	4,978	0.114	1,991	0.046
6020	--	1.80	--	--	--	19,714	0.453	14,337	0.329
6021	--	2.80	--	--	--	44,152	1.014	46,270	1.062
6022	--	3.80	--	--	--	92,139	2.115	114,415	2.627
6023	--	4.80	--	--	--	105,786	2.429	213,378	4.898
6024	--	5.80	--	--	--	121,700	2.794	327,121	7.510
6025	--	6.80	--	--	--	134,890	3.097	455,416	10.455
6026	--	7.80	--	--	--	144,944	3.327	595,333	13.667
6027	--	8.80	--	--	--	155,173	3.562	745,391	17.112

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)



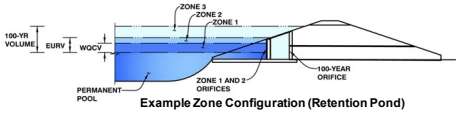


DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)

Project: **Mayberry Sketch Plan**

Basin ID: **Pond F**



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	**EDB**	
Watershed Area =	75.00	acres
Watershed Length =	2,785	ft
Watershed Length to Centroid =	1,393	ft
Watershed Slope =	0.010	ft/ft
Watershed Imperviousness =	74.00%	percent
Percentage Hydrologic Soil Group A =	100.0%	percent
Percentage Hydrologic Soil Group B =	0.0%	percent
Percentage Hydrologic Soil Groups C/D =	0.0%	percent
Target WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	User Input	

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

			Optional User Overrides	
Water Quality Capture Volume (WQCV) =	1.839	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	7.142	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	5.210	acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	6.783	acre-feet	1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	8.047	acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	9.588	acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	11.093	acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	12.873	acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 3.14 in.) =	16.793	acre-feet	3.14	inches
Approximate 2-yr Detention Volume =	4.673	acre-feet		
Approximate 5-yr Detention Volume =	6.088	acre-feet		
Approximate 10-yr Detention Volume =	7.294	acre-feet		
Approximate 25-yr Detention Volume =	8.706	acre-feet		
Approximate 50-yr Detention Volume =	9.540	acre-feet		
Approximate 100-yr Detention Volume =	10.346	acre-feet		

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	1.839	acre-feet
Zone 2 Volume (EURV - Zone 1) =	5.302	acre-feet
Zone 3 (100yr + 1 / 2 WQCV - Zones 1 & 2) =	4.124	acre-feet
Total Detention Basin Volume =	11.266	acre-feet
Initial Surcharge Volume (ISV) =	user	ft^3
Initial Surcharge Depth (ISD) =	user	ft
Total Available Detention Depth (H_{total}) =	user	ft
Depth of Trickle Channel (H_{TC}) =	user	ft
Slope of Trickle Channel (S_{TC}) =	user	ft/ft
Slopes of Main Basin Sides (S_{main}) =	user	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	user	

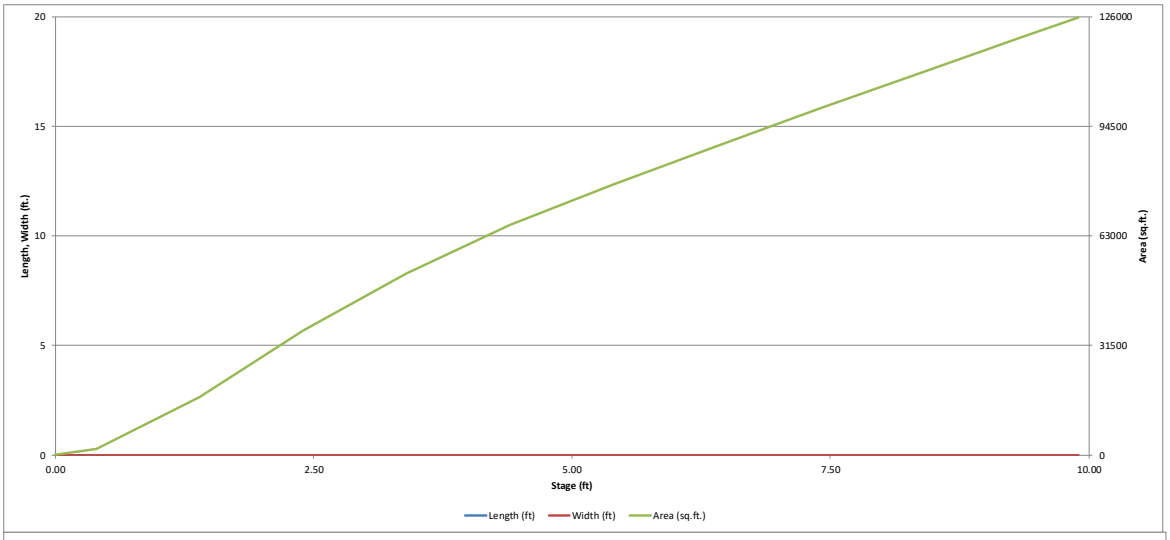
Initial Surcharge Area (A_{ISV}) =	user	ft^2
Surcharge Volume Length (L_{ISV}) =	user	ft
Surcharge Volume Width (W_{ISV}) =	user	ft
Depth of Basin Floor (H_{FLOOR}) =	user	ft
Length of Basin Floor (L_{FLOOR}) =	user	ft
Width of Basin Floor (W_{FLOOR}) =	user	ft
Area of Basin Floor (A_{FLOOR}) =	user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

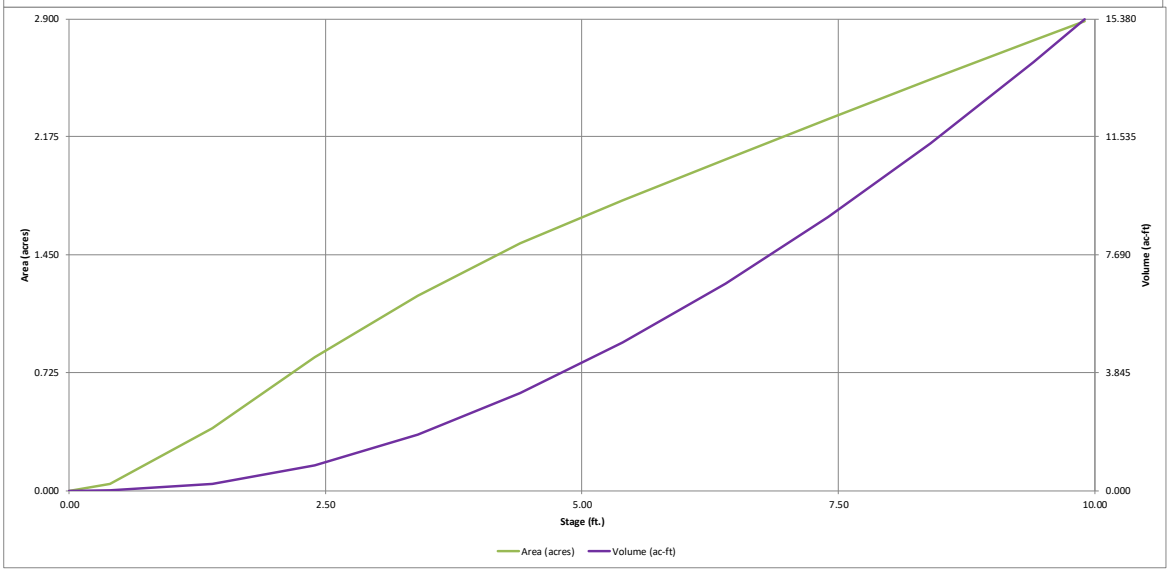
Depth Increment = ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	--	0.00	--	--	--	48	0.001		
6049	--	0.40	--	--	--	1,745	0.040	359	0.008
6050	--	1.40	--	--	--	16,626	0.382	9,544	0.219
6051	--	2.40	--	--	--	35,675	0.819	35,694	0.819
6052	--	3.40	--	--	--	52,181	1.198	79,622	1.828
6053	--	4.40	--	--	--	66,143	1.518	138,784	3.186
6054	--	5.40	--	--	--	77,732	1.784	210,722	4.838
6055	--	6.40	--	--	--	88,692	2.036	293,934	6.748
6056	--	7.40	--	--	--	99,487	2.284	388,023	8.908
6057	--	8.40	--	--	--	110,114	2.528	492,824	11.314
6058	--	9.40	--	--	--	120,573	2.768	608,167	13.962
6058.5	--	9.90	--	--	--	125,740	2.887	669,746	15.375

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)



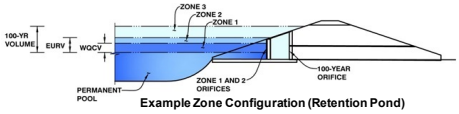


DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)

Project: Mayberry Sketch Plan

Basin ID: Pond G



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	EDB	
Watershed Area =	160.00	acres
Watershed Length =	3,625	ft
Watershed Length to Centroid =	1,822	ft
Watershed Slope =	0.010	ft/ft
Watershed Imperviousness =	70.00%	percent
Percentage Hydrologic Soil Group A =	100.0%	percent
Percentage Hydrologic Soil Group B =	0.0%	percent
Percentage Hydrologic Soil Groups C/D =	0.0%	percent
Target 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) =	3.667	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	14.190	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	10.426	acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	13.616	acre-feet	1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	16.175	acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	19.390	acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	22.536	acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	26.302	acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 3.14 in.) =	34.568	acre-feet	3.14	inches
Approximate 2-yr Detention Volume =	9.261	acre-feet		
Approximate 5-yr Detention Volume =	12.085	acre-feet		
Approximate 10-yr Detention Volume =	14.516	acre-feet		
Approximate 25-yr Detention Volume =	17.386	acre-feet		
Approximate 50-yr Detention Volume =	19.095	acre-feet		
Approximate 100-yr Detention Volume =	20.801	acre-feet		

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	3.667	acre-feet
Zone 2 Volume (EURV - Zone 1) =	10.523	acre-feet
Zone 3 (100yr + 1 / 2 WQCV - Zones 1 & 2) =	8.445	acre-feet
Total Detention Basin Volume =	22.634	acre-feet
Initial Surcharge Volume (ISV) =	user	ft^3
Initial Surcharge Depth (ISD) =	user	ft
Total Available Detention Depth (H_{total}) =	user	ft
Depth of Trickle Channel (H_{TC}) =	user	ft
Slope of Trickle Channel (S_{TC}) =	user	ft/ft
Slopes of Main Basin Sides (S_{main}) =	user	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	user	

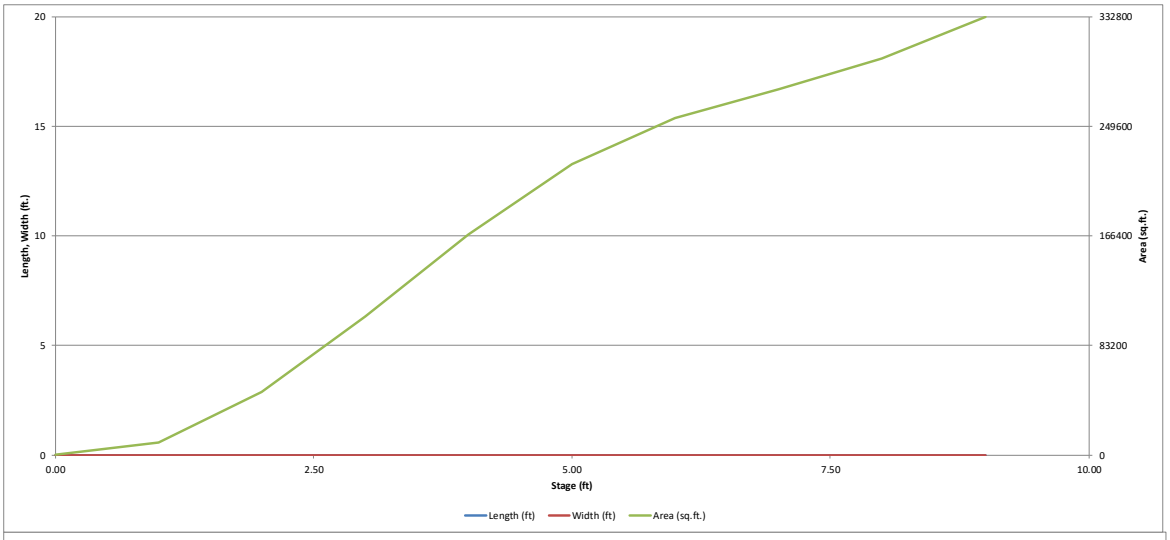
Initial Surcharge Area (A_{ISV}) =	user	ft^2
Surcharge Volume Length (L_{ISV}) =	user	ft
Surcharge Volume Width (W_{ISV}) =	user	ft
Depth of Basin Floor (H_{FLOOR}) =	user	ft
Length of Basin Floor (L_{FLOOR}) =	user	ft
Width of Basin Floor (W_{FLOOR}) =	user	ft
Area of Basin Floor (A_{FLOOR}) =	user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

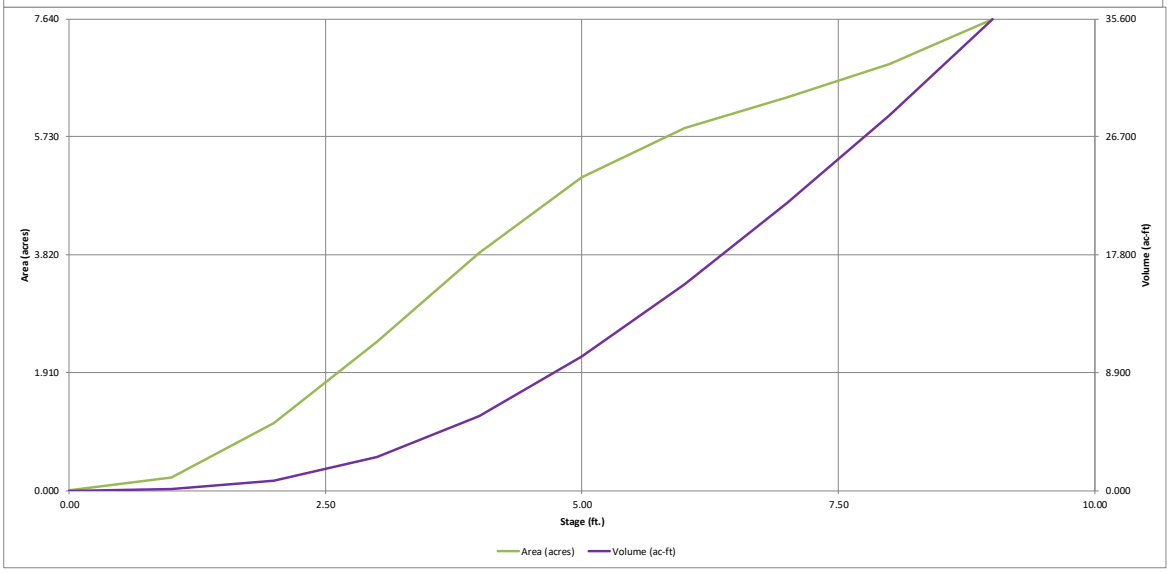
Depth Increment = ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	--	0.00	--	--	--	470	0.011		
6026	--	1.00	--	--	--	9,193	0.211	4,831	0.111
6027	--	2.00	--	--	--	47,523	1.091	33,189	0.762
6028	--	3.00	--	--	--	105,030	2.411	109,465	2.513
6029	--	4.00	--	--	--	167,485	3.845	245,723	5.641
6030	--	5.00	--	--	--	220,930	5.072	439,930	10.099
6031	--	6.00	--	--	--	255,650	5.869	678,220	15.570
6032	--	7.00	--	--	--	277,365	6.367	944,728	21.688
6033	--	8.00	--	--	--	300,965	6.909	1,233,893	28.326
6034	--	9.00	--	--	--	332,445	7.632	1,550,598	35.597

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)





APPENDIX C – HYDRAULIC CALCULATIONS

C.2 OPEN CHANNELS

Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, May 2 2023

Channel A - 5 YEAR

Trapezoidal

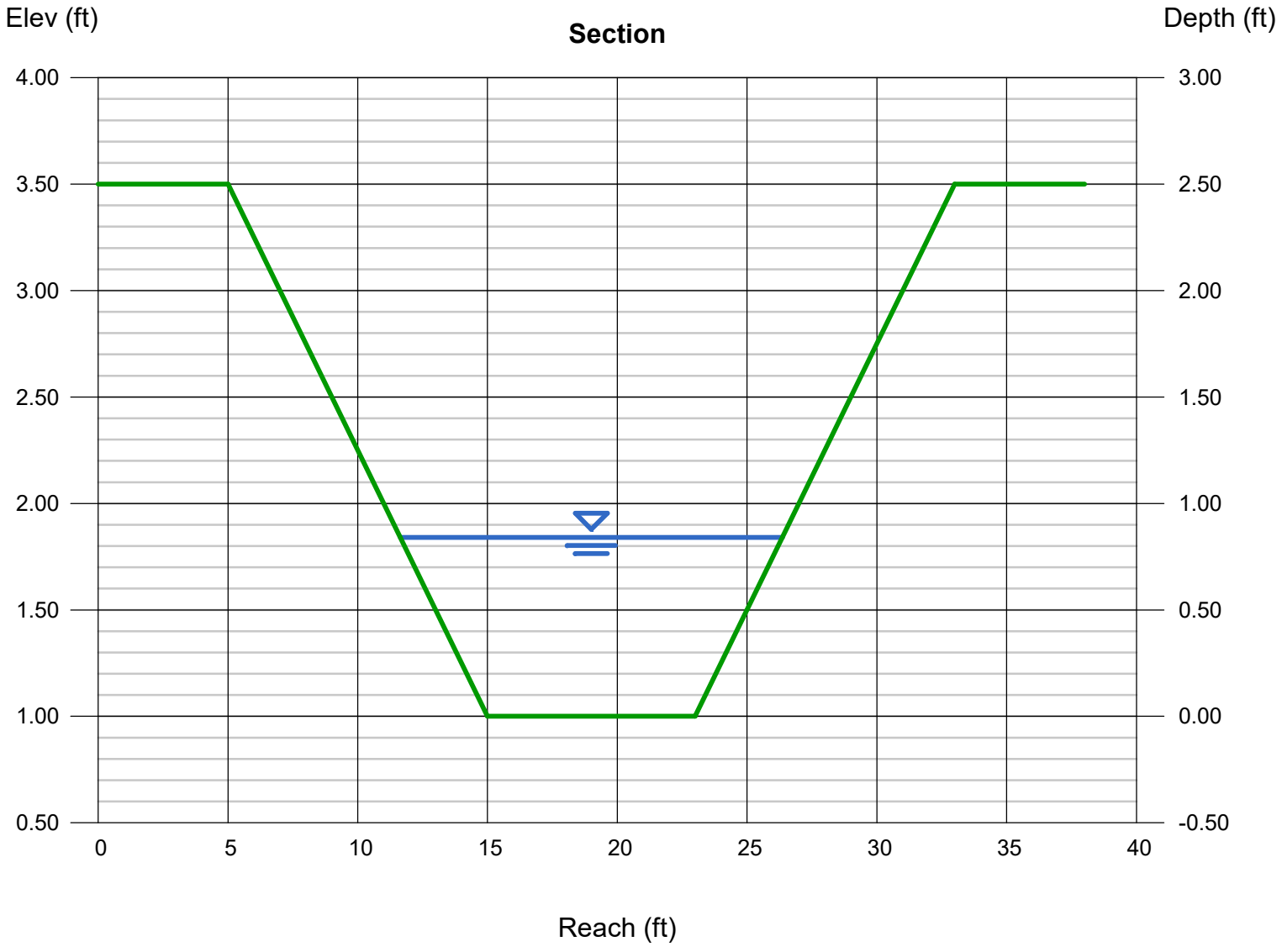
Bottom Width (ft)	= 8.00
Side Slopes (z:1)	= 4.00, 4.00
Total Depth (ft)	= 2.50
Invert Elev (ft)	= 1.00
Slope (%)	= 0.60
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 26.90

Highlighted

Depth (ft)	= 0.84
Q (cfs)	= 26.90
Area (sqft)	= 9.54
Velocity (ft/s)	= 2.82
Wetted Perim (ft)	= 14.93
Crit Depth, Yc (ft)	= 0.64
Top Width (ft)	= 14.72
EGL (ft)	= 0.96



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, May 2 2023

Channel A - 100 YEAR

Trapezoidal

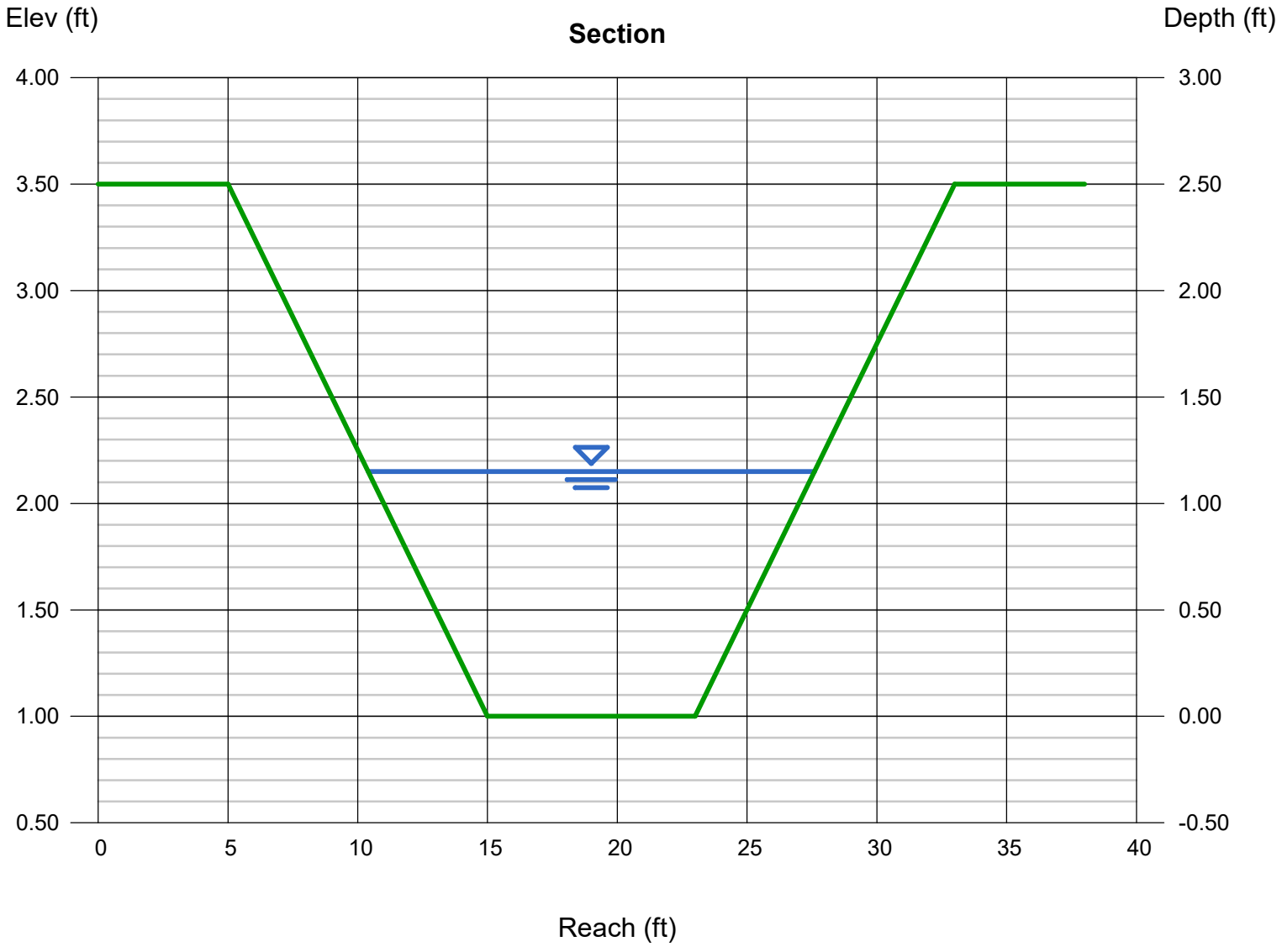
Bottom Width (ft)	= 8.00
Side Slopes (z:1)	= 4.00, 4.00
Total Depth (ft)	= 2.50
Invert Elev (ft)	= 1.00
Slope (%)	= 0.60
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 49.00

Highlighted

Depth (ft)	= 1.15
Q (cfs)	= 49.00
Area (sqft)	= 14.49
Velocity (ft/s)	= 3.38
Wetted Perim (ft)	= 17.48
Crit Depth, Yc (ft)	= 0.90
Top Width (ft)	= 17.20
EGL (ft)	= 1.33



Channel Report

Channel B (Offsite) - 5 YEAR

Trapezoidal

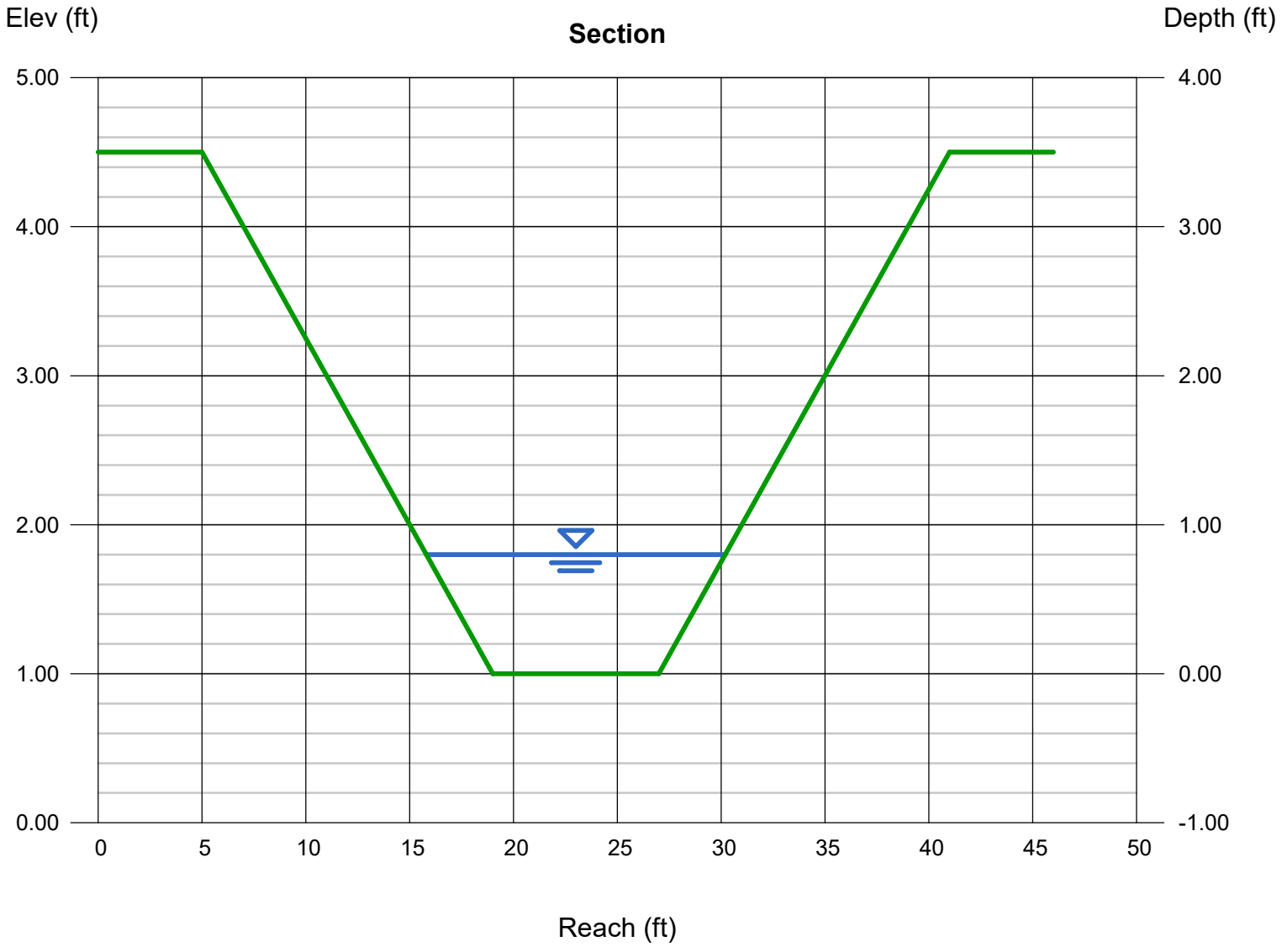
Bottom Width (ft)	= 8.00
Side Slopes (z:1)	= 4.00, 4.00
Total Depth (ft)	= 3.50
Invert Elev (ft)	= 1.00
Slope (%)	= 0.60
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 24.41

Highlighted

Depth (ft)	= 0.80
Q (cfs)	= 24.41
Area (sqft)	= 8.96
Velocity (ft/s)	= 2.72
Wetted Perim (ft)	= 14.60
Crit Depth, Yc (ft)	= 0.60
Top Width (ft)	= 14.40
EGL (ft)	= 0.92



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Monday, May 1 2023

Channel B (Offsite) - 100 YEAR

Trapezoidal

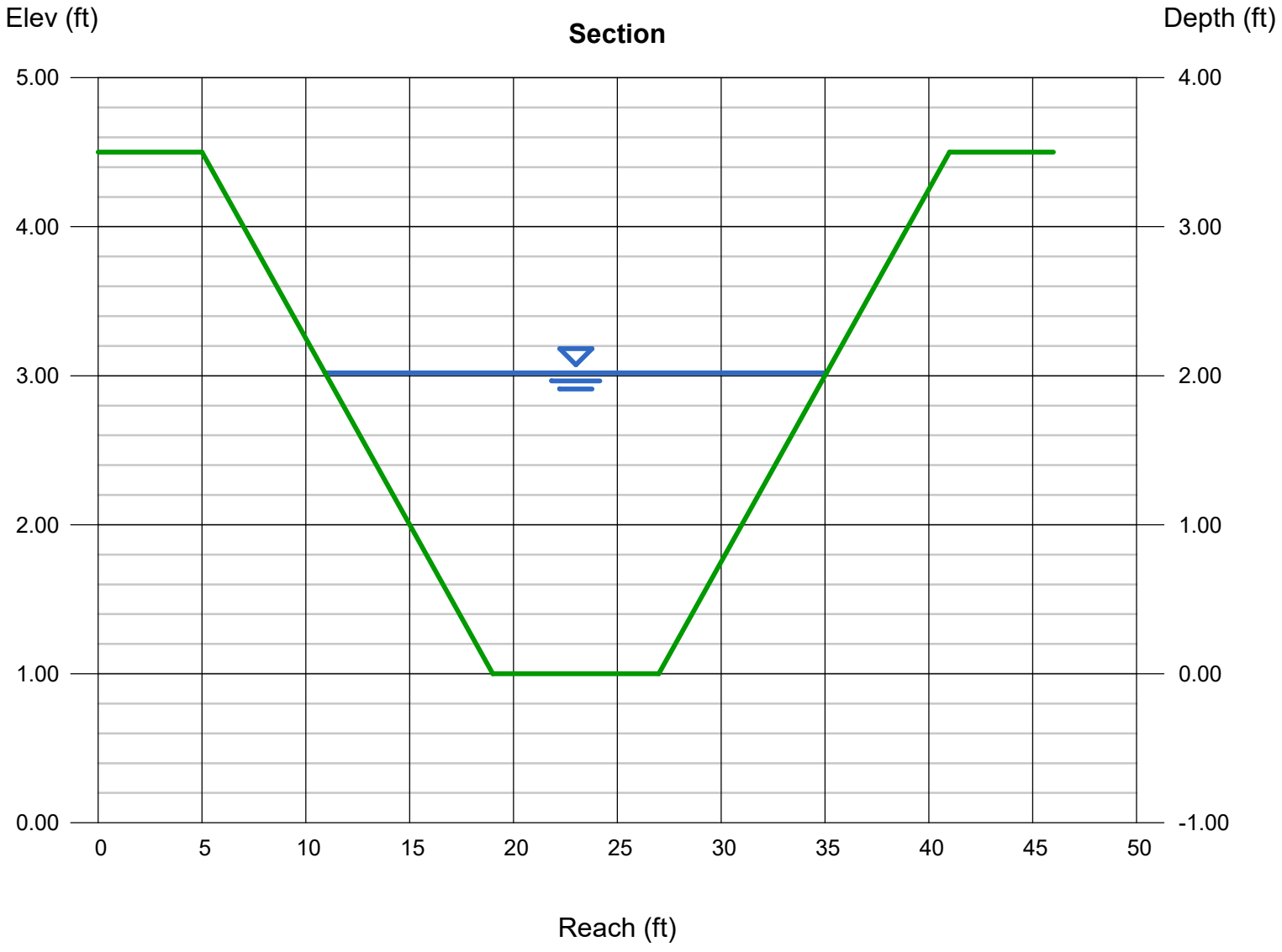
Bottom Width (ft)	= 8.00
Side Slopes (z:1)	= 4.00, 4.00
Total Depth (ft)	= 3.50
Invert Elev (ft)	= 1.00
Slope (%)	= 0.60
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 149.50

Highlighted

Depth (ft)	= 2.02
Q (cfs)	= 149.50
Area (sqft)	= 32.48
Velocity (ft/s)	= 4.60
Wetted Perim (ft)	= 24.66
Crit Depth, Yc (ft)	= 1.68
Top Width (ft)	= 24.16
EGL (ft)	= 2.35



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Monday, May 1 2023

Channel D - 5 YEAR

Trapezoidal

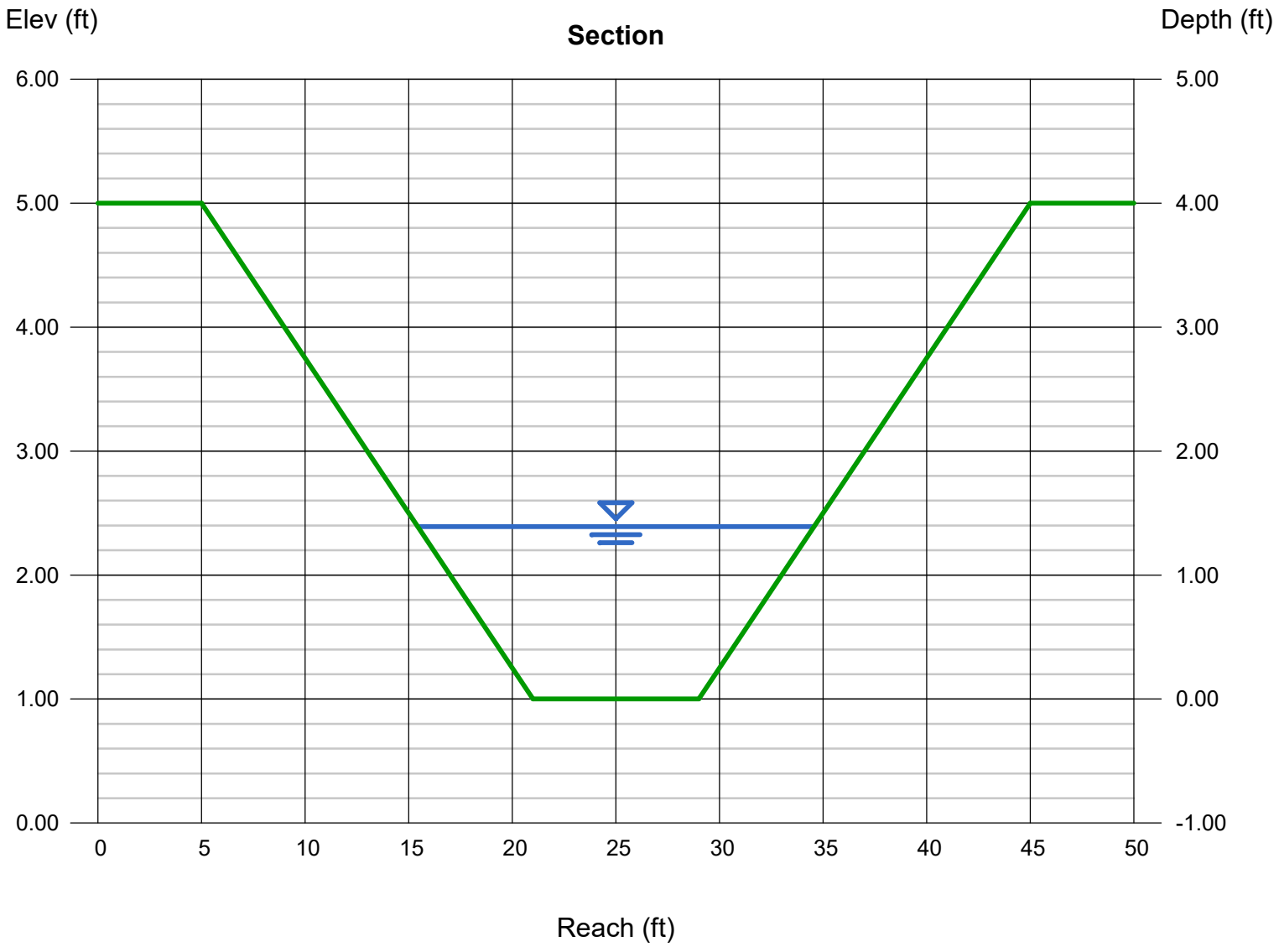
Bottom Width (ft)	= 8.00
Side Slopes (z:1)	= 4.00, 4.00
Total Depth (ft)	= 4.00
Invert Elev (ft)	= 1.00
Slope (%)	= 0.40
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 57.50

Highlighted

Depth (ft)	= 1.39
Q (cfs)	= 57.50
Area (sqft)	= 18.85
Velocity (ft/s)	= 3.05
Wetted Perim (ft)	= 19.46
Crit Depth, Yc (ft)	= 0.99
Top Width (ft)	= 19.12
EGL (ft)	= 1.53



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Monday, May 1 2023

Channel D - 100 YEAR

Trapezoidal

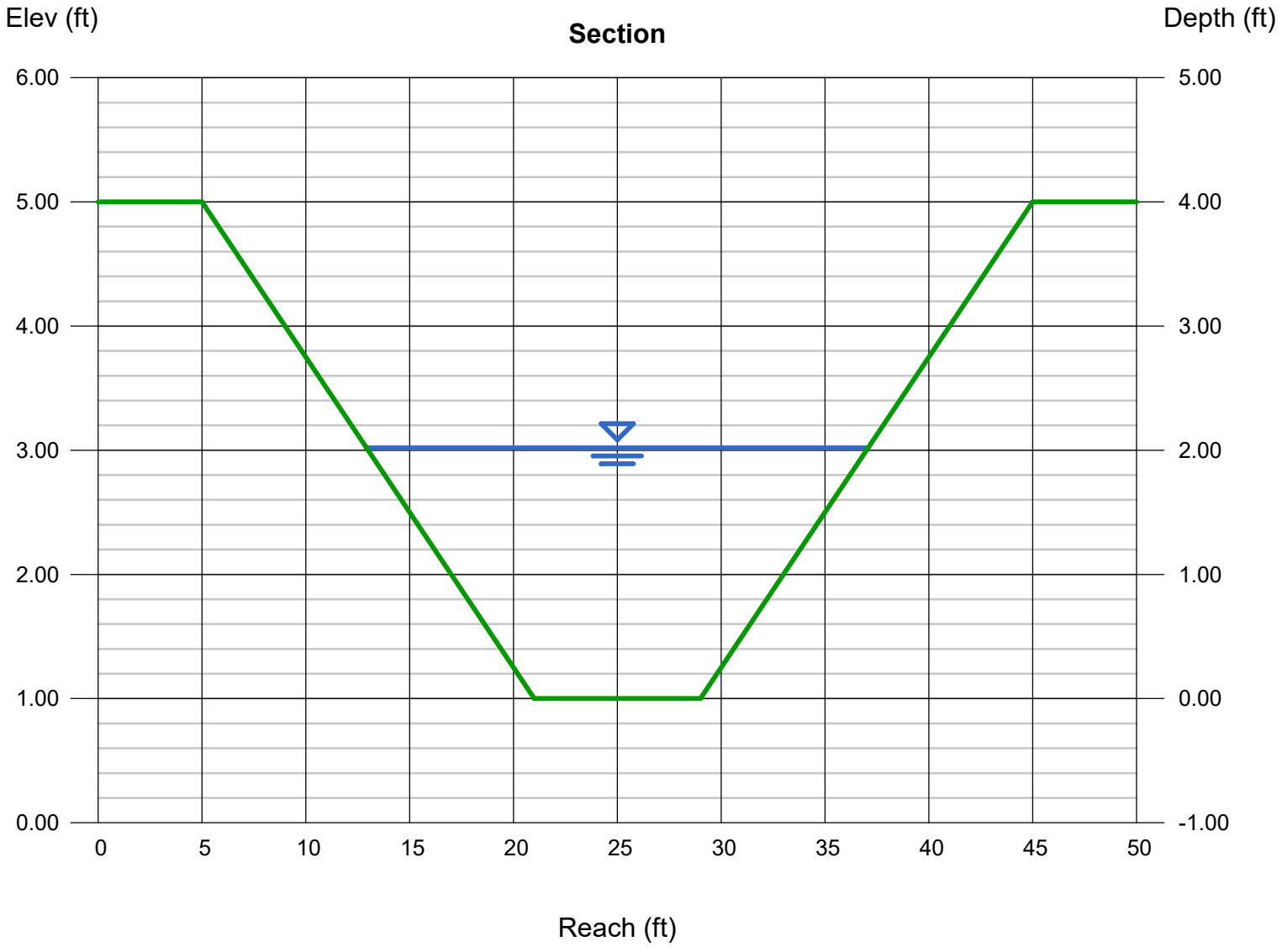
Bottom Width (ft)	= 8.00
Side Slopes (z:1)	= 4.00, 4.00
Total Depth (ft)	= 4.00
Invert Elev (ft)	= 1.00
Slope (%)	= 0.40
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 121.60

Highlighted

Depth (ft)	= 2.02
Q (cfs)	= 121.60
Area (sqft)	= 32.48
Velocity (ft/s)	= 3.74
Wetted Perim (ft)	= 24.66
Crit Depth, Yc (ft)	= 1.50
Top Width (ft)	= 24.16
EGL (ft)	= 2.24



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Monday, May 1 2023

Channel E (Offsite & Pond D) - 5 YEAR

Trapezoidal

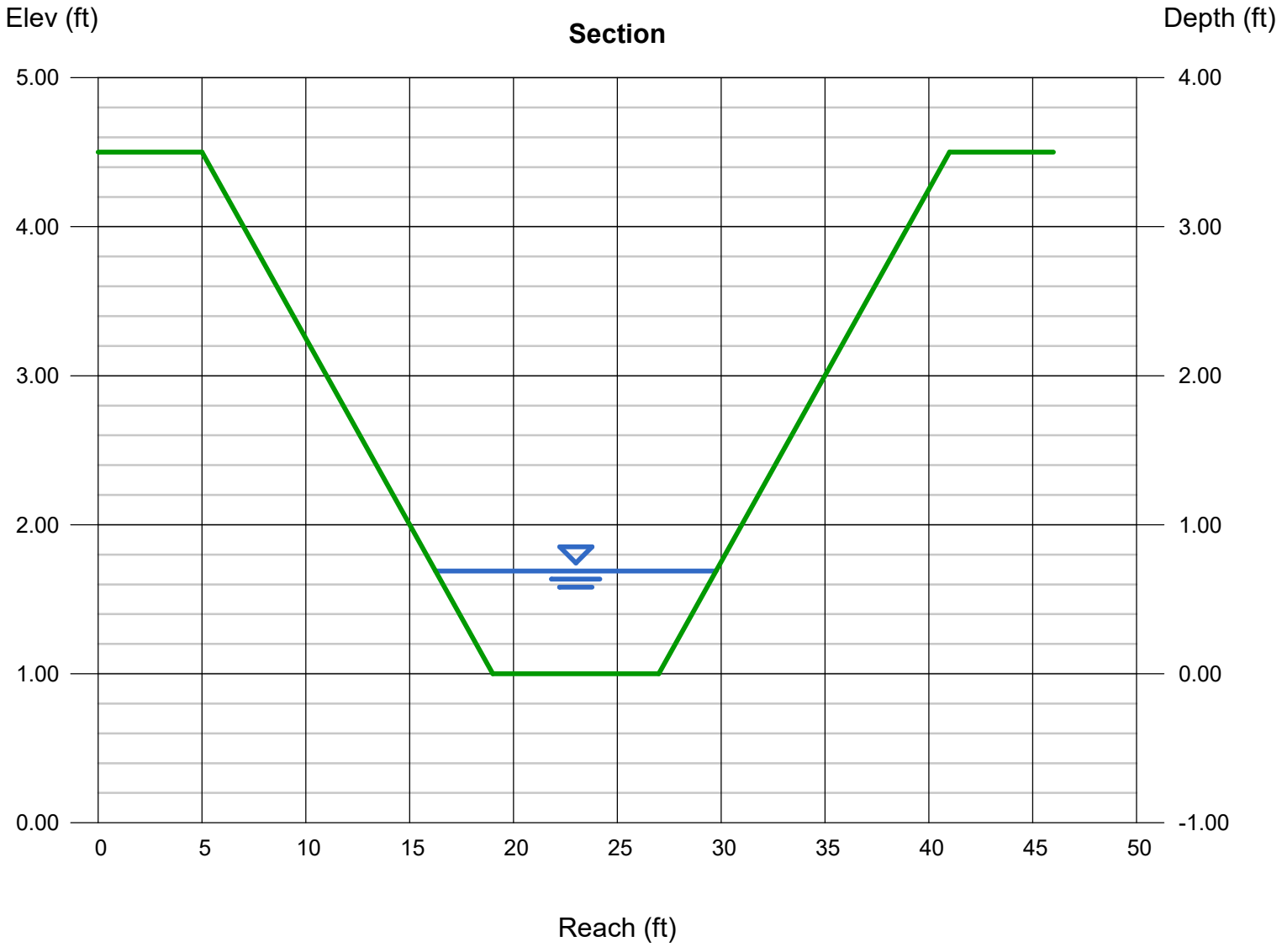
Bottom Width (ft)	= 8.00
Side Slopes (z:1)	= 4.00, 4.00
Total Depth (ft)	= 3.50
Invert Elev (ft)	= 1.00
Slope (%)	= 0.60
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 18.70

Highlighted

Depth (ft)	= 0.69
Q (cfs)	= 18.70
Area (sqft)	= 7.42
Velocity (ft/s)	= 2.52
Wetted Perim (ft)	= 13.69
Crit Depth, Yc (ft)	= 0.51
Top Width (ft)	= 13.52
EGL (ft)	= 0.79



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Monday, May 1 2023

Channel E (Offsite & Pond D) - 100 YEAR

Trapezoidal

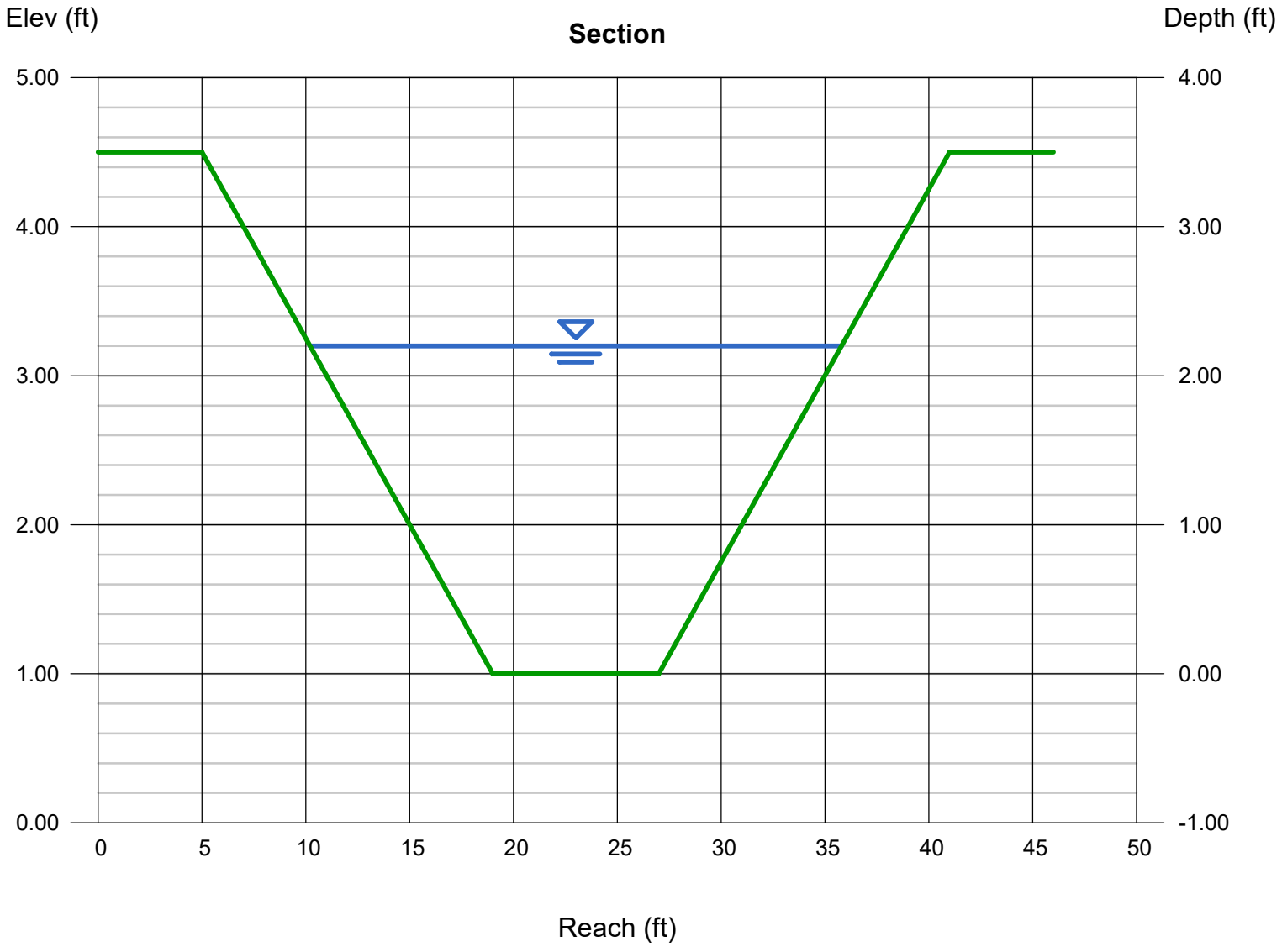
Bottom Width (ft)	= 8.00
Side Slopes (z:1)	= 4.00, 4.00
Total Depth (ft)	= 3.50
Invert Elev (ft)	= 1.00
Slope (%)	= 0.60
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 177.50

Highlighted

Depth (ft)	= 2.20
Q (cfs)	= 177.50
Area (sqft)	= 36.96
Velocity (ft/s)	= 4.80
Wetted Perim (ft)	= 26.14
Crit Depth, Yc (ft)	= 1.84
Top Width (ft)	= 25.60
EGL (ft)	= 2.56



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, May 2 2023

Channel H - 5 YEAR

Trapezoidal

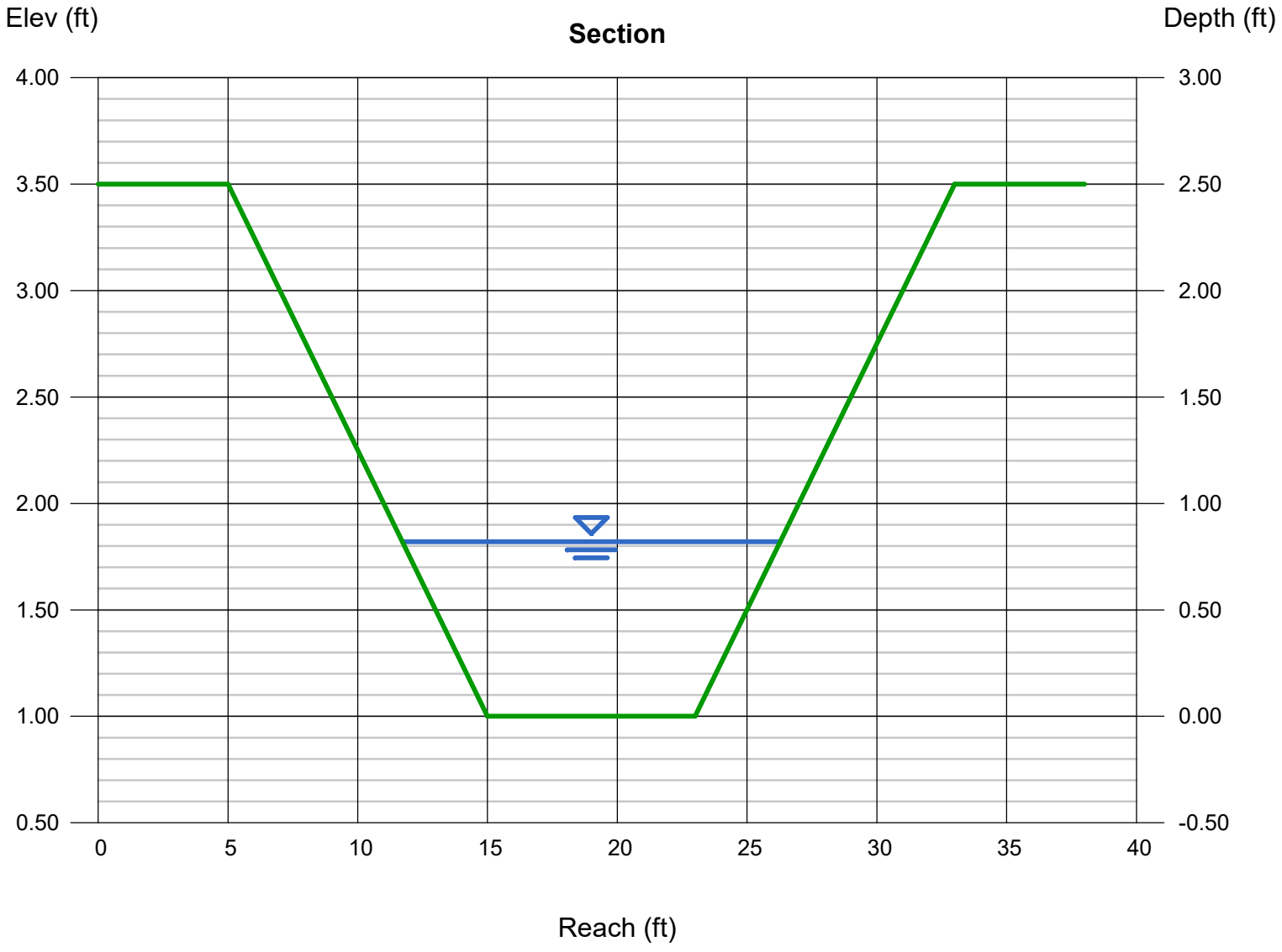
Bottom Width (ft)	= 8.00
Side Slopes (z:1)	= 4.00, 4.00
Total Depth (ft)	= 2.50
Invert Elev (ft)	= 1.00
Slope (%)	= 0.50
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 23.50

Highlighted

Depth (ft)	= 0.82
Q (cfs)	= 23.50
Area (sqft)	= 9.25
Velocity (ft/s)	= 2.54
Wetted Perim (ft)	= 14.76
Crit Depth, Yc (ft)	= 0.59
Top Width (ft)	= 14.56
EGL (ft)	= 0.92



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, May 2 2023

Channel H - 100 YEAR

Trapezoidal

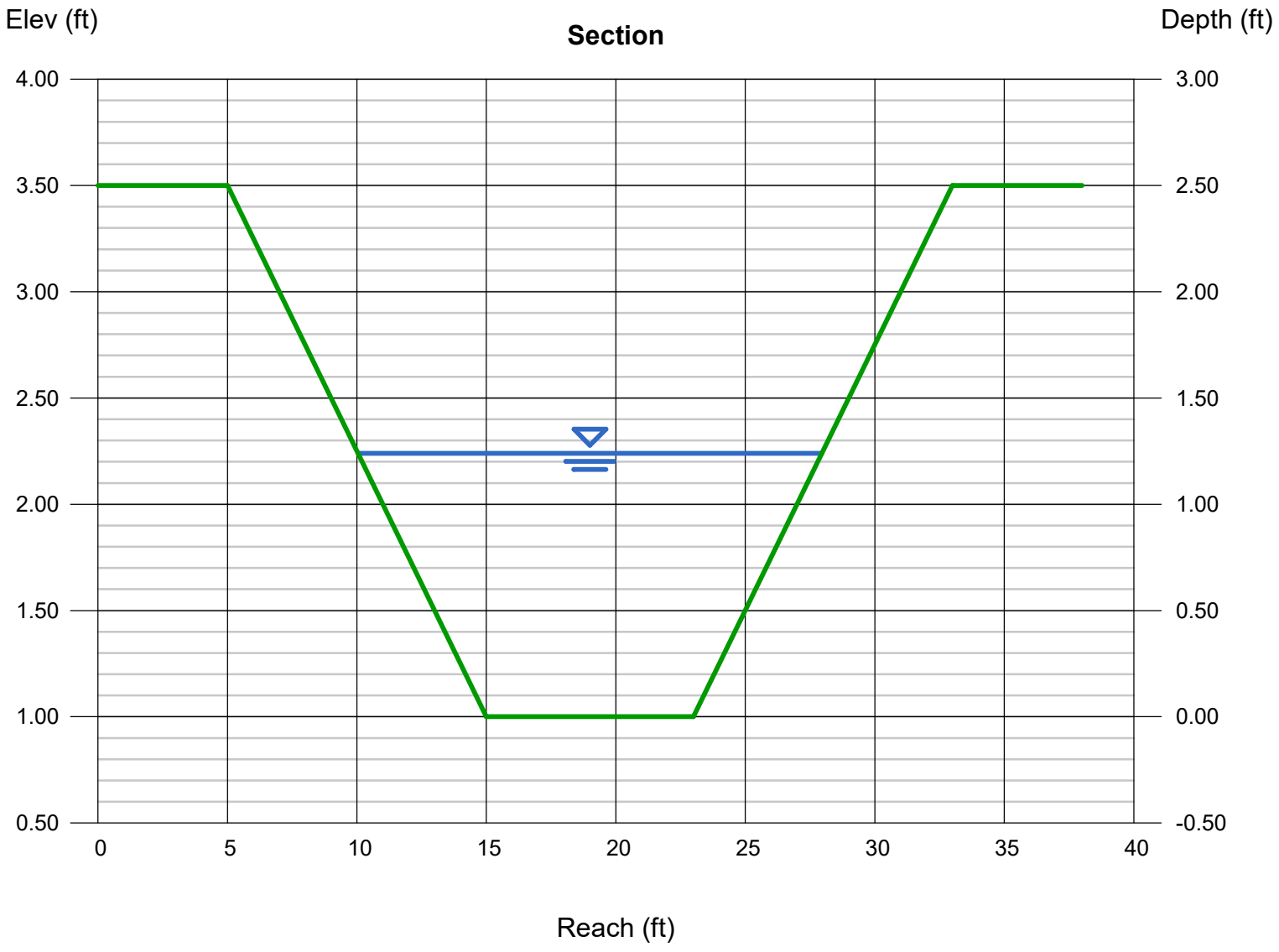
Bottom Width (ft)	= 8.00
Side Slopes (z:1)	= 4.00, 4.00
Total Depth (ft)	= 2.50
Invert Elev (ft)	= 1.00
Slope (%)	= 0.50
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 51.60

Highlighted

Depth (ft)	= 1.24
Q (cfs)	= 51.60
Area (sqft)	= 16.07
Velocity (ft/s)	= 3.21
Wetted Perim (ft)	= 18.23
Crit Depth, Yc (ft)	= 0.93
Top Width (ft)	= 17.92
EGL (ft)	= 1.40



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, May 2 2023

Channel G - 5 YEAR

Trapezoidal

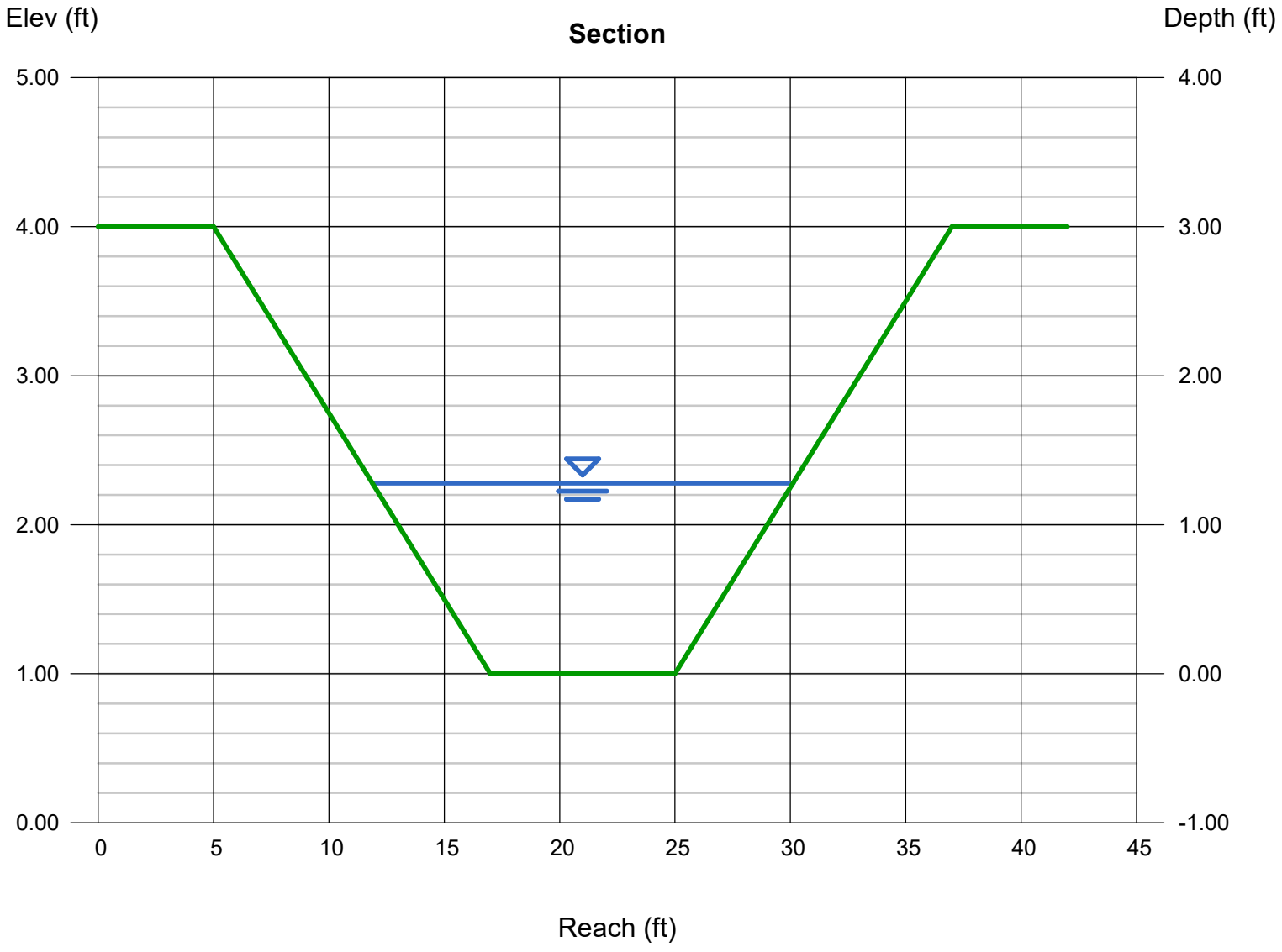
Bottom Width (ft)	= 8.00
Side Slopes (z:1)	= 4.00, 4.00
Total Depth (ft)	= 3.00
Invert Elev (ft)	= 1.00
Slope (%)	= 0.60
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 59.60

Highlighted

Depth (ft)	= 1.28
Q (cfs)	= 59.60
Area (sqft)	= 16.79
Velocity (ft/s)	= 3.55
Wetted Perim (ft)	= 18.56
Crit Depth, Yc (ft)	= 1.01
Top Width (ft)	= 18.24
EGL (ft)	= 1.48



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, May 2 2023

Channel G - 100 YEAR

Trapezoidal

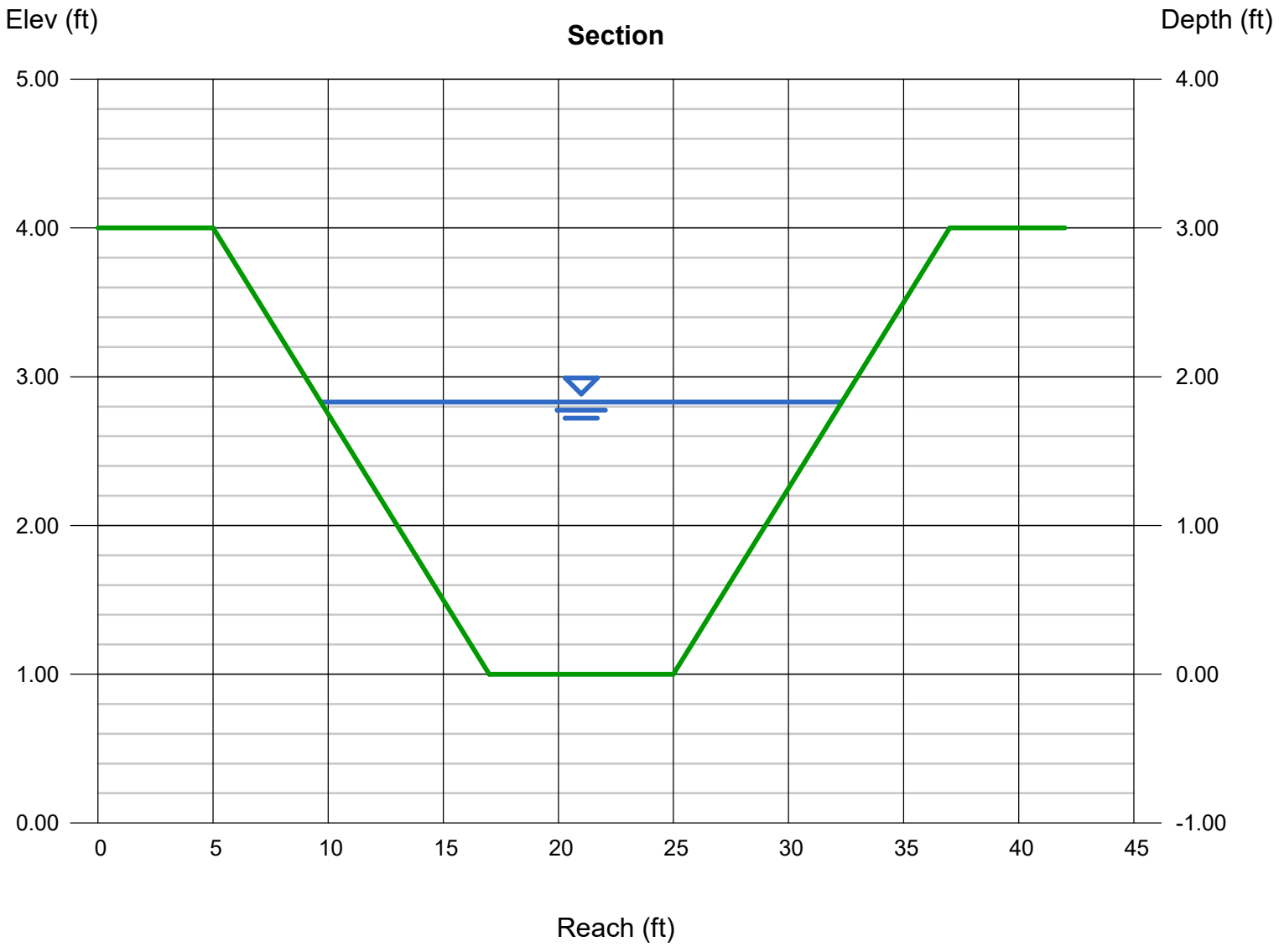
Bottom Width (ft)	= 8.00
Side Slopes (z:1)	= 4.00, 4.00
Total Depth (ft)	= 3.00
Invert Elev (ft)	= 1.00
Slope (%)	= 0.60
N-Value	= 0.030

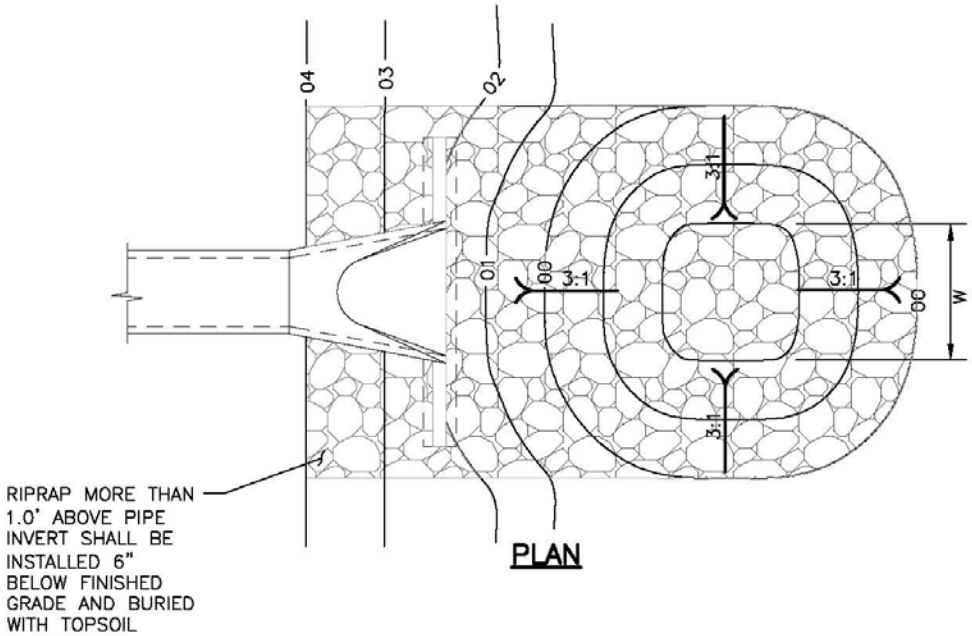
Calculations

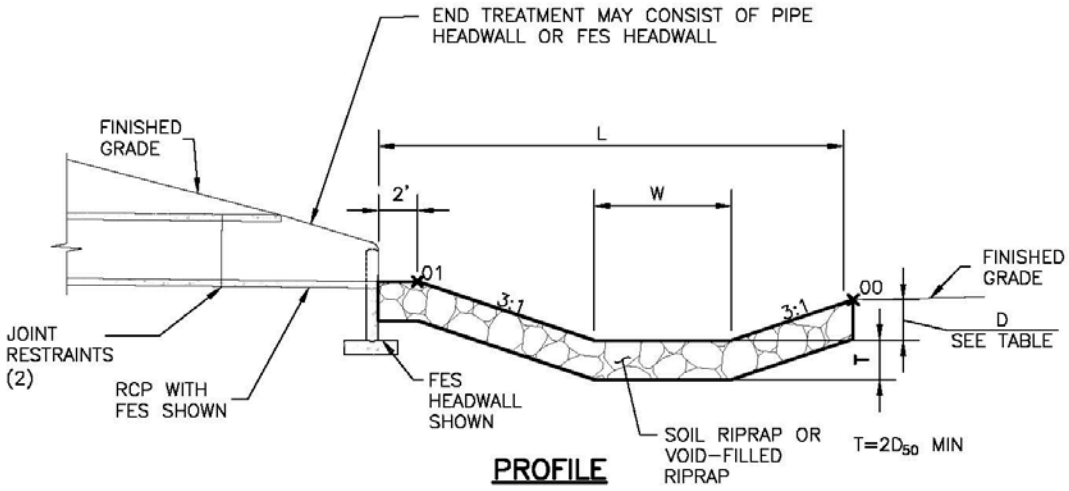
Compute by:	Known Q
Known Q (cfs)	= 121.70

Highlighted

Depth (ft)	= 1.83
Q (cfs)	= 121.70
Area (sqft)	= 28.04
Velocity (ft/s)	= 4.34
Wetted Perim (ft)	= 23.09
Crit Depth, Yc (ft)	= 1.50
Top Width (ft)	= 22.64
EGL (ft)	= 2.12







PIPE SIZE OR BOX HEIGHT	D	W*	L
18" – 24"	1'–0"	4'	15'
30" – 36"	1'–6"	6'	20'
42" – 48"	2'–0"	7'	24'
54" – 60"	2'–6"	8'	28'
66" – 72"	3'–0"	9'	32'

* IF OUTLET PIPE IS A BOX CULVERT WITH A WIDTH GREATER THAN W, THEN W = CULVERT WIDTH

Figure 9-37. Low tailwater riprap basin

APPENDIX C – HYDRAULIC CALCULATIONS

C.3 CULVERT SIZING

Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Jul 17 2024

CULVERT 1 - OFFSITE F1 & Pond C

Invert Elev Dn (ft)	=	6040.70
Pipe Length (ft)	=	140.00
Slope (%)	=	0.50
Invert Elev Up (ft)	=	6041.40
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

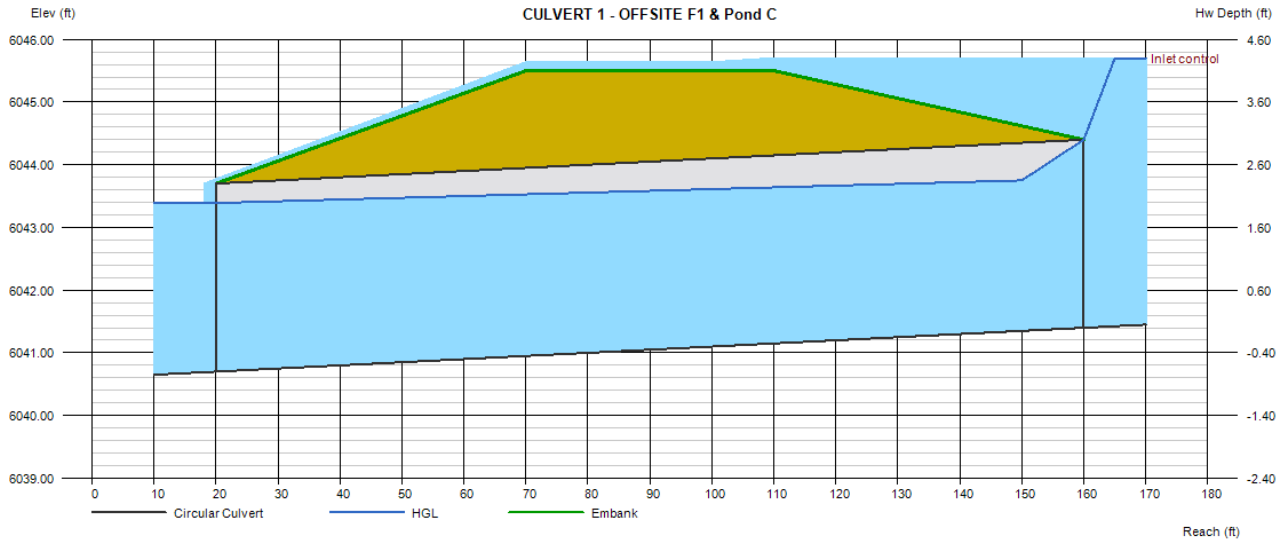
Top Elevation (ft)	=	6045.50
Top Width (ft)	=	40.00
Crest Width (ft)	=	40.00

Calculations

Qmin (cfs)	=	64.50
Qmax (cfs)	=	164.50
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	64.50
Qpipe (cfs)	=	53.69
Qovertop (cfs)	=	10.81
Veloc Dn (ft/s)	=	8.04
Veloc Up (ft/s)	=	8.93
HGL Dn (ft)	=	6043.39
HGL Up (ft)	=	6043.78
Hw Elev (ft)	=	6045.70
Hw/D (ft)	=	1.43
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Jul 17 2024

CULVERT 2 - OFFSITE F1 & Pond C & Pond B

Invert Elev Dn (ft)	=	6038.00
Pipe Length (ft)	=	150.00
Slope (%)	=	0.50
Invert Elev Up (ft)	=	6038.75
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

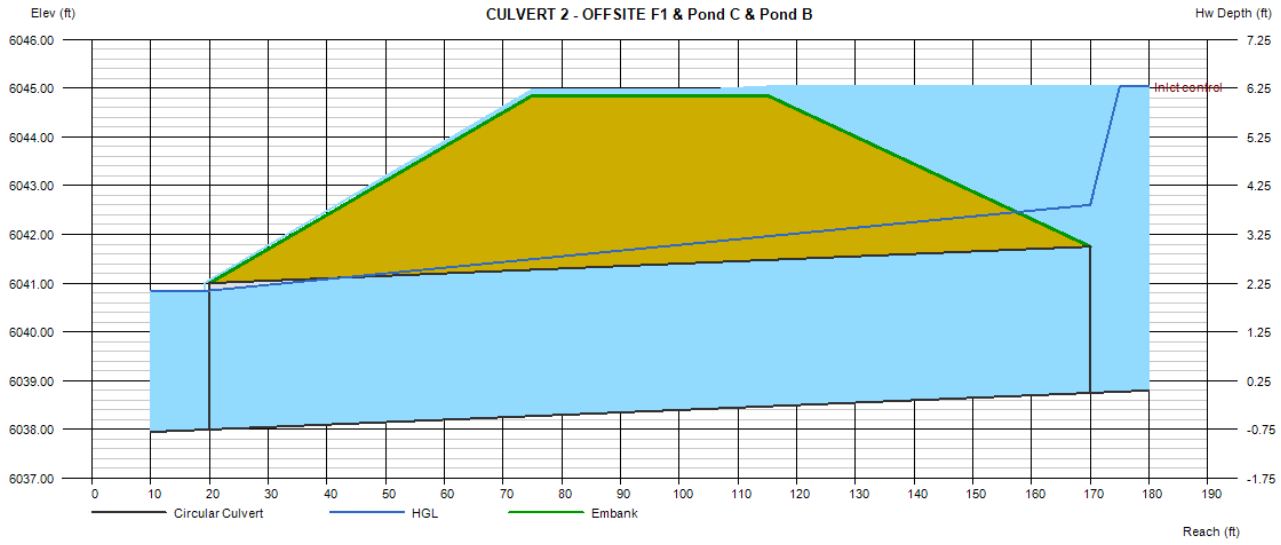
Top Elevation (ft)	=	6044.85
Top Width (ft)	=	40.00
Crest Width (ft)	=	40.00

Calculations

Qmin (cfs)	=	82.50
Qmax (cfs)	=	182.50
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	82.50
Qpipe (cfs)	=	73.30
Qovertop (cfs)	=	9.20
Veloc Dn (ft/s)	=	10.57
Veloc Up (ft/s)	=	10.37
HGL Dn (ft)	=	6040.85
HGL Up (ft)	=	6042.60
Hw Elev (ft)	=	6045.03
Hw/D (ft)	=	2.09
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, May 2 2023

CULVERT 3 - OFFSITE F3 & POND D

Invert Elev Dn (ft)	=	6026.00
Pipe Length (ft)	=	140.00
Slope (%)	=	0.50
Invert Elev Up (ft)	=	6026.70
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

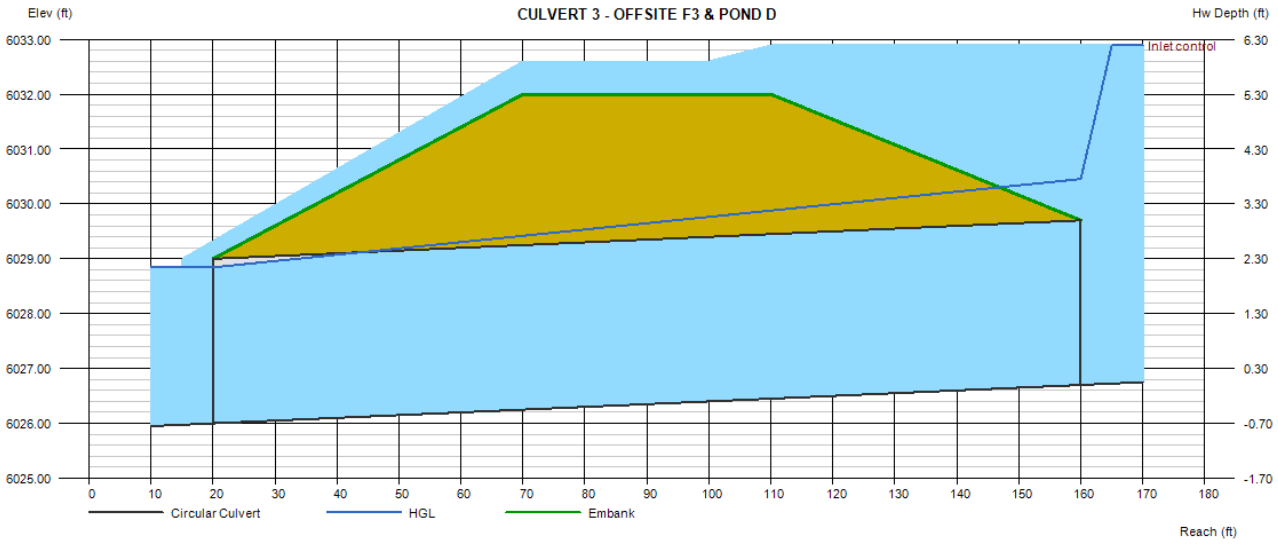
Top Elevation (ft)	=	6032.00
Top Width (ft)	=	40.00
Crest Width (ft)	=	40.00

Calculations

Qmin (cfs)	=	77.50
Qmax (cfs)	=	177.50
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	177.50
Qpipe (cfs)	=	72.50
Qovertop (cfs)	=	105.00
Veloc Dn (ft/s)	=	10.46
Veloc Up (ft/s)	=	10.26
HGL Dn (ft)	=	6028.84
HGL Up (ft)	=	6030.45
Hw Elev (ft)	=	6032.89
Hw/D (ft)	=	2.06
Flow Regime	=	Inlet Control



Culvert Report

CULVERT 4 - PORTION OF BASIN G

Invert Elev Dn (ft)	=	6053.00
Pipe Length (ft)	=	90.00
Slope (%)	=	0.50
Invert Elev Up (ft)	=	6053.45
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

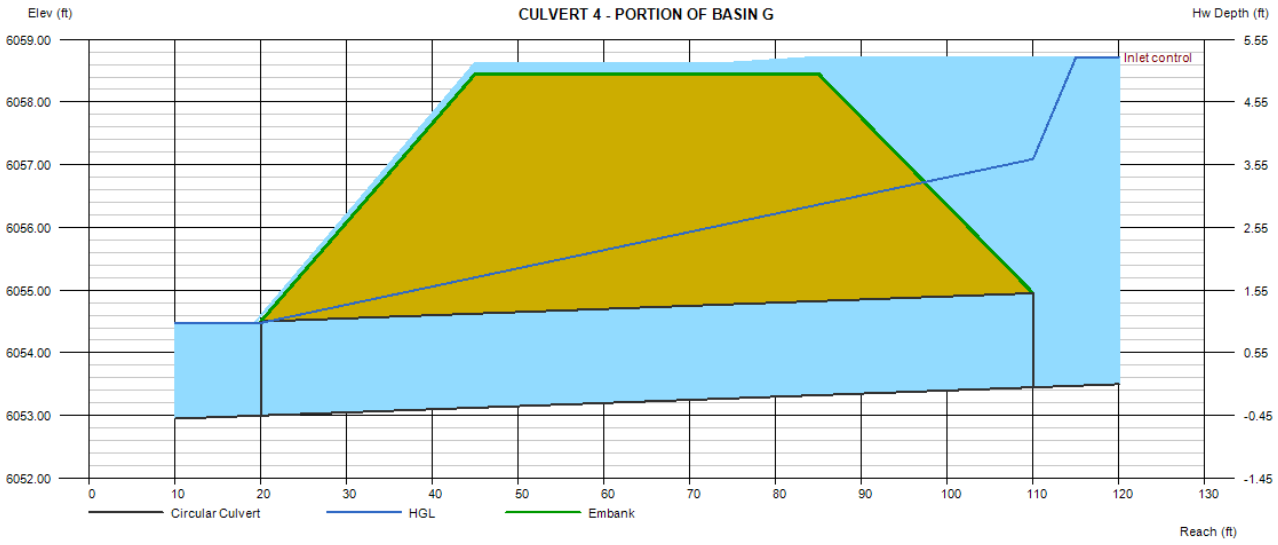
Top Elevation (ft)	=	6058.45
Top Width (ft)	=	40.00
Crest Width (ft)	=	40.00

Calculations

Qmin (cfs)	=	21.40
Qmax (cfs)	=	39.10
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	38.40
Qpipe (cfs)	=	18.29
Qovertop (cfs)	=	20.11
Veloc Dn (ft/s)	=	10.39
Veloc Up (ft/s)	=	10.35
HGL Dn (ft)	=	6054.48
HGL Up (ft)	=	6057.09
Hw Elev (ft)	=	6058.72
Hw/D (ft)	=	3.51
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, May 2 2023

CULVERT 5 - PORTION OF BASIN G

Invert Elev Dn (ft)	=	6040.00
Pipe Length (ft)	=	80.00
Slope (%)	=	0.50
Invert Elev Up (ft)	=	6040.40
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

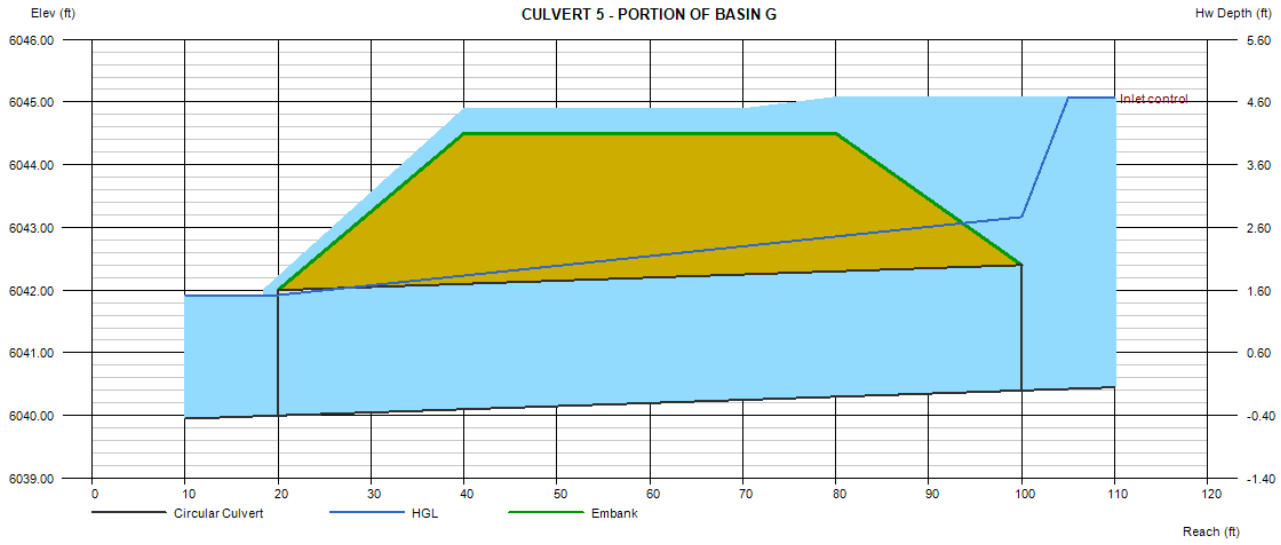
Top Elevation (ft)	=	6044.50
Top Width (ft)	=	40.00
Crest Width (ft)	=	40.00

Calculations

Qmin (cfs)	=	45.10
Qmax (cfs)	=	89.90
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	89.10
Qpipe (cfs)	=	28.76
Qovertop (cfs)	=	60.34
Veloc Dn (ft/s)	=	9.28
Veloc Up (ft/s)	=	9.15
HGL Dn (ft)	=	6041.92
HGL Up (ft)	=	6043.17
Hw Elev (ft)	=	6045.07
Hw/D (ft)	=	2.34
Flow Regime	=	Inlet Control



Culvert Report

CULVERT 6 - PORTION OF BASIN G

Invert Elev Dn (ft)	=	6030.00
Pipe Length (ft)	=	80.00
Slope (%)	=	0.50
Invert Elev Up (ft)	=	6030.40
Rise (in)	=	30.0
Shape	=	Circular
Span (in)	=	30.0
No. Barrels	=	1
n-Value	=	0.013
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

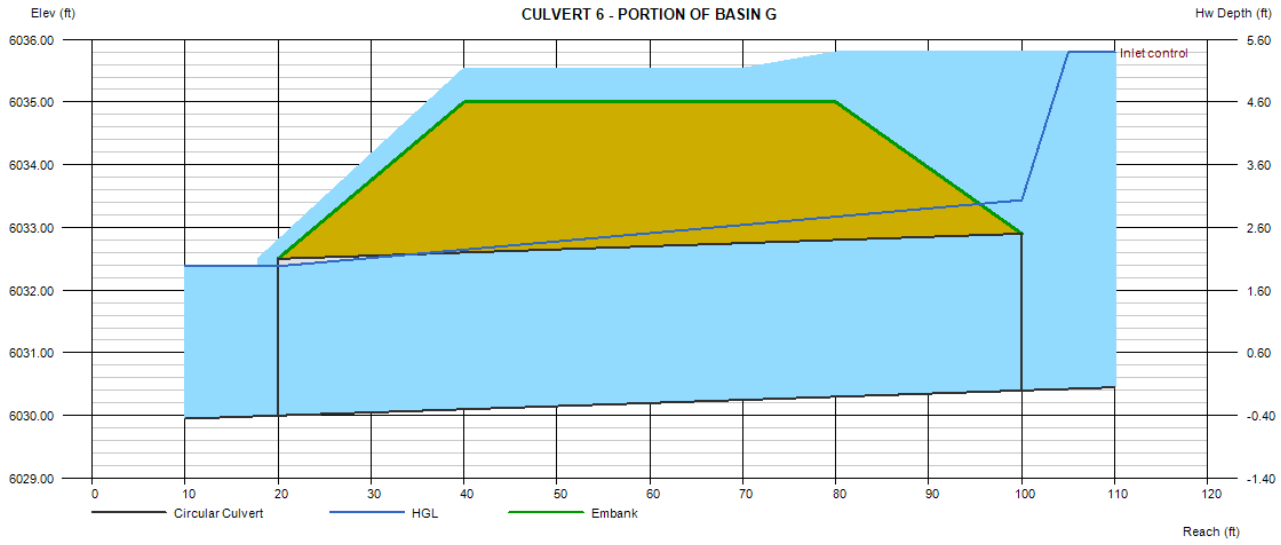
Top Elevation (ft)	=	6035.00
Top Width (ft)	=	40.00
Crest Width (ft)	=	40.00

Calculations

Qmin (cfs)	=	68.80
Qmax (cfs)	=	142.40
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	141.80
Qpipe (cfs)	=	47.49
Qovertop (cfs)	=	94.31
Veloc Dn (ft/s)	=	9.84
Veloc Up (ft/s)	=	9.68
HGL Dn (ft)	=	6032.38
HGL Up (ft)	=	6033.44
Hw Elev (ft)	=	6035.79
Hw/D (ft)	=	2.16
Flow Regime	=	Inlet Control



Culvert Report

CULVERT 7 - PORTION OF BASIN F

Invert Elev Dn (ft)	=	6055.80
Pipe Length (ft)	=	80.00
Slope (%)	=	0.50
Invert Elev Up (ft)	=	6056.20
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

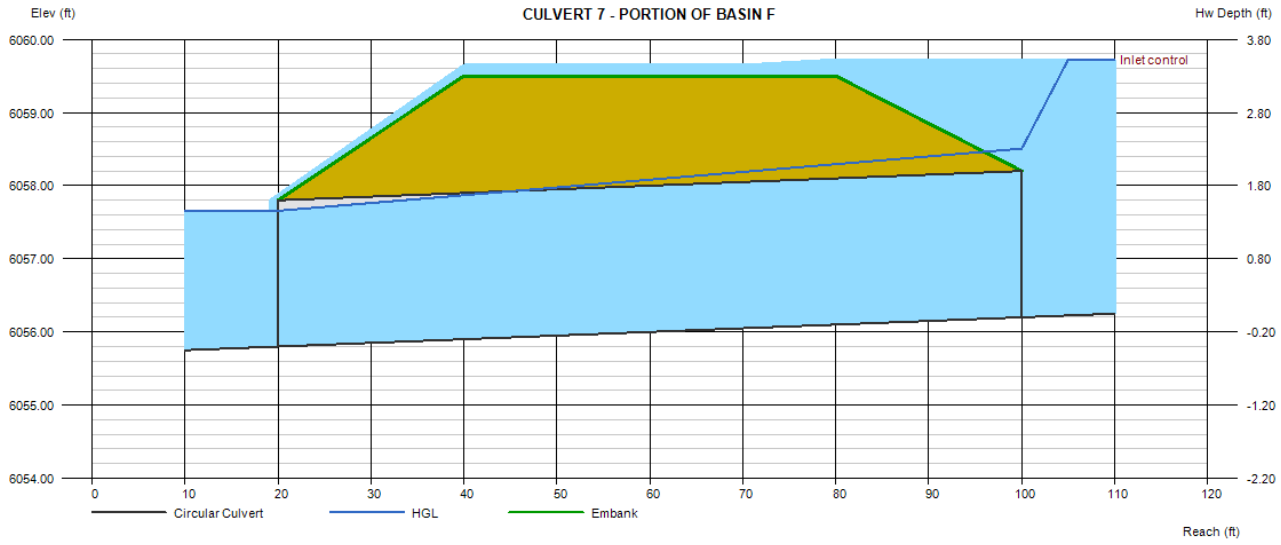
Top Elevation (ft)	=	6059.50
Top Width (ft)	=	40.00
Crest Width (ft)	=	40.00

Calculations

Qmin (cfs)	=	17.30
Qmax (cfs)	=	38.10
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	37.30
Qpipe (cfs)	=	23.31
Qovertop (cfs)	=	13.99
Veloc Dn (ft/s)	=	7.66
Veloc Up (ft/s)	=	7.42
HGL Dn (ft)	=	6057.66
HGL Up (ft)	=	6058.51
Hw Elev (ft)	=	6059.73
Hw/D (ft)	=	1.76
Flow Regime	=	Inlet Control



Culvert Report

CULVERT 8 - PORTION OF BASIN F

Invert Elev Dn (ft)	=	6054.60
Pipe Length (ft)	=	80.00
Slope (%)	=	0.50
Invert Elev Up (ft)	=	6055.00
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

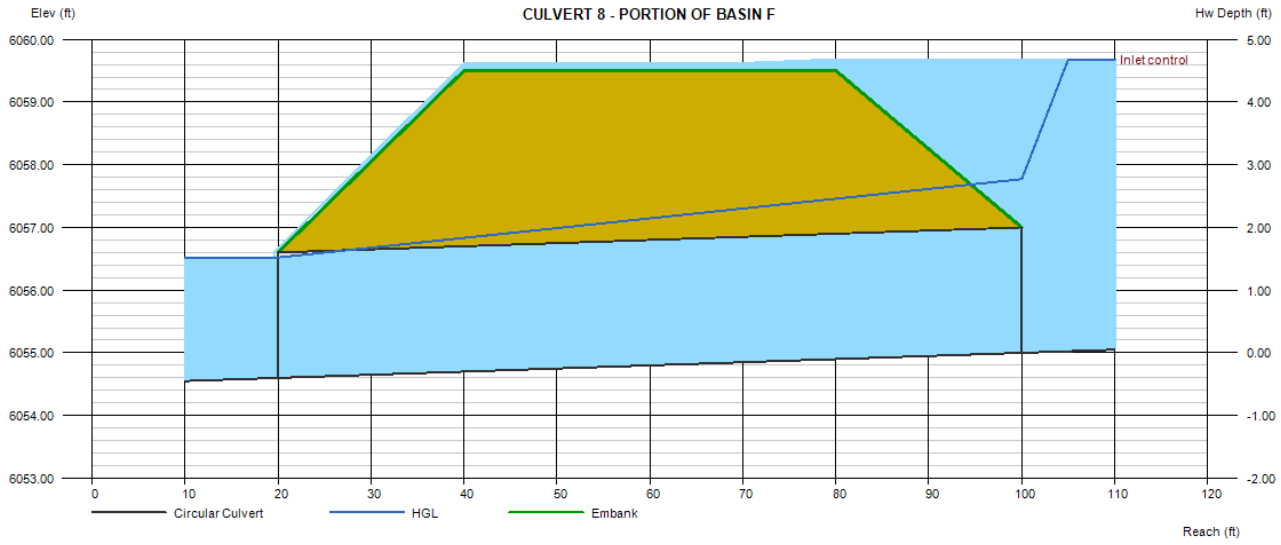
Top Elevation (ft)	=	6059.50
Top Width (ft)	=	40.00
Crest Width (ft)	=	40.00

Calculations

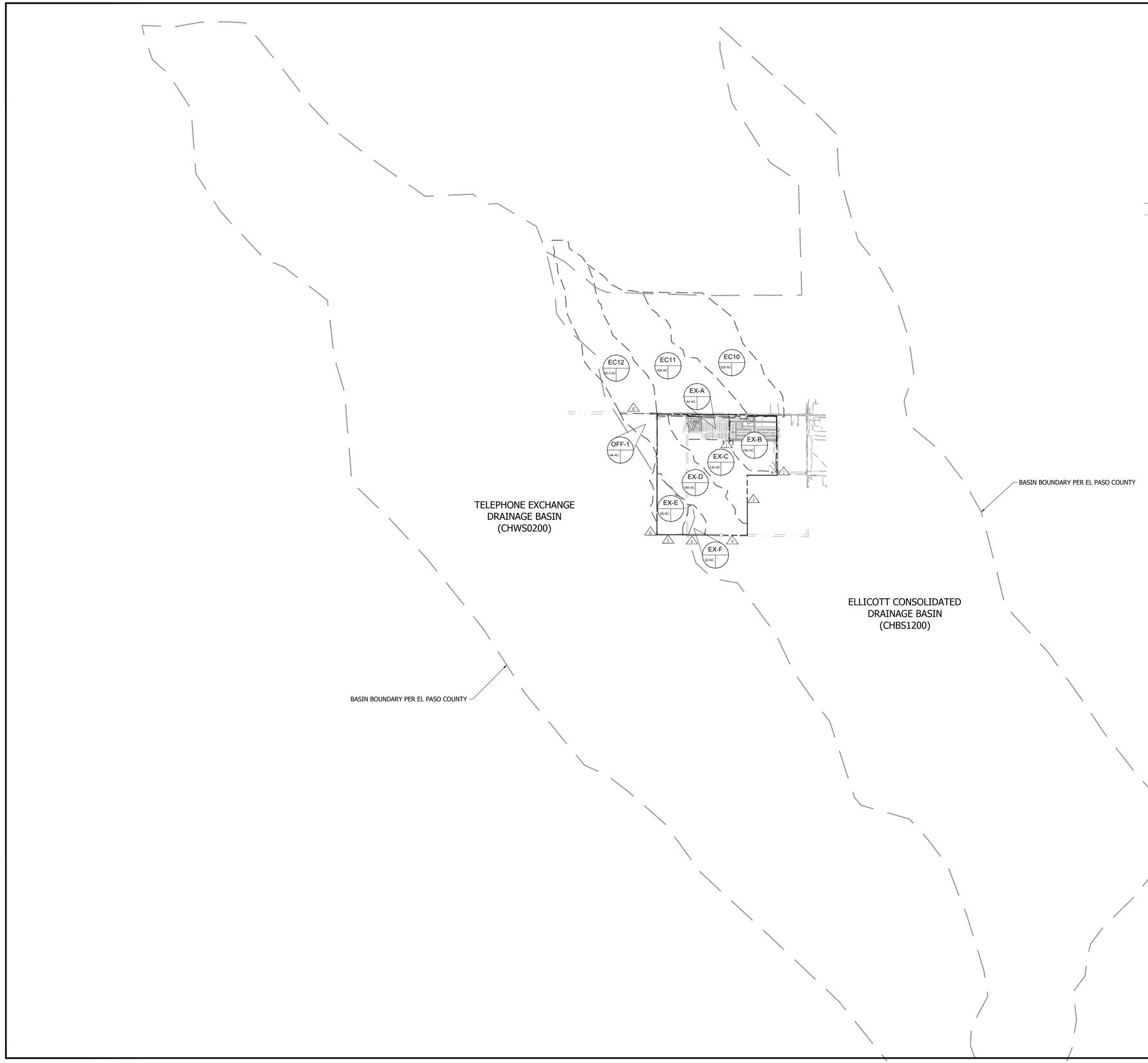
Qmin (cfs)	=	17.80
Qmax (cfs)	=	39.30
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	38.80
Qpipe (cfs)	=	28.81
Qovertop (cfs)	=	9.99
Veloc Dn (ft/s)	=	9.29
Veloc Up (ft/s)	=	9.17
HGL Dn (ft)	=	6056.52
HGL Up (ft)	=	6057.77
Hw Elev (ft)	=	6059.68
Hw/D (ft)	=	2.34
Flow Regime	=	Inlet Control



APPENDIX D – DRAINAGE MAPS



EXISTING	DESCRIPTION	PROPOSED
	PROPERTY LINE	
5825	MAJOR CONTOUR	5825
5822	MINOR CONTOUR	5822
	DRAINAGE BASIN LABEL * BASIN LABEL ** TRIBUTARY AREA (AC)	C–1* 1**
	FLOW ARROW	
	DESIGN POINT	1
	DRAINAGE AREA BOUNDARY	
	DRAINAGE BASIN BOUNDARY PER EL PASO COUNTY	

0 2,000' 4,000' 6,000'

SCALE: 1" = 2,000'

NO.	REVISION	BY	DATE

R&R ENGINEERS-SURVEYORS, INC.
1635 WEST 13TH AVENUE, SUITE 310
DENVER, COLORADO 80204
PHONE: 303-753-6730
WWW.RRENGINEERS.COM

MAYBERRY SKETCH PLAN

SITE ADDRESS: MAYBERRY, COLORADO SPRINGS
EL PASO COUNTY

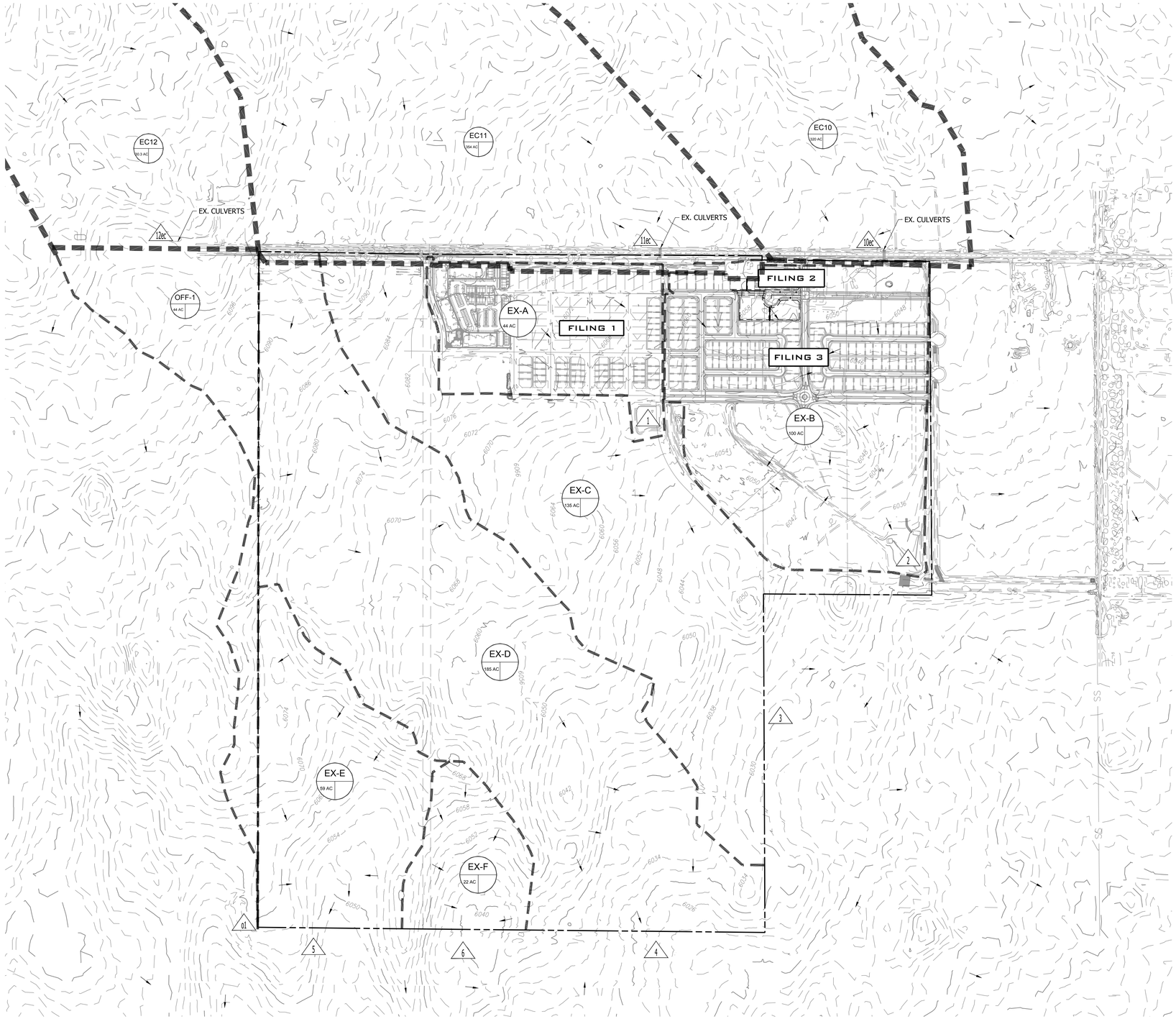
PREPARED FOR: MAYBERRY COMMUNITIES, LLC
3296 DEVINE HEIGHTS #208
COLORADO SPRINGS, CO 80922

EXHIBIT

JOB NO. MC22208
ORG. SUBM. DATE
DWN: GWH CHKD: CJD
NAME

HISTORIC
DRAINAGE PLAN

NO. DR1



EXISTING	DESCRIPTION	PROPOSED
	PROPERTY LINE	
5825	MAJOR CONTOUR	5825
5822	MINOR CONTOUR	5822

DRAINAGE BASIN LABEL
* BASIN LABEL
** TRIBUTARY AREA (AC)

C–1*
1**

FLOW ARROW

DESIGN POINT 1

DRAINAGE AREA BOUNDARY

BASIN SUMMARY TABLE

Basin	Area (acres)	5-yr (cfs)	100-yr (cfs)
OFF-1	44.00	5.90	25.8
EX-A	44.00	151.65	184.8
EX-B	100.00	169.04	271.5
EX-C	135.00	34.51	151.0
EX-D	185.00	40.27	176.2
EX-E	59.00	14.14	61.8
EX-F	22.00	6.65	29.1
EC12	30.30	16.67	40.3
EC11	354.00	24.40	149.5
EC10	320.00	18.40	144.7

DESIGN POINT SUMMARY TABLE

Design Point	Contributing Basins	Area (acres)	5-yr (cfs)	100-yr (cfs)
1	EX-A	44.00	87.90	179.97
2	EX-B	100.00	96.33	259.89
3	EX-C	135.00	20.06	147.43
4	EX-D	185.00	24.32	178.74
5	EX-E	59.00	8.33	61.21
6	EX-F	22.00	3.78	27.78
o1	OFF-1	44.00	4.36	32.04
10ec	EC10	320.00	18.40	144.7
11ec	EC11	354.00	24.40	149.5
12ec	EC12	30.30	16.67	40.3

0 400' 800' 1200'

SCALE: 1" = 400'

NO.	REVISION	BY	DATE

R&R ENGINEERS-SURVEYORS, INC.
1635 WEST 13TH AVENUE, SUITE 310
DENVER, COLORADO 80204
PHONE: 303-753-6730
WWW.RRENGINEERS.COM

MAYBERRY SKETCH PLAN

SITE ADDRESS: MAYBERRY, COLORADO SPRINGS
EL PASO COUNTY

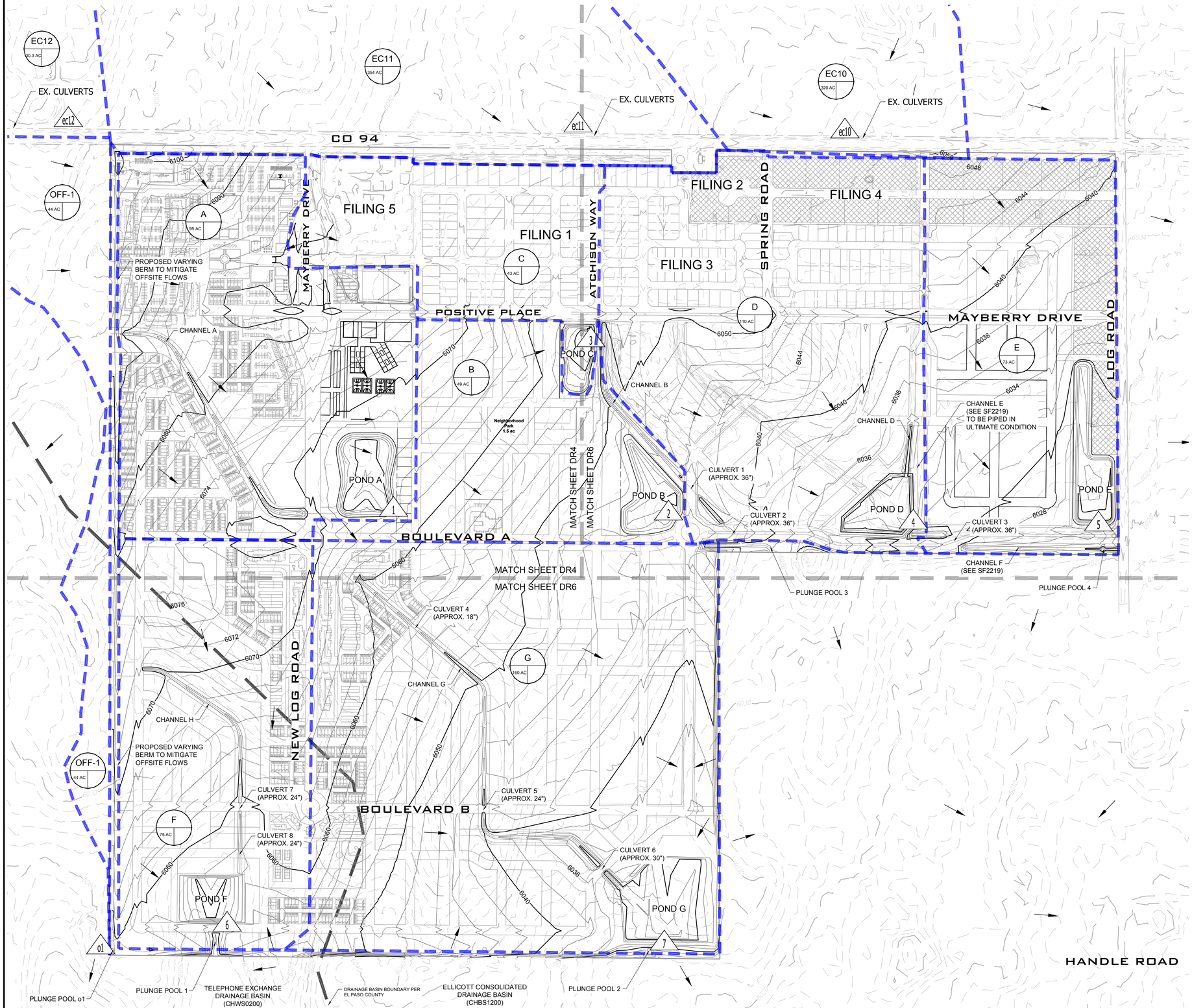
PREPARED FOR: MAYBERRY COMMUNITIES, LLC
3296 DEVINE HEIGHTS #208
COLORADO SPRINGS, CO 80922

EXHIBIT

JOB NO. MC22208
ORG. SUBM. DATE
DWN: GWH CHKD: CJD
NAME

HISTORIC
DRAINAGE PLAN

NO.
DR2



EXISTING	DESCRIPTION	PROPOSED
	PROPERTY LINE	
	EASEMENT	
	EDGE OF PAVEMENT	
	VERTICAL CURB AND GUTTER	
	SPILL GUTTER	
	TRANSITION GUTTER	
5825	MAJOR CONTOUR	5825
5822	MINOR CONTOUR	5822
	STORM SEWER PIPE	

DRAINAGE BASIN LABEL
* BASIN LABEL
** TRIBUTARY AREA (AC)

FLOW ARROW

DESIGN POINT

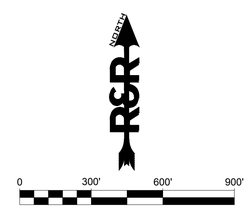
DRAINAGE AREA BOUNDARY

BASIN SUMMARY TABLE

Basin	Area (acres)	5-yr (cfs)	100-yr (cfs)
A	95.00	154.99	286.8
B	49.00	67.48	143.6
C	43.00	59.08	121.5
D	110.00	145.86	309.1
E	73.00	106.61	215.9
F	75.00	71.09	145.1
G	160.00	173.79	364.6
EC12	30.30	16.67	40.3
EC11	354.00	24.40	149.5
EC10	320.00	18.40	144.7
OFF-1	44.00	5.90	25.8

DESIGN POINT SUMMARY TABLE

Design Point	Contributing Basins	Area (acres)	5-yr (cfs)	100-yr (cfs)
1	A	95.00	147.81	273.86
2	B	49.00	64.15	136.63
3	C	43.00	56.01	115.33
4	D	110.00	138.30	293.42
5	E	73.00	101.07	204.91
6	F	75.00	70.97	145.03
7	G	160.00	166.68	350.13



NO.	REVISION	BY	DATE

R&R ENGINEERS
ENGINEERS SURVEYORS INC
R&R ENGINEERS-SURVEYORS, INC.
1635 WEST 13TH AVENUE, SUITE 310
DENVER, COLORADO 80204
PHONE: 303-753-6730
WWW.RRENGINEERS.COM

MAYBERRY SKETCH PLAN

SITE ADDRESS: MAYBERRY, COLORADO SPRINGS
EL PASO COUNTY

PREPARED FOR: MAYBERRY COMMUNITIES, LLC
3296 DEVINE HEIGHTS #208
COLORADO SPRINGS, CO 80922

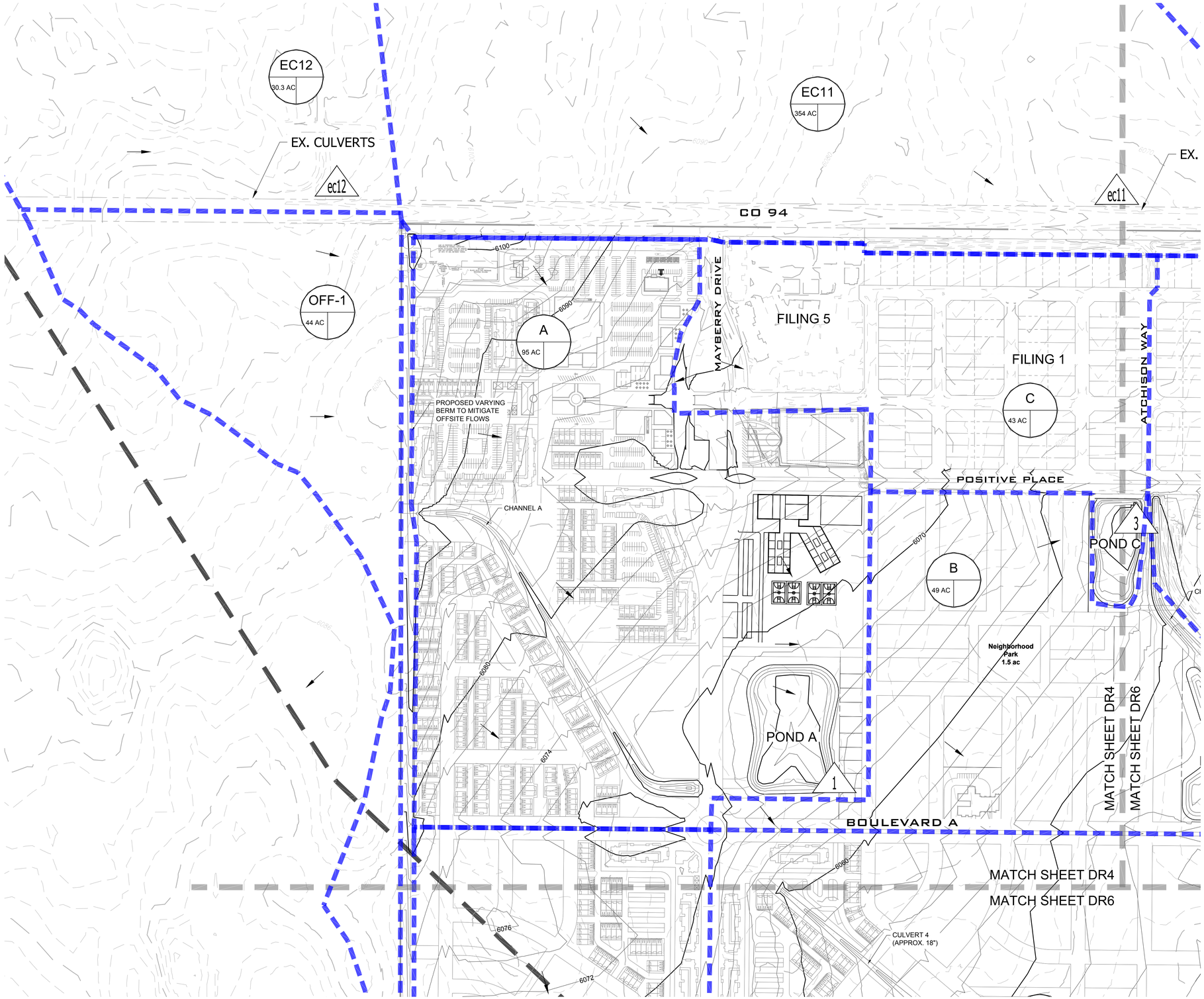
EXHIBIT

JOB NO. MC22208
ORG. SUBM. DATE
DWN: GWH CHKD: CJD
NAME

OVERALL PROPOSED DRAINAGE MAP

NO.

DR3



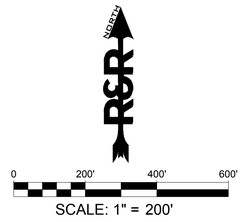
EXISTING	DESCRIPTION	PROPOSED
	PROPERTY LINE	
	EASEMENT	
	EDGE OF PAVEMENT	
	VERTICAL CURB AND GUTTER	
	SPILL GUTTER	
	TRANSITION GUTTER	
5825	MAJOR CONTOUR	5825
5822	MINOR CONTOUR	5822
	STORM SEWER PIPE	
	DRAINAGE BASIN LABEL * BASIN LABEL ** TRIBUTARY AREA (AC)	X* X**
	FLOW ARROW	
	DESIGN POINT	1
	DRAINAGE AREA BOUNDARY	

BASIN SUMMARY TABLE

Basin	Area (acres)	5-yr (cfs)	100-yr (cfs)
A	95.00	154.99	286.8
B	49.00	67.48	143.6
C	43.00	59.08	121.5
D	110.00	145.86	309.1
E	73.00	106.61	215.9
F	75.00	71.09	145.1
G	160.00	173.79	364.6
EC12	30.30	16.67	40.3
EC11	354.00	24.40	149.5
EC10	320.00	18.40	144.7
OFF-1	44.00	5.90	25.8

DESIGN POINT SUMMARY TABLE

Design Point	Contributing Basins	Area (acres)	5-yr (cfs)	100-yr (cfs)
1	A	95.00	147.81	273.86
2	B	49.00	64.15	136.63
3	C	43.00	56.01	115.33
4	D	110.00	138.30	293.42
5	E	73.00	101.07	204.91
6	F	75.00	70.97	145.03
7	G	160.00	166.68	350.13



NO.	REVISION	BY	DATE

R&R ENGINEERS-SURVEYORS, INC.
1635 WEST 13TH AVENUE, SUITE 310
DENVER, COLORADO 80204
PHONE: 303-753-6730
WWW.RRENGINEERS.COM

MAYBERRY SKETCH PLAN

SITE ADDRESS: MAYBERRY, COLORADO SPRINGS
EL PASO COUNTY

PREPARED FOR: MAYBERRY COMMUNITIES, LLC
3296 DEVINE HEIGHTS #208
COLORADO SPRINGS, CO 80922

EXHIBIT

JOB NO. MC22208
ORG. SUBM. DATE
DWN: GWH CHKD: CJD
NAME

PROPOSED DRAINAGE MAP

NO.

DR4

EC10
320 AC

EX. CULVERTS

EX. CULVERTS

ec11

ec10

FILING 1

FILING 2

FILING 3

FILING 4

SPRING ROAD

ATCHISON WAY

C
43 AC

D
110 AC

E
73 AC

MAYBERRY DRIVE

LOG ROAD

ITIVE PLACE

3
POND C

CHANNEL B

Neighborhood Park 1.5 ac

MATCH SHEET DR4

MATCH SHEET DR6

POND B
2

CULVERT 1 (APPROX. 36")

CULVERT 2 (APPROX. 36")

CHANNEL D

CHANNEL E (SEE SF2219) TO BE PIPED IN ULTIMATE CONDITION

POND D
4

CULVERT 3 (APPROX. 36")

POND E
5

CHANNEL F (SEE SF2219)

PLUNGE POOL 3

PLUNGE POOL 4

6050

6048

6044

6040

6038

6036

6034

6028

EXISTING	DESCRIPTION	PROPOSED
	PROPERTY LINE	
	EASEMENT	
	EDGE OF PAVEMENT	
	VERTICAL CURB AND GUTTER	
	SPILL GUTTER	
	TRANSITION GUTTER	
5825	MAJOR CONTOUR	5825
5822	MINOR CONTOUR	5822
	STORM SEWER PIPE	
	DRAINAGE BASIN LABEL * BASIN LABEL ** TRIBUTARY AREA (AC)	X* X**
	FLOW ARROW	
	DESIGN POINT	1
	DRAINAGE AREA BOUNDARY	

BASIN SUMMARY TABLE

Basin	Area (acres)	5-yr (cfs)	100-yr (cfs)
A	95.00	154.99	286.8
B	49.00	67.48	143.6
C	43.00	59.08	121.5
D	110.00	145.86	309.1
E	73.00	106.61	215.9
F	75.00	71.09	145.1
G	160.00	173.79	364.6
EC12	30.30	16.67	40.3
EC11	354.00	24.40	149.5
EC10	320.00	18.40	144.7
OFF-1	44.00	5.90	25.8

DESIGN POINT SUMMARY TABLE

Design Point	Contributing Basins	Area (acres)	5-yr (cfs)	100-yr (cfs)
1	A	95.00	147.81	273.86
2	B	49.00	64.15	136.63
3	C	43.00	56.01	115.33
4	D	110.00	138.30	293.42
5	E	73.00	101.07	204.91
6	F	75.00	70.97	145.03
7	G	160.00	166.68	350.13

MATCH SHEET DR4

MATCH SHEET DR6

NORTH

0 200' 400' 600'

SCALE: 1" = 200'

NO.	REVISION	BY	DATE

R&R ENGINEERS-SURVEYORS, INC.
1635 WEST 13TH AVENUE, SUITE 310
DENVER, COLORADO 80204
PHONE: 303-753-6730
WWW.RRENGINEERS.COM

MAYBERRY SKETCH PLAN

SITE ADDRESS: MAYBERRY, COLORADO SPRINGS
EL PASO COUNTY

PREPARED FOR: MAYBERRY COMMUNITIES, LLC
3296 DEVINE HEIGHTS #208
COLORADO SPRINGS, CO 80922

EXHIBIT

JOB NO. MC22208

ORG. SUBM. DATE

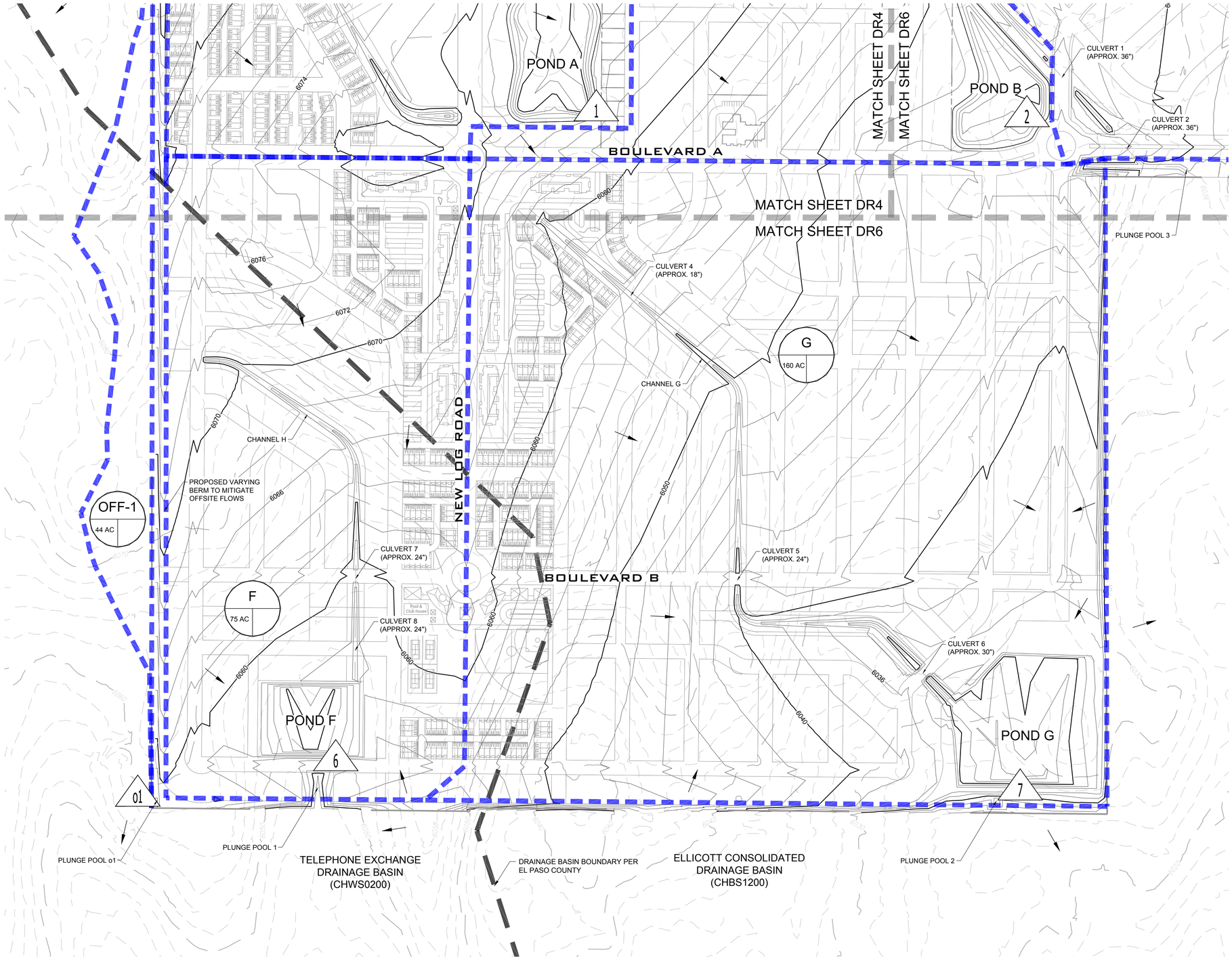
DWN: GWH CHKD: CJD

NAME

PROPOSED DRAINAGE MAP

NO.

DR5



EXISTING	DESCRIPTION	PROPOSED
5825	MAJOR CONTOUR	5825
5822	MINOR CONTOUR	5822
	STORM SEWER PIPE	
	DRAINAGE BASIN LABEL * BASIN LABEL ** TRIBUTARY AREA (AC)	X* X**
	FLOW ARROW	
	DESIGN POINT	1
	DRAINAGE AREA BOUNDARY	

BASIN SUMMARY TABLE

Basin	Area (acres)	5-yr (cfs)	100-yr (cfs)
A	95.00	154.99	286.8
B	49.00	67.48	143.6
C	43.00	59.08	121.5
D	110.00	145.86	309.1
E	73.00	106.61	215.9
F	75.00	71.09	145.1
G	160.00	173.79	364.6
EC12	30.30	16.67	40.3
EC11	354.00	24.40	149.5
EC10	320.00	18.40	144.7
OFF-1	44.00	5.90	25.8

DESIGN POINT SUMMARY TABLE

Design Point	Contributing Basins	Area (acres)	5-yr (cfs)	100-yr (cfs)
1	A	95.00	147.81	273.86
2	B	49.00	64.15	136.63
3	C	43.00	56.01	115.33
4	D	110.00	138.30	293.42
5	E	73.00	101.07	204.91
6	F	75.00	70.97	145.03
7	G	160.00	166.68	350.13

0 200' 400' 600'

SCALE: 1" = 200'

NO.	REVISION	BY	DATE

R&R ENGINEERS SURVEYORS INC

R&R ENGINEERS-SURVEYORS, INC.
1635 WEST 13TH AVENUE, SUITE 310
DENVER, COLORADO 80204
PHONE: 303-753-6730

WWW.RRENGINEERS.COM

MAYBERRY SKETCH PLAN

SITE ADDRESS: MAYBERRY, COLORADO SPRINGS
EL PASO COUNTY

PREPARED FOR: MAYBERRY COMMUNITIES, LLC
3296 DEVINE HEIGHTS #208
COLORADO SPRINGS, CO 80922

EXHIBIT

JOB NO. MC22208
ORG. SUBM. DATE
DWN: GWH CHKD: CJD
NAME

PROPOSED
DRAINAGE MAP

NO.
DR6

APPENDIX E – REFERENCED DRAINAGE REPORTS

SKP-05-005
Rev. app.

NEW DOC

MASTER DEVELOPMENT DRAINAGE PLAN
FOR
ELLICOTT TOWN CENTER

Prepared for:

Accretive Capital Partners, LLC
3655 Nobel Drive, Suite 650
San Diego, CA 92122

August 25, 2005
Revised October 31, 2005
Revised November 22, 2005

Prepared by:

JPS ENGINEERING

19 East Willamette Avenue
Colorado Springs, CO 80903
(719)-477-9429
(719)-471-0766 FAX

JPS Project No. 030502

ELLICOTT TOWN CENTER

MAJOR BASIN / HISTORIC DRAINAGE PLAN

ELLICOTT DRAINAGE BASIN (CHBS 1600)

ELLICOTT HIGHWAY

HANDLE ROAD

MIDDLE FORK BLACK SQUIRREL CREEK

LOG ROAD

ELLICOTT CONSOLIDATED DRAINAGE BASIN (CHBS 1200)

ELLICOTT TOWN CENTER PARCEL

FUTURE LOG ROAD

McDANIELS ROAD

SH 94

GIECK RANCH DRAINAGE BASIN (CHMS 0400)

HAEGLER RANCH DRAINAGE BASIN (CHMS 0200)

VIEWPOINT ESTATES PARCEL

ANTELOPE PARK RANCHETTES

TELEPHONE EXCHANGE DRAINAGE BASIN (CHWS 0200)

FUTURE BOX CULVERT CROSSING (3EA 10'X6' RCB'S)

APPROXIMATE 100-YEAR FLOODPLAIN LIMITS

WEST TRIBUTARY TO MIDDLE FORK OF BLACK SQUIRREL CREEK

EXISTING 3EA-30" CMP CULVERTS

EXISTING DETENTION POND

EXISTING 30" CMP CULVERTS (2 EA.)

EXISTING 30" CMP CULVERTS (3 EA.)

EC10 142.7 AC.

EC11 296 AC.

EC12 284 AC.

EC15 78 AC.

EC20 148 AC.

EC50 1258 AC.

OA1 66.8 AC.

OA2 257.88 AC.

OB1 33.7 AC.

A 58.20 AC.

A29 – AC.

A30 – AC.

A32 – AC.

B 183.8 AC.

C 123.04 AC.

D 154.8 AC.

BB 22.45 AC.

20 225 | 381

30 44 | 409

40 212 | 358

50 830 | 1405

1 5.0 | 34.8

RS 10000

RS 8565

RS 5584

RS 4361

RS 2115

RS 8587

RS 10969

RS 12835

RS 13635

RS 14986

LEGEND

OD1 296 AC. — DRAINAGE BASIN AREA (AC)

2 410 | 694 — DESIGN POINT 05 / 0100 (CFS)

MAJOR BASIN LINE

BASIN LINE

ORIGINAL SCALE: 1"=1000'

1000 0 1000 2000

JPS ENGINEERING

19 E. Willamette Ave.
Colorado Springs, CO
80903

PH: 719-477-9429
FAX: 719-471-0766

No	REVISION	BY	DATE

HORZ. SCALE: 1"=1000'	DRAWN: MJP
VERT SCALE: N/A	DESIGNED: JPS
SURVEYED: UP&E	CHECKED: JPS
CREATED: 12/3/00	LAST MODIFIED: 11/1/05
PROJECT NO: 090001	MODIFIED BY: MJP
SHEET: EX1	

J:\projects\090001_Ellicott\CAD\dwg\Civil\Ex1.dwg Dec 01, 2005 - 8:59am

ELLICOTT TOWN CENTER
RATIONAL METHOD - DRAINAGE CALCULATIONS

DEVELOPED FLOWS

BASIN	DESIGN POINT	AREA (AC)	C		OVERLAND LENGTH (FT)	SLOPE (%)	Tco [1] (MIN)	CHANNEL LENGTH (FT)	CONVEYANCE COEFFICIENT K	SLOPE (%)	SCS [2] VELOCITY (FT/S)	Tt [3] (MIN)	TOTAL Tc [4] (MIN)	INTENSITY [5]		PEAK FLOW	
			5-YEAR [7]	100-YEAR [7]										5-YR (IN/HR)	100-YR (IN/HR)	Q5 [6] (CFS)	Q100 [6] (CFS)
OA2		15.1	0.250	0.350									26.5	2.50	4.50	9.44	23.78
OA1		66.8	0.250	0.350	1000	0.5	60.9	2300	1.50	0.9	1.42	26.9	87.9	1.50	2.65	25.05	61.96
A		60.0	0.468	0.568			0.0	2400	1.50	1.0	1.50	26.7	26.7	1.70	3.15	47.72	107.32
OA2,OA1, A	1	141.9	0.342	0.442									141.0	1.50	2.65	72.78	166.18
EC12		30.3	0.250	0.350									33.0	2.20	3.80	16.67	40.30
OB1		33.7	0.250	0.350	700	1.4	36.2	0				0.0	36.2	2.10	3.70	17.69	43.64
B1		97.0	0.591	0.671			0.0	2000	1.50	1.1	1.57	21.2	21.2	1.50	2.65	85.96	172.41
B2		85.3	0.522	0.622			0.0	2600	1.50	1.1	1.57	27.5	27.5	1.50	2.65	66.79	140.60
EC12,OB1,B1,B2	B2	246.3	0.479	0.571									117.9	1.50	2.65	176.94	372.63
BB		20.3	0.520	0.620	1000	2.8	23.4	300	1.50	1.0	1.50	3.3	26.8	2.00	3.50	21.11	44.05
B3		59.1	0.507	0.607			0.0	1300	1.50	1.3	1.71	12.7	12.7				
EC12,OB1,B1-B3,BB	3	325.7	0.486	0.580									130.6	1.50	2.65	237.41	500.54
B4	4	4.5	0.550	0.650	300	1.0	17.1	800	1.50	0.5	1.06	12.6	29.7	2.35	4.20	5.82	12.29
EC11		296	0.250	0.350	1000	1.0	48.4	6135	1.50	1.3	1.71	59.8	108.2	1.50	2.65	111.00	274.54
C		162.7	0.522	0.615			0.0	3900	1.50	0.9	1.38	47.0	47.0	1.50	2.65	127.39	265.16
D		58.62	0.539	0.639	300	1.0	17.5	3000	2.00	0.83	1.82	27.4	44.9	1.50	2.65	47.39	99.26
EC12,EC11,OB1,B,C	5	517.3	0.368	0.466									155.2	1.50	2.65	285.56	638.84
EC10		142.7	0.250	0.350	1000	1.0	48.4	6300	1.50	1.1	1.57	66.7	115.1	1.50	2.65	53.51	132.35
E		8.4	0.475	0.575			0.0	1300	1.50	0.9	1.39	15.6	15.6	1.50	2.65	6.00	12.83
EC10,E	6	151.1	0.263	0.363									130.7	2.00	3.65	79.49	200.23

1) OVERLAND FLOW Tco = (1.87*(1.1-RUNOFF COEFFICIENT)*(OVERLAND FLOW LENGTH^(0.5)/(SLOPE^(0.333))
2) SCS VELOCITY = K * ((SLOPE(%))^0.5)
K = 0.25 FOR MEADOW
K = 1.0 FOR BARE SOIL
K = 1.5 FOR GRASS CHANNEL
K = 2.0 FOR PAVEMENT
3) CHANNEL / SWALE / GUTTER FLOW, Tt = (CHANNEL LENGTH/ SCS VELOCITY) / 60 SEC
4) Tc = Tco + Tt
*** IF TOTAL TIME OF CONCENTRATION IS LESS THAN 5 MINUTES, THEN 5 MINUTES IS USED
5) INTENSITY BASED ON I-D-F CURVE IN EL PASO COUNTY DRAINAGE CRITERIA MANUAL
6) Q = CIA
7) WEIGHTED AVERAGE C VALUES FOR COMBINED BASINS

FINAL DRAINAGE REPORT
for
MAYBERRY, COLORADO SPRINGS – FILING NO. 1A REPLAT

Prepared for:

Mayberry Communities, LLC
PO Box 675725
Rancho Santa Fe, CA 92067

November 19, 2021
Revised February 22, 2022
Revised April 8, 2022

Prepared by:

19 East Willamette Avenue
Colorado Springs, CO 80903
(719)-477-9429
www.jpsengr.com

JPS Project No. 030502
PCD File No. VR2113

MAYBERRY, COLORADO SPRINGS (fka "ELLICOTT TOWN CENTER")

HISTORIC FLOWS

									Overland Flow			Channel flow							Time of	Total	Total	Peak Flow SCS	
BASIN	DESIGN POINT	AREA (AC)	AREA (SM)	RUNOFF COEFFICIENT (C5)	CURVE No. (CN)	S	Ia	PERCENT IMPERVIOUS (%)	LENGTH (FT)	SLOPE (%)	Tco [1] (MIN)	HIGH ELEV. (FT)	LOW ELEV. (FT)	H (FT)	CHANNEL LENGTH (FT)	CHANNEL LENGTH (MI)	SLOPE (%)	Tt [1] (MIN)	Concentration Tc [2] (MIN)	Lag Time Tl [2] (HR)	Lag Time Tl [2] (MIN)	Q5 [3] (CFS)	Q100 [3] (CFS)
EC11	EC11	353.6	0.55	0.08	61	6.39	1.28	2	1000	6.0	32.0	6180	6067	113	8945	1.69	1.3%	46.37	78.34	0.78	47.00	24.4	149.5
D		154.6	0.24	0.08	61	6.39	1.28	2			0.0	6067	6028	39	3850	0.73	1.0%	26.38	26.38	0.26	15.83	20.3	141.5
EC11,D	5	508.2	0.79																104.72	1.05	62.83	**30.6**	**174.9**
EC10	EC10	317.3	0.50	0.08	61	6.39	1.28	2	1000	1.0	58.1	6140	6052	88	8100	1.53	1.1%	45.53	103.59	1.04	62.15	18.9	110.6
E		7.4	0.01	0.08	61	6.39	1.28	2			0.0	6052	6040	12	1200	0.23	1.0%	10.80	10.80	0.11	6.48	1.4	9.1
EC10,E	6	324.74	0.51																114.39	1.14	68.63	**19.1**	**111.4**

DEVELOPED FLOWS

									Overland Flow			Channel flow							Time of	Total	Total	Peak Flow SCS	
BASIN	DESIGN POINT	AREA (AC)	AREA (SM)	RUNOFF COEFFICIENT (C5)	CURVE No. (CN)	S	Ia	PERCENT IMPERVIOUS (%)	LENGTH (FT)	SLOPE (%)	Tco [1] (MIN)	HIGH ELEV. (FT)	LOW ELEV. (FT)	H (FT)	CHANNEL LENGTH (FT)	CHANNEL LENGTH (MI)	SLOPE (%)	Tt [1] (MIN)	Concentration Tc [2] (MIN)	Lag Time Tl [2] (HR)	Lag Time Tl [2] (MIN)	Q5 [3] (CFS)	Q100 [3] (CFS)
EC11	EC11	353.6	0.55	0.08	61	6.39	1.28	2	1000	6.0	32.0	6180	6067	113	8945	1.69	1.3%	46.37	78.34	0.78	47.00	24.4	149.5
C1-C3,D		159.3	0.25	0.331	77.879	2.84	0.57	44.2			0.0	6067	6028	39	3850	0.73	1.0%	26.38	26.38	0.26	15.83	225.0	456.3
EC11,D	5	512.87	0.80																104.72	1.05	62.83	226.6	461.4
EC10	EC10	317.3	0.50	0.08	61	6.39	1.28	2	1000	1.0	58.1	6140	6052	88	8100	1.53	1.1%	45.53	103.59	1.04	62.15	18.9	110.6
E		2.4	0.00	0.114	63.165	5.83	1.17	6.0			0.0	6052	6040	12	1450	0.27	0.8%	13.44	13.44	0.13	8.07	0.9	4.0
EC10,E	6	319.67	0.50																117.03	1.17	70.22	**19.0**	**111.0**

FULLY DEVELOPED FLOWS - FOR UPSTREAM EMERGENCY CONDITIONS ANALYSIS ONLY

									Overland Flow			Channel flow							Time of	Total	Total	Peak Flow SCS	
BASIN	DESIGN POINT	AREA (AC)	AREA (SM)	RUNOFF COEFFICIENT (C5)	CURVE No. (CN)	S	Ia	PERCENT IMPERVIOUS (%)	LENGTH (FT)	SLOPE (%)	Tco [1] (MIN)	HIGH ELEV. (FT)	LOW ELEV. (FT)	H (FT)	CHANNEL LENGTH (FT)	CHANNEL LENGTH (MI)	SLOPE (%)	Tt [1] (MIN)	Concentration Tc [2] (MIN)	Lag Time Tl [2] (HR)	Lag Time Tl [2] (MIN)	Q5 [3] (CFS)	Q100 [3] (CFS)
EC11	EC11	353.6	0.55	0.08	63	5.87	1.17	7	1000	6.0	32.0	6180	6067	113	8945	1.69	1.3%	46.37	78.34	0.78	47.00	49.2	196.0

DETAINED FLOWS

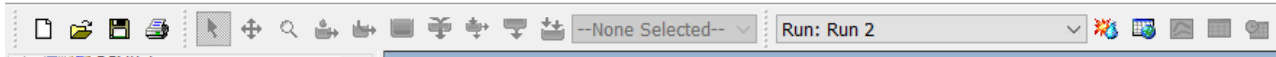
									Overland Flow			Channel flow							Time of	Total	Total	Peak Flow SCS	
BASIN	DESIGN POINT	AREA (AC)	AREA (SM)	RUNOFF COEFFICIENT (C5)	CURVE No. (CN)	S	Ia	PERCENT IMPERVIOUS (%)	LENGTH (FT)	SLOPE (%)	Tco [1] (MIN)	HIGH ELEV. (FT)	LOW ELEV. (FT)	H (FT)	CHANNEL LENGTH (FT)	CHANNEL LENGTH (MI)	SLOPE (%)	Tt [1] (MIN)	Concentration Tc [2] (MIN)	Lag Time Tl [2] (HR)	Lag Time Tl [2] (MIN)	Q5 [3] (CFS)	Q100 [3] (CFS)
EC11	EC11	353.6	0.55	0.08	61	6.39	1.28	2	1000	6.0	32.0	6180	6067	113	8945	1.69	1.3%	46.37	78.34	0.78	47.00	24.4	149.5
CULVERT EC11												6180	6067	113	8945	1.69	1.3%	46.37	46.37	0.46	27.82		
C (C1.1-C1.10)	C1.10A	44.8	0.07	0.375	81.4	2.29	0.46	51.7											35.9	0.36	21.54		
POND C1 DISCHARGE		44.8	0.07																			**1.0**	**9.7**
CHANNEL C1												6048	6028	20	2800	0.53	0.7%	23.61	23.61	0.24	14.17		
REACH EC11												6180	6028	152	11745	2.22	1.3%	56.66	56.66	0.57	34.00		
C2,C3,D		113.2	0.18	0.329	58.2	7.18	1.44	43.1											62.6	0.63	37.56		
POND D DISCHARGE		113.2	0.18																			**1.7**	**11.4**
EC11,C,D - DETAINED	5d	511.6	0.80																			**27.1**	**170.6**

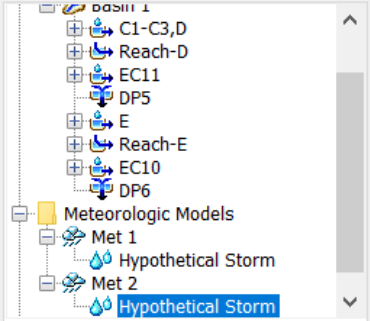
* Tc from Rational Method Calculation Spreadsheet
** Pond Discharge Flows from MHFD-Detention Calculations

1) OVERLAND FLOW Tco = (1.8*(1.1-RUNOFF COEFFICIENT)*(OVERLAND FLOW LENGTH^(0.5)/(SLOPE^(0.333))
2) TRAVEL TIME, Tt = ((11.9*L^3)/H)^(0.385)
3) Tc = Tco + Tt
4) SCS LAG TIME, Tl = 0.6 * Tt
5) PEAK FLOWS CALCULATED BY HEC-HMS 4.8 (TYPE 2 STORM; 5-YR; 24-HR RAINFALL = 2.6 IN; 100-YR; 24-HR RAINFALL = 4.4 IN)

HEC-HMS 4.3 [G:\jpsprojects\030502.etc\ETC_D\ETC_D.hms]

File Edit View Components GIS Parameters Compute Results Tools Help





Components Compute Results

Hypothetical Storm

Met Name: Met 2

Method: SCS Type 2

*Point Depth (IN) 2.6

Area Reduction: --None--

Global Summary Results for Run "Run 2"

Project: ETC_D Simulation Run: Run 2

Start of Run: 01Jan3000, 01:00 Basin Model: Basin 1
End of Run: 02Jan3000, 01:30 Meteorologic Model: Met 2
Compute Time: 10Sep2019, 21:18:23 Control Specifications: Control 1

Show Elements: All Elements Volume Units: IN AC-FT

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
EC11	0.55	24.4	01Jan3000, 13:52	7.9
Reach-D	0.55	24.4	01Jan3000, 14:07	7.8
C1-C3,D	0.25	225.0	01Jan3000, 13:08	21.6
DP5	0.80	226.6	01Jan3000, 13:08	29.4
EC10	0.50	18.9	01Jan3000, 14:13	7.1
Reach-E	0.50	18.9	01Jan3000, 14:19	7.0
E	0.00	0.9	01Jan3000, 13:04	0.1
DP6	0.50	19.0	01Jan3000, 14:18	7.1

NOTE 40043: The basin model "Basin 1" contains 2 elements with no downstream connection: DP5, DP6
NOTE 40043: The basin model "Basin 1" contains 2 elements with no downstream connection: DP5, DP6
NOTE 15301: Began computing simulation run "Run 1" at time 10Sep2019, 21:12:10.
NOTE 20364: Found no parameter problems in meteorologic model "Met 1".
NOTE 40040: The basin model contains 2 outlets: DP5, DP6
NOTE 40049: Found no parameter problems in basin model "Basin 1".
NOTE 41743: Initial abstraction ratio for subbasin "EC11" is 0.2002.
NOTE 41743: Initial abstraction ratio for subbasin "C1-C3,D" is 0.2007.
NOTE 41743: Initial abstraction ratio for subbasin "EC10" is 0.2002.
NOTE 41743: Initial abstraction ratio for subbasin "E" is 0.2006.
NOTE 42413: Unit hydrograph volume for subbasin "EC11" is 1.0000 in.
NOTE 42413: Unit hydrograph volume for subbasin "C1-C3,D" is 1.0000 in.
NOTE 42413: Unit hydrograph volume for subbasin "EC10" is 1.0000 in.
NOTE 42413: Unit hydrograph volume for subbasin "E" is 1.0000 in.
NOTE 15302: Finished computing simulation run "Run 1" at time 10Sep2019, 21:12:11.
NOTE 40043: The basin model "Basin 1" contains 2 elements with no downstream connection: DP5, DP6
NOTE 40043: The basin model "Basin 1" contains 2 elements with no downstream connection: DP5, DP6
NOTE 15301: Began computing simulation run "Run 2" at time 10Sep2019, 21:18:23.
NOTE 20364: Found no parameter problems in meteorologic model "Met 2".
NOTE 40040: The basin model contains 2 outlets: DP5, DP6
NOTE 40049: Found no parameter problems in basin model "Basin 1".
NOTE 41743: Initial abstraction ratio for subbasin "EC11" is 0.2002.
NOTE 41743: Initial abstraction ratio for subbasin "C1-C3,D" is 0.2007.
NOTE 41743: Initial abstraction ratio for subbasin "EC10" is 0.2002.
NOTE 41743: Initial abstraction ratio for subbasin "E" is 0.2006.
NOTE 42413: Unit hydrograph volume for subbasin "EC11" is 1.0000 in.
NOTE 42413: Unit hydrograph volume for subbasin "C1-C3,D" is 1.0000 in.
NOTE 42413: Unit hydrograph volume for subbasin "EC10" is 1.0000 in.

HEC-HMS 4.3 [G:\jpsprojects\030502.etc\ETC_D\ETC_D.hms]

File Edit View Components GIS Parameters Compute Results Tools Help

--None Selected-- Run: Run 1

ETC_D
- Basin Models
  - Basin 1
    - C1-C3,D
    - Reach-D
    - EC11
    - DP5
    - E
    - Reach-E
    - EC10
    - DP6
- Meteorologic Models
  - Met 1
    - Hypothetical Storm

Components Compute Results

Hypothetical Storm

Met Name: Met 1

Method: SCS Type 2

*Point Depth (IN) 4.4

Area Reduction: --None--

Global Summary Results for Run "Run 1"

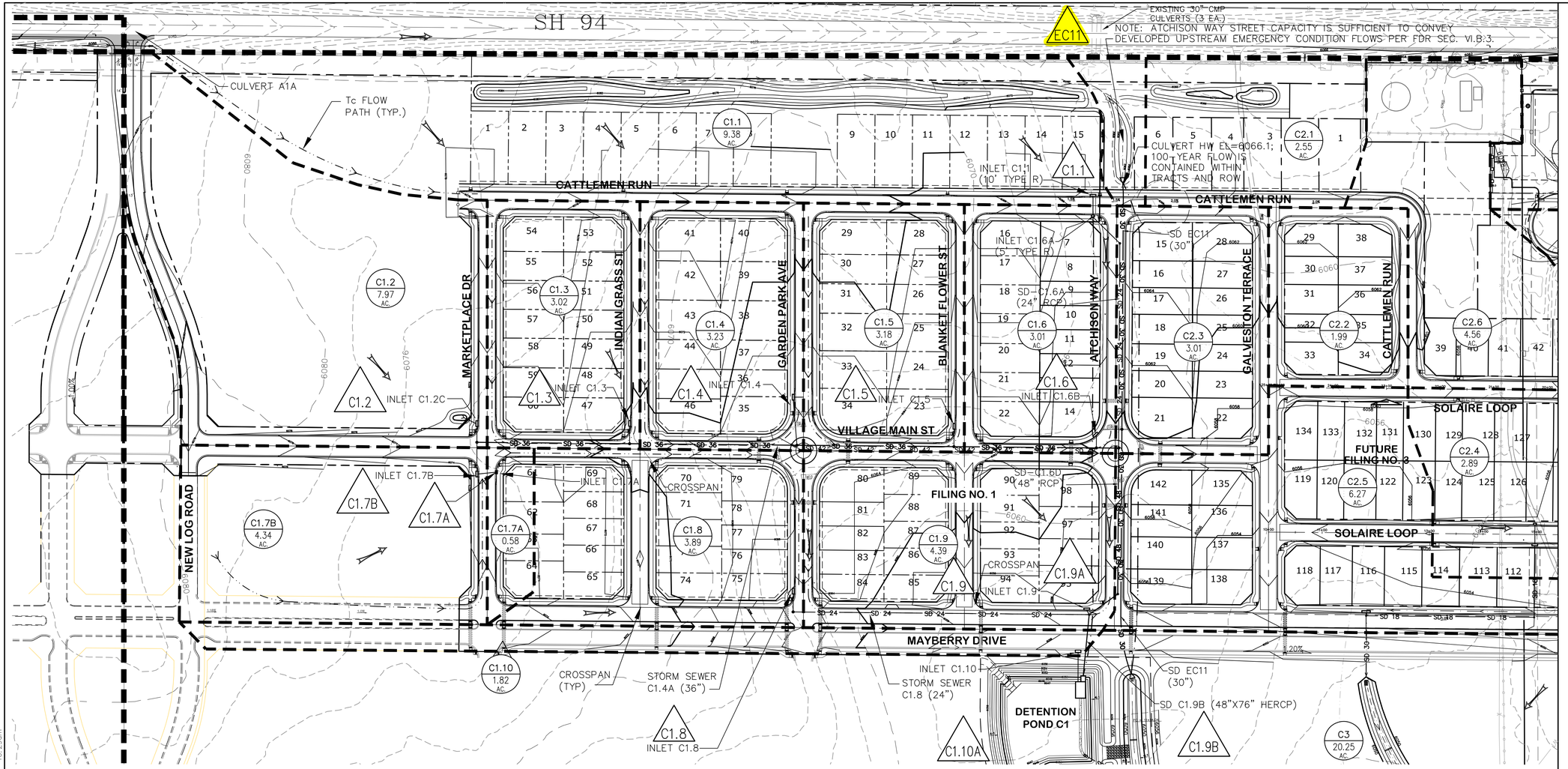
Project: ETC_D Simulation Run: Run 1

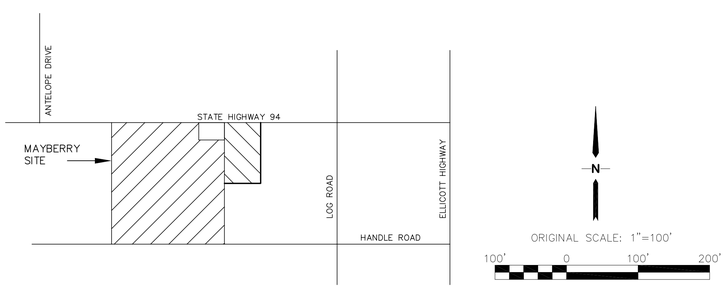
Start of Run: 01Jan3000, 01:00 Basin Model: Basin 1
End of Run: 02Jan3000, 01:30 Meteorologic Model: Met 1
Compute Time: 10Sep2019, 21:12:10 Control Specifications: Control 1

Show Elements: All Elements Volume Units: IN AC-FT

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
EC11	0.55	149.5	01Jan3000, 13:46	31.6
Reach-D	0.55	149.5	01Jan3000, 14:01	31.4
C1-C3,D	0.25	456.3	01Jan3000, 13:08	42.3
DP5	0.80	461.4	01Jan3000, 13:08	73.7
EC10	0.50	110.6	01Jan3000, 14:04	28.5
Reach-E	0.50	110.6	01Jan3000, 14:10	28.4
E	0.00	4.0	01Jan3000, 13:02	0.3
DP6	0.50	111.0	01Jan3000, 14:10	28.7

NOTE 42413: Unit hydrograph volume for subbasin "D" is 1.0000 in.
NOTE 42413: Unit hydrograph volume for subbasin "EC11" is 1.0000 in.
NOTE 42413: Unit hydrograph volume for subbasin "E" is 1.0000 in.
NOTE 42413: Unit hydrograph volume for subbasin "EC10" is 1.0000 in.
NOTE 15302: Finished computing simulation run "Run 2" at time 10Sep2019, 20:56:09.
NOTE 40043: The basin model "Basin 1" contains 2 elements with no downstream connection: DP5, DP6
NOTE 40043: The basin model "Basin 1" contains 2 elements with no downstream connection: DP5, DP6
NOTE 40043: The basin model "Basin 1" contains 2 elements with no downstream connection: DP5, DP6
NOTE 10022: Begin copying project "ETC-H" to directory "G:\jpsprojects\030502.etc\ETC_D" at time 10Sep2019, 21:04:34.
NOTE 10187: Closed project "ETC-H" at time 10Sep2019, 21:04:35.
NOTE 10023: Finished copying project "ETC_D" to directory "G:\jpsprojects\030502.etc\ETC_D" at time 10Sep2019, 21:04:36.
NOTE 10181: Opened control specifications "Control 1" at time 10Sep2019, 21:05:25.
NOTE 40043: The basin model "Basin 1" contains 2 elements with no downstream connection: DP5, DP6
NOTE 40043: The basin model "Basin 1" contains 2 elements with no downstream connection: DP5, DP6
NOTE 40043: The basin model "Basin 1" contains 2 elements with no downstream connection: DP5, DP6
NOTE 40043: The basin model "Basin 1" contains 2 elements with no downstream connection: DP5, DP6
NOTE 40043: The basin model "Basin 1" contains 2 elements with no downstream connection: DP5, DP6
NOTE 15301: Began computing simulation run "Run 1" at time 10Sep2019, 21:12:10.
NOTE 20364: Found no parameter problems in meteorologic model "Met 1".
NOTE 40040: The basin model contains 2 outlets: DP5, DP6
NOTE 40049: Found no parameter problems in basin model "Basin 1".
NOTE 41743: Initial abstraction ratio for subbasin "EC11" is 0.2002.
NOTE 41743: Initial abstraction ratio for subbasin "C1-C3,D" is 0.2007.
NOTE 41743: Initial abstraction ratio for subbasin "EC10" is 0.2002.
NOTE 41743: Initial abstraction ratio for subbasin "E" is 0.2006.
NOTE 42413: Unit hydrograph volume for subbasin "EC11" is 1.0000 in.
NOTE 42413: Unit hydrograph volume for subbasin "C1-C3,D" is 1.0000 in.
NOTE 42413: Unit hydrograph volume for subbasin "EC10" is 1.0000 in.





VICINITY MAP
NTS

SUMMARY HYDROLOGY TABLE

DESIGN POINT	Q5 (CFS)	Q100 (CFS)
EC11	24.4	149.5
C1.1	5.4	18.0
C1.2	16.9	35.9
C1.3	5.9	14.3
C1.4	6.3	15.3
C1.5	6.2	15.6
C1.6	3.8	9.4
C1.7A	1.1	2.7
C1.7B	8.2	17.3
C1.8	7.5	18.4
C1.9A	13.7	33.3
C1.9B	35.7	87.0
C1.10A	37.2	90.6

LEGEND:

- PROPERTY LINES
- DRAINAGE BASIN BOUNDARY
- SUB-BASIN BOUNDARY
- PROPOSED FLOW DIRECTION ARROW
- 5 — DESIGN POINT
- OA1 / 66.8 AC. — DEVELOPED BASIN DESIGNATION / BASIN AREA (ACRES)
- 6490 — EXISTING CONTOURS
- 6490 — PROPOSED CONTOURS
- 1.5% — PROPOSED STREET PROFILE GRADE

MAYBERRY, COLORADO SPRINGS - FILING NO. 1

FILING NO. 1
DEVELOPED DRAINAGE PLAN

JPS ENGINEERING
19 E. Willamette Ave.
Colorado Springs, CO 80903
PH: 719-477-9429
FAX: 719-471-0766
www.jpsengr.com

CALL UTILITY NOTIFICATION CENTER OF COLORADO
1-800-922-1987
CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES.

NO.	REVISION	BY	DATE

HORZ. SCALE:	1"=100'
VERT. SCALE:	N/A
SURVEYED:	RAMPART
CREATED:	12/03/00
PROJECT NO:	090001
DRAWN:	BJJ
DESIGNED:	JPS
CHECKED:	JPS
LAST MODIFIED:	4/7/22
MODIFIED BY:	JPS

SHEET: **D2.1**

G:\Users\Owner\Dropbox\jpsprojects\090001 Ellicott TFC\dwg\Civil\02-1.DWG Apr 08, 2022 - 10:29am

FINAL DRAINAGE REPORT

FOR

MAYBERRY, COLORADO SPRINGS – FILING NO. 3

PREPARED FOR:

COLORADO SPRINGS MAYBERRY, LLC
3296 DEVINE HEIGHTS #208
COLORADO SPRINGS, CO 80922

PREPARED BY:

R & R ENGINEERS - SURVEYORS, INC.
1635 W. 13TH AVE, SUITE 310
DENVER, CO 80204
CONTACT: CLIF DAYTON, P.E.
(303) 753-6730

R&R JOB #MC22110
EPC PROJECT NO. SF2219

ORIGINAL SUBMITTAL: MAY 2022
2ND SUBMITTAL: SEPTEMBER 2022
3RD SUBMITTAL: JANUARY 2023
4TH SUBMITTAL: APRIL 2023

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

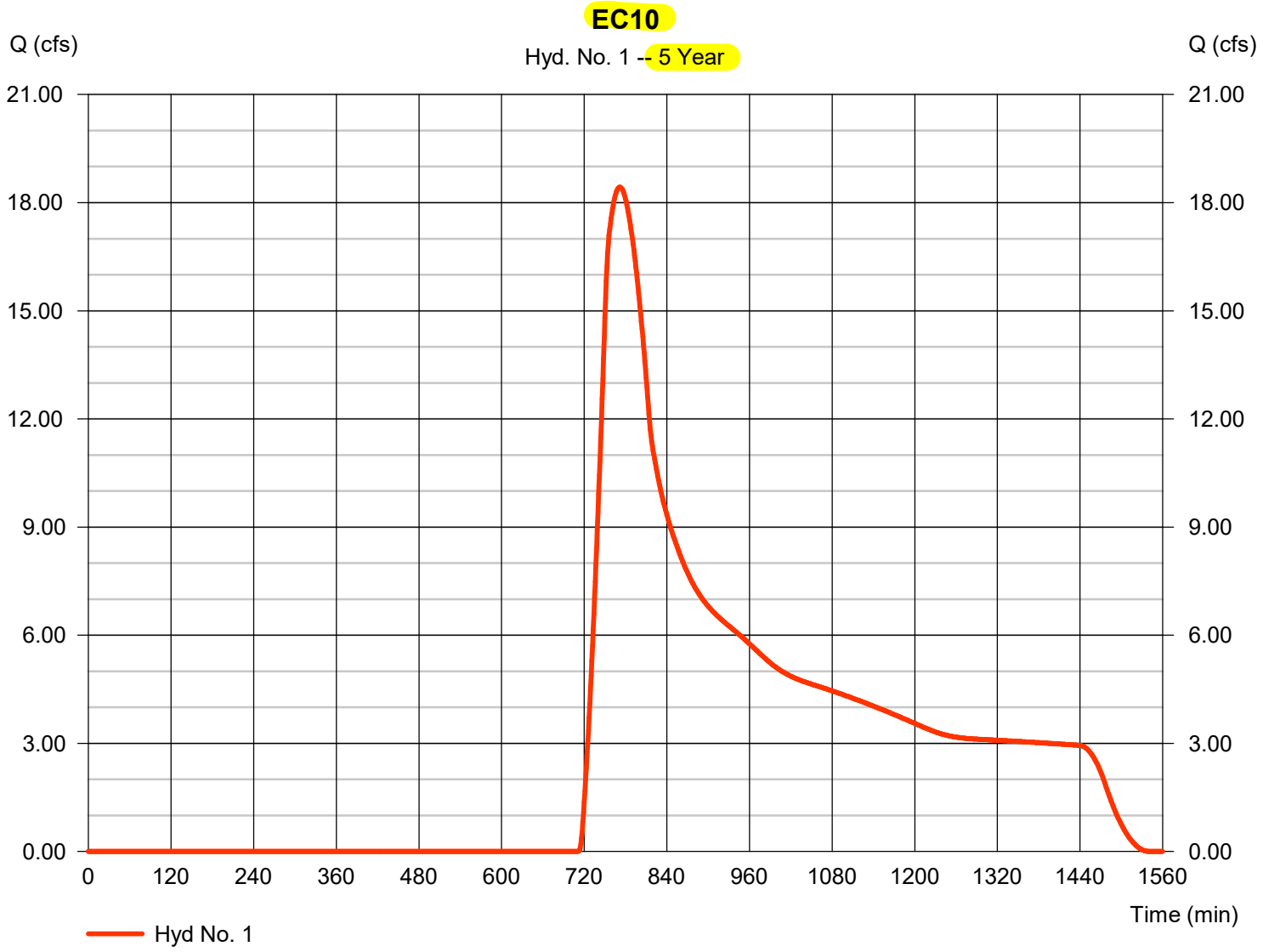
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	18.43	1	772	262,007	------	------	------	EC10
2	SCS Runoff	1.349	1	734	6,442	------	------	------	OS-1
3	SCS Runoff	8.399	1	737	76,243	------	------	------	EX-D1
4	SCS Runoff	1.367	1	728	9,340	------	------	------	EX-D2
5	Combine	9.557	1	735	85,583	3, 4	------	------	TOTAL ONSITE FLOW
6	Combine	23.73	1	755	344,692	1, 2, 3,	------	------	DP EX-5
7	SCS Runoff	6.054	1	745	62,432	------	------	------	EX-E
8	SCS Runoff	3.682	1	729	15,373	------	------	------	EX-LOG
9	Combine	30.51	1	752	422,497	6, 7, 8	------	------	DP EX-6
10	SCS Runoff	8.146	1	742	76,284	------	------	------	EX-Z
11	Combine	38.16	1	751	498,780	9, 10	------	------	DP EX-7

Hydrograph Report

Hyd. No. 1

EC10

Hydrograph type	=	SCS Runoff	Peak discharge	=	18.43 cfs
Storm frequency	=	5 yrs	Time to peak	=	772 min
Time interval	=	1 min	Hyd. volume	=	262,007 cuft
Drainage area	=	320.000 ac	Curve number	=	61
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	63.00 min
Total precip.	=	2.60 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

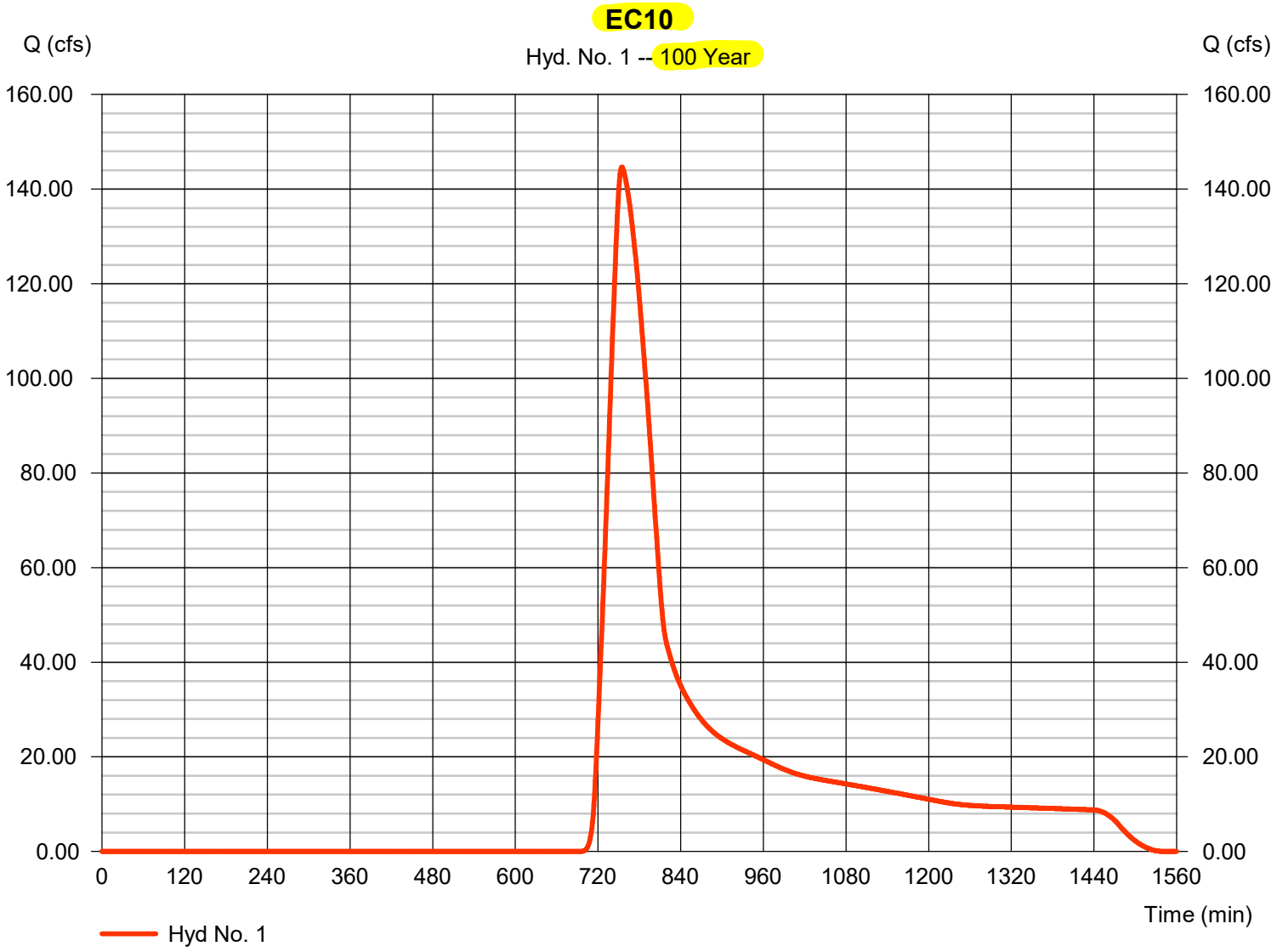
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	144.67	1	755	1,185,497	------	------	------	EC10
2	SCS Runoff	4.333	1	733	18,356	------	------	------	OS-1
3	SCS Runoff	76.23	1	732	344,975	------	------	------	EX-D1
4	SCS Runoff	12.54	1	725	42,259	------	------	------	EX-D2
5	Combine	86.19	1	731	387,234	3, 4	------	------	TOTAL ONSITE FLOW
6	Combine	183.85	1	749	1,548,829	1, 2, 3,	------	------	DP EX-5
7	SCS Runoff	53.32	1	736	282,485	------	------	------	EX-E
8	SCS Runoff	6.317	1	729	27,009	------	------	------	EX-LOG
9	Combine	231.35	1	745	1,858,321	6, 7, 8	------	------	DP EX-6
10	SCS Runoff	63.40	1	736	328,266	------	------	------	EX-Z
11	Combine	289.85	1	740	2,186,588	9, 10	------	------	DP EX-7

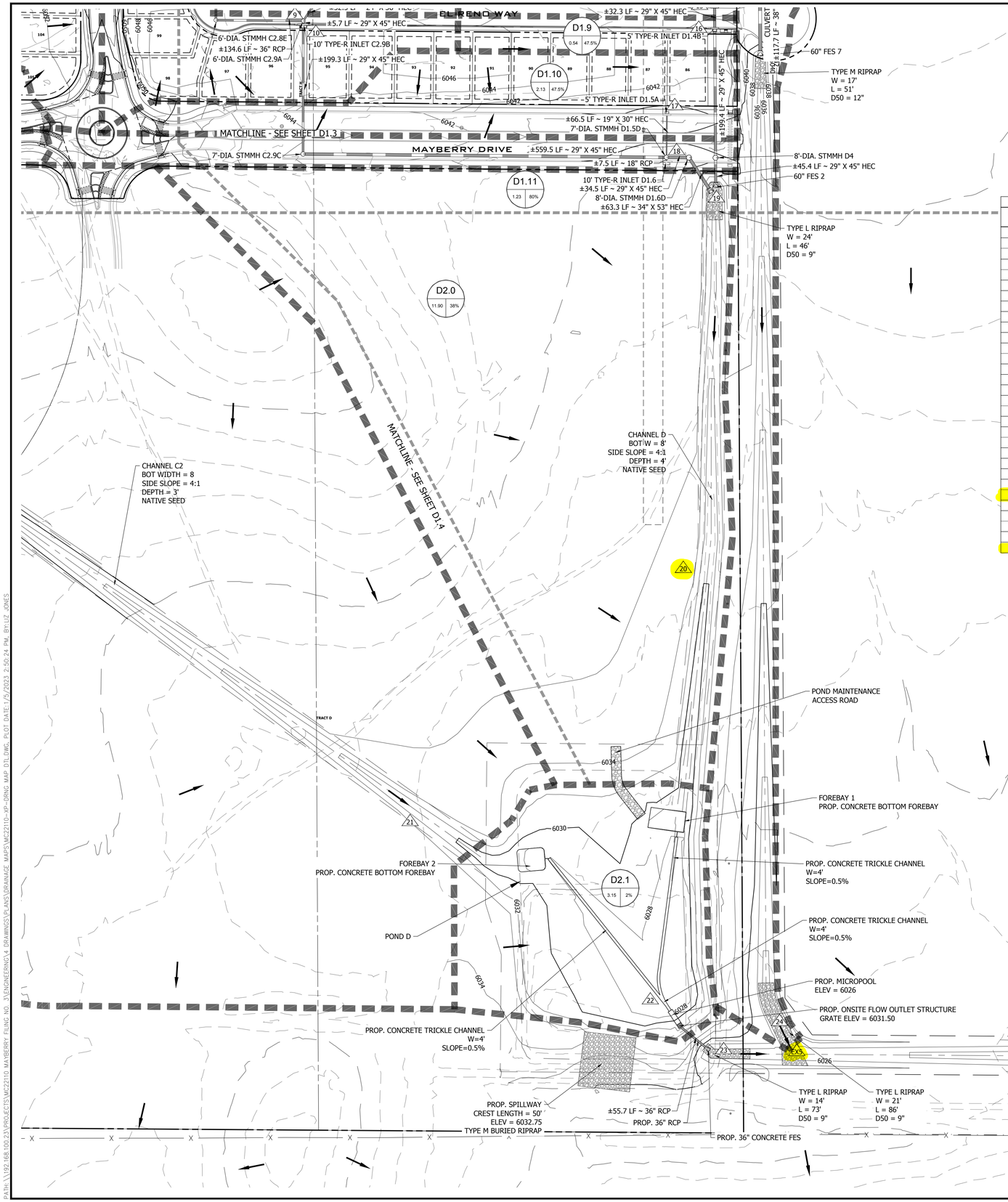
Hydrograph Report

Hyd. No. 1

EC10

Hydrograph type	=	SCS Runoff	Peak discharge	=	144.67 cfs
Storm frequency	=	100 yrs	Time to peak	=	755 min
Time interval	=	1 min	Hyd. volume	=	1,185,497 cuft
Drainage area	=	320.000 ac	Curve number	=	61
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	63.00 min
Total precip.	=	4.40 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484





CDOT NOTE: MAINTAIN EXISTING ROADSIDE DITCH DRAINAGE PATTERSN & EXTEND EXISTING CULVERTS AS REQUIRED BASED ON SH94 IMPROVEMENTS; PROVIDE RIPRAP APRONS & EROSION CONTROL FOR ALL CULVERT EXTENSIONS

NOTE: DETAILED BASIN MAPS REPRESENT THE FULL ANTICIPATED BUILD OUT OF ALL AREAS TRIBUTARY TO POND D

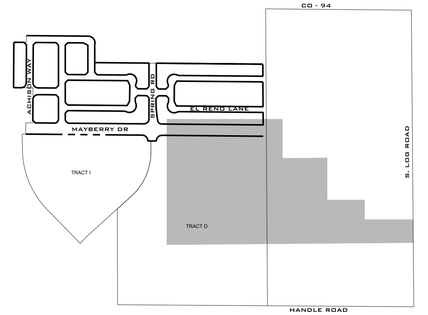
Know what's **below.** **Call** before you dig.

0 60' 120' 180'

SCALE: 1" = 80'

DESIGN POINT SUMMARY TABLE				
Design Point	Contributing Basins	Area (acres)	5-yr (cfs)	100-yr (cfs)
1	C2.1	0.8	1.1	2.7
2	DP1, C2.2	1.1	1.6	3.9
3A	C2.5	9.6	14.2	34.6
3B	C2.3, DP3A	12.5	14.9	36.2
4	C2.4, DP3B	13.7	17.4	41.1
5A	D1.12	3.4	3.8	9.3
5B	D1.14, DP5A	4.3	5.2	12.2
6	D1.2	2.6	3.4	8.3
7A	DP5B, DP6	6.9	8.0	19.0
7B	D1.13	3.1	10.9	19.9
7C	D1.1	1.7	6.7	12.2
7D	DP7B, DP7C	4.8	16.7	30.3
7E	DP7D, DP7A	11.7	19.3	39.7
8	D1.3	2.0	3.1	7.5
9	DP7, DP8	13.7	20.5	42.7
10	DP9, D1.4	17.5	24.8	52.6
11	EC10, OS-1, E1	0.0	18.9	148.3
12	D1.5	9.9	31.6	57.6
13	DP12, D1.6	11.8	30.9	57.9
14	DP13, D1.7	13.4	32.9	62.8
15	DP14, D1.8	14.7	33.6	64.9
16	DP15, D1.9	15.2	34.2	66.4
17	D1.10	2.1	3.3	8.0
18	D1.11, DP17, DP10	20.8	27.4	57.8
19	DP16, DP18	36.0	53.1	106.8
20	DP19, D2.0	47.9	57.5	121.6
21	DP4, C3.0	49.1	36.7	104.9
22	D2.1, DP20, DP21	100.2	98.5	237.8
23	POND D OUTFLOW		1.2	39.6
24	CHANNEL E OUTFLOW		17.6	138.5
EX5	DP23, DP24		18.7	177.4

BASIN SUMMARY TABLE			
Basin	Area (acres)	5-yr (cfs)	100-yr (cfs)
C2.1	0.77	1.1	2.7
C2.2	0.33	0.6	1.4
C2.3	1.81	2.1	5.2
C2.4	1.16	4.1	7.8
C2.5	9.61	14.2	34.6
C3.0	35.40	22.0	72.7
D1.1	1.73	6.7	12.2
D1.2	2.56	3.4	8.3
D1.3	2.02	3.1	7.5
D1.4	3.75	5.4	12.7
D1.5	9.88	31.6	57.6
D1.6	1.96	2.6	6.3
D1.7	1.56	2.1	5.0
D1.8	1.27	1.8	4.3
D1.9	0.54	0.9	2.1
D1.10	2.13	3.3	8.0
D1.11	1.23	4.0	7.7
D1.12	3.42	3.8	9.3
D1.13	3.07	10.9	19.9
D1.14	0.91	1.8	3.9
D2.0	11.90	10.30	27.7
D2.1	3.15	0.90	6.6
E1	3.92	0.30	2.8
OS-1	2.65	0.40	2.6
EC10	320.0	18.40	144.7



KEY MAP
N.T.S.

EXISTING	DESCRIPTION	PROPOSED
	PROPERTY LINE	
	EASEMENT	
	EDGE OF PAVEMENT	
	VERTICAL CURB AND GUTTER	
	SPILL GUTTER	
	TRANSITION GUTTER	
5825	MAJOR CONTOUR	5825
5822	MINOR CONTOUR	5822
	STORM SEWER PIPE	
	STORM SEWER MANHOLE	
	STORM SEWER INLET	
	STORM SEWER FLARED END SECTION	
	STORM SEWER HEADWALL	

DRAINAGE BASIN LABEL
* BASIN LABEL
** TRIBUTARY AREA (AC)
*** PERCENT IMPERVIOUS (%)
(FULL BUILDOUT)

C-1*
1** 50%***

FLOW ARROW

DESIGN POINT 1

DRAINAGE AREA BOUNDARY

NO.	REVISION	BY	DATE
	2ND SUBMISSION		9/1/22
	3RD SUBMISSION		01/09/23

R&R ENGINEERS-SURVEYORS, INC.
1635 WEST 13TH AVENUE, SUITE 310
DENVER, COLORADO 80204
PHONE: 303-753-6730
WWW.RRENGINEERS.COM

MAYBERRY PUD PH1 - FILING NO. 3

SITE ADDRESS: MAYBERRY, COLORADO SPRINGS
EL PASO COUNTY

PREPARED FOR: MAYBERRY COMMUNITIES, LLC
3296 DEVINE HEIGHTS #208
COLORADO SPRINGS, CO 80922

CONSTRUCTION DOCUMENTS

JOB NO. MC22110
ORG. SUBM. DATE 06/16/2022
DWN: LAO CHKD: CJD
NAME

FILING 3
DETAILED
DRAINAGE PLAN -
SOUTH EAST

NO.
D1.5