Skyview Village
A Portion of Lot 7, Filing No. 1D

April 28, 2021

Preliminary Drainage Report

Prepared For:

CHALLENGER HOMES

Prepared By:

ENERTIA CONSULTING GROUP LLC

Jeffrey M. Mohr, PE
Enertia Consulting Group, LLC
1529 Market Street, Suite 200
Denver, Colorado 80202

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SIGNATURE PAGE

Skyview Village

ENGINEER'S STATEMENT

This report and plan for the preliminary drainage design of Skyview Village was prepared by me (or under my direct supervision) in accordance with the provisions of City of Colorado Springs Drainage Criteria Manual for the owners thereof. I understand that City of Colorado Springs does not and will not assume liability for drainage facilities designed by others.

_____

Jeffrey M. Mohr, P.E. Date

Registered Professional Engineer State of Colorado No. 46411

DEVELOPER'S STATEMENT

Challenger Homes hereby certifies that the drainage facilities for Skyview Village shall be constructed according to the design presented in this report. I understand that the City of Colorado Springs does not and will not assume liability for the drainage facilities designed and/or certified by my engineer and that are submitted to the City of Colorado Springs pursuant to section 7.7.906 of the City Code; and cannot, on behalf of Skyview Village, guarantee that final drainage design review will absolve Challenger Homes and/or their successors and/or assigns of future liability for improper design. I further understand that approval of the final plat does not imply approval of my engineer's drainage design.

Challenger Homes
Name of Developer

_____
Authorized Signature Date

Mike Mason
Printed Name

Developer
Title

8605 Explorer Drive, Suite 250
Colorado Springs, CO 80920
Address

CITY OF COLORADO SPRINGS STATEMENT

Filed in accordance with section 7.7.906 of the Code of the City of Colorado Springs, 2001, as amended.

_____
For the City Engineer Date
Conditions:

GENERAL LOCATION AND DESCRIPTION

Introduction

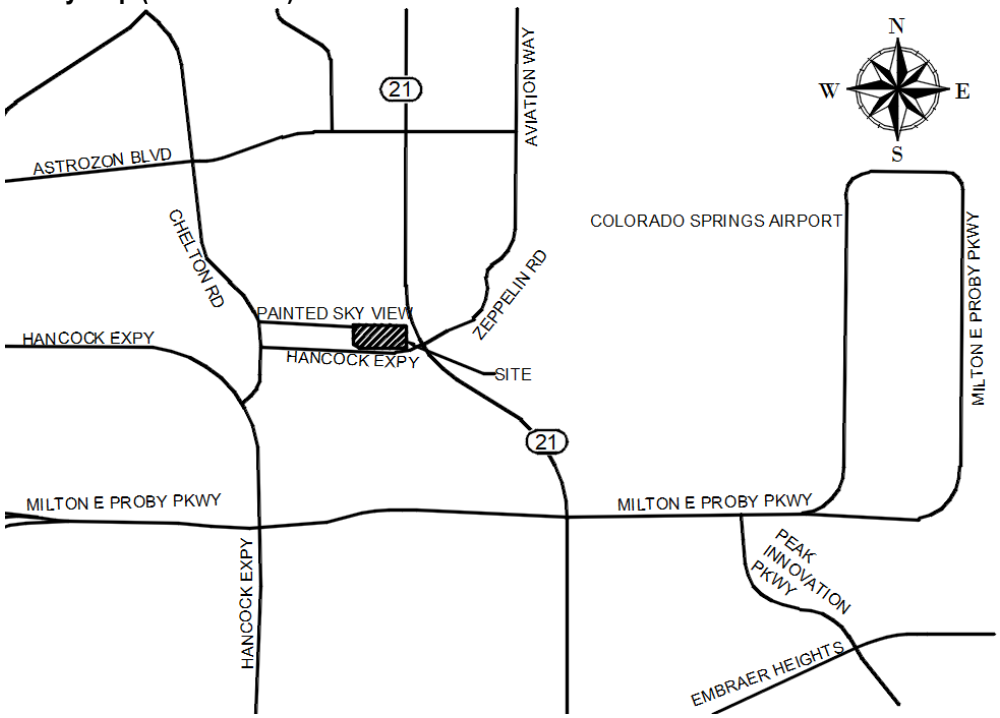
This Preliminary Drainage Report (Report) for the Challenger Homes Skyview Village Development (Project) has been prepared in association with the Project Development Plan (DP). The intent of this Report is to outline at a conceptual level the drainage patterns and infrastructure necessary to support the Project, to preliminarily size the proposed on-site detention and water quality pond and to demonstrate that the proposed improvements will not negatively impact downstream systems. A Final Drainage Report will be prepared as the Project progresses.

The methods used and information provided with this Report have been prepared in accordance with the City of Colorado Springs Drainage Criteria Manual Volume 1 and 2.

Project Location

The project is located north of Hancock Expressway and between Silver Hawk Avenue and South Powers Boulevard, El Paso County, City of Colorado Springs in the west half of section 36, township 14 south, range 66 west of the sixth principal meridian. The site has two adjacent subdivisions, Silver Hawk Subdivision to the west and My Place Subdivision to the north.

Figure 1 - Vicinity Map (Not to Scale)



Description of Property

The project site consists of 7.3-acres of undeveloped land with ground cover generally consisting of grass, weeds, several small trees, and a dirt trail. The site also has a high point at the east side and

slopes to the north, west, and south. The NRCS web soil survey, In Appendix C, shows type A soil through the entire site.

Off-site storm infrastructure includes a 42-inch storm drain, 20-foot by 9-foot box culvert, and a concrete channel. Specific locations are referenced in the Existing Conditions Map, Appendix A.

Project Description

The Project proposes a residential infill development with 73 single family detached lots, wet and dry utilities, private streets, and other infrastructure required to support the Project. Stormwater is proposed to be collected and conveyed by private storm infrastructure to a proposed pond at the southwest corner of the site. The Pond provides stormwater treatment and detention as a sand filter with full spectrum detention Pond. The Pond will release stormwater from an outlet structure at historical rates established by this Report to an existing 42-inch RCP pipe in Silver Hawk Avenue. The stormwater is ultimately conveyed to the existing box culvert in Hancock Expressway. The Emergency spillway is located on the south side of the pond and ties into the existing concrete channel.

DRAINAGE BASINS AND SUBBASINS

Major Basin Description

The Project is located in Peterson Fields Drainage Basin (and historically flows to the concrete box culvert to the south by sheet flow and the storm system in Silver Hawk Avenue. The Peterson Fields Basin outfalls to Sand Creek which in turn outfalls to Fountain Creek.

There are no on-site irrigation facilities.

The subject property lies in Zone-X which has been determined to be outside of the 0.2% annual chance floodplain as shown on the FEMA map, panel 761 of 1300 Map No. 08041C0761G, dated December 7,2018, in Appendix C.

Subbasin Description

In the existing condition, stormwater sheet flows from a high point at the eastern side of the site in all directions off-site, with the majority flowing to the west, and ultimately ends up at the existing box culvert as further described in this section. Existing condition subbasins are broken down into three on-site basins and three off-site basins as shown on the Existing Conditions Map in Appendix A. The basins are delineated based on grading and existing storm infrastructure as further described below.

Basin X1 is a 2.1-acre on-site basin that has slopes ranging from 2% to 7% and is located north of the site's high point with an imperviousness of 5%. This basin's runoff sheet flows off-site north to My Place Subdivision. Ultimately, stormwater is routed overland through My Place Subdivision to Silver Hawk Avenue. This stormwater is captured by the existing storm system and conveyed south to the existing box culvert.

Basin X2 is a 4.1-acre on-site basin that has slopes ranging from 2% to 4% and is located west of the site's high point with an imperviousness of 5%. This basin's runoff sheet flows off-site west to Silver

Hawk Avenue. This stormwater is captured by the existing storm system and conveyed south to the existing box culvert.

Basin X3 is a 1.1-acre on-site basin that has slopes ranging from 5% to 20% and is located south of the site's high point with an imperviousness of 5%. This basin's runoff sheet flows off-site south to the concrete channel which is routed to the box culvert in Hancock Expressway.

Basin E-5 is a 0.34-acre off-site basin delineated by Silver Hawk Subdivision Filing No. 1 Final Drainage Report and is located across Silver Hawk Avenue from the proposed site. Basin E-5 does not directly impact the site but will contribute to the capacity of the storm system in Silver Hawk Avenue. This basin's runoff sheet flows east to the storm system in Silver Hawk Avenue and generates 0.4 cfs in the 5-year and 1.1 cfs in the 100-year. A Copy of the Silver Hawk Subdivision Fling No. 1 Final Drainage Report Map is included in Appendix A.

Basin C is an off-site basin delineated by My Place Subdivision Final Drainage Report and is located north of Silver Hawk Avenue and encompasses the southeast 17.22-acres of the trailer park. Basin C does not directly impact the site but will contribute to the capacity of the storm system in Silver Hawk Avenue. This basin discharges 25.3 cfs south into the curb and gutter of Silver Hawk Avenue ultimately entering the storm system to the south. A Copy of the My Place Subdivision Final Drainage Report Map is included in Appendix A.

Basin XO1 is a 1.3-acre off-site basin that represents runoff generated from Hancock Expressway and Silver Hawk Avenue to the existing storm system. Basin XO1 does not directly impact the site but will contribute to the capacity of the storm system in Silver Hawk Avenue.

Table 1 below provides an existing basin summary for the 5-year (minor) and 100-year (major) events. The total flow being generated from basins X1-X3 is 11.8 cfs. The allowable release rate for the Project in the Proposed Condition is 90% of the total flow which is 10.7 cfs. Flows from X1, X2, X3, XO1, E-5, and Basin C flows to design point DPX1 and Basin X3 flows to design point DPX2. Applicable drainage report excerpts are included in Appendix A for My Place Subdivision and Silver Hawk Subdivision.

Table 1 – Basin Peak Flow Summary

BASIN SUMMARY						
Basin	**Area (acres)**	**Impervious Percentage**	**Q_5 (cfs)**	**Q_{100} (cfs)**	**Q_5 (cfs/acre)**	**Q_{100} (cfs/acre)**
X1	2.1	5%	0.6	3.2	0.3	1.5
X2	4.1	5%	1.1	6.1	0.3	1.5
X3	1.1	5%	0.5	2.6	0.4	2.4
Sum of X1-X3				11.8		
Allowable Release (90%)				10.7		
XO1	1.3	75%	3.0	6.2	2.3	4.7
E-5	REFER TO PREVIOUS DRIANAGE REPORTS FOR MY PLACE SUBDIVISION & SILVER HAWK SUBDIVISION		0.4	1.1		
BASIN C			NOT FOUND	25.3		

DRAINAGE DESIGN CRITERIA

Development Criteria Reference

The methods used, and information provided with this Report have been prepared in accordance with the following design criteria:

- City of Colorado Springs Drainage Criteria Manual Volume 1 & 2 (Last revised May 2014) and 11 policy clarifications (COCS Standards)
- Mile High Flood District's (MHFD) Urban Storm Drainage Criteria Manual, Latest Revision/Updates (MHFD Standards)

Drainage & Bridge Fees

Per the 1984 Peterson Field, the drainage fee per acre is $13,912 and the bridge fee is $641 per acre. This Site falls within the Peterson Field basin and the calculated bridge and drainage fee total $106,236.90.

Applicable Drainage Studies

The site lies next to two major subdivisions, Silver Hawk Subdivision to the west and My Place Subdivision to the east. The Final Drainage Report for Silver Hawk Subdivision references Basin E-5 and states that it generates 0.4 cfs in the 5-year and 1.1 cfs in the 100-year. The Final Drainage Report for

My Place Subdivision references Basin C and states that it generates 25.3 cfs in the 100-year. Both basins' runoff enters the storm system in Silver Hawk Avenue and shall be accounted for in the capacity of the 42-inch storm drain that connects the system to the box culver in Hancock Expressway. Pertinent information from both Project Reports is included in Appendix A of this Report.

Hydrologic Criteria

Existing and proposed conditions were analyzed hydrologically in accordance with COCS Standards and MHFD Standards for the:

- **Major Event** (100-year, 1-hour)
- **Minor Event** (5-year, 1-hour)

Hydrologic analysis criteria for the Project are discussed below and associated calculations are included in Appendix B. The rational method was used to calculate basin flows.

Table 2 includes a summary of the criteria and resources used in preparation of the hydrologic analysis.

Table 2 – Hydrologic (Rational Method) Analysis Parameters

Parameter	Value	Unit	Reference
Time of Concentration, Tc	-	min.	Sheet SF-2
Runoff Coefficient, C	-	-	COCS DCM Vol I, Chapter 6, Tbl 6-6
1-hr Point Rainfall, P1 (5-Year)	1.50	inches	COCS DCM Vol I, Chapter 6, Tbl 6-2
1-hr Point Rainfall, P1 (100-Year)	2.52	inches	COCS DCM Vol I, Chapter 6, Tbl 6-2
Rainfall Intensity, I	-	-	COCS DCM Vol I, Chapter 6, Fig 6-5
Storm Runoff, Q	-	cfs	Q = CIA

DRAINAGE FACILITY DESIGN

General Concept

The project will provide storm water detention and water quality in accordance with COCS and MHFD criteria. A sand filter with full spectrum detention is proposed to treat and release stormwater at the allowable rate. The pond has three design points which route all but one basins to the pond. The basin's flow rate released off-site is subtracted from the allowable release rate. All storm infrastructure is private and maintained by the HOA. The design points and basins are further explained below:

Design Point 1 (DP1) consists of cumulative flows from **Basins 1, 2, 7, and 8** which encompass 4.1-acres of tributary area. These basins capture runoff from Painted Sky View, Street A, and a portion of Street B. DP1's storm system is entirely private.

Design Point 2 (DP2) consists of cumulative flows from **Basins 3, 4, 5, 6, and 12** which encompass 2.3-acres of tributary area. **Basins 3, 4, 5, and 6** capture runoff from a portion of Street B, Street C, and Street D. **Basin 12** captures runoff from the rear portion of the lots adjacent to the concrete channel and S Powers Boulevard to the east. DP2's storm system is entirely private.

Design Point 3 (DP3) consists of cumulative flows from **Basin 9** which encompasses 0.24-acres. DP3's storm system is entirely private and provided to prevent stormwater from running off-site.

Basin 10 cannot be captured due to grade constraints and will be released off-site un-treated and un-detained. The total acreage of this basin is 0.02-acres. This meets State Stormwater Permit criteria which allows 20%, up to 1-acre, to be released untreated. **Basin 10** is used as an approach to Painted Sky View and releases into Silver Hawk Avenue's gutter.

Basin 11 consists 0.56-acres of tributary area and encompasses the pond and adjacent area that sheet flows to the Pond.

Table 3 below provides a proposed basin summary for the 5-year (minor) and 100-year (major) events.

Table 3 – Proposed Basin Summary

BASIN SUMMARY				
Basin	**Area (acres)**	**Impervious Percentage**	**Q_5 (cfs)**	**Q_{100} (cfs)**
1	1.06	47%	1.6	2.5
2	2.05	85%	5.9	11.4
3	0.65	75%	1.7	3.5
4	0.48	50%	0.7	1.7
5	0.35	50%	0.5	1.2
6	0.15	50%	0.2	0.3
7	0.85	75%	2.0	4.0
8	0.18	50%	0.3	0.7
9	0.24	50%	0.3	0.9
10	0.02	95%	0.1	0.2
11	0.56	10%	0.4	1.9
12	0.71	50%	1.1	2.8

Table 4 provides a design point flow summary for the 5 year (minor) and 100 year (major) at each design point. Note that for the purposes of this Preliminary Report, the basin flows were conservatively summed to obtain a total flow at each design point.

Table 4 – Design Point Flow Summary

DESIGN POINT FLOW SUMMARY				
Design Point (DP)	**Tributary Basins**	**Tributary Basin Area (acres)**	**Q_5 (cfs)**	**Q_{100} (cfs)**
DP1	1, 2, 7, 8	4.1	9.1	18.8
DP2	6, 5, 4, 3, 12	2.3	3.8	8.7
DP3	9	0.2	0.3	0.9
RELEASE OFF SITE	10	0.02	0.1	0.2

Allowable Release Rate From Pond	10.5
Allowable Release Rate (10.7 cfs) - Rate Released Off Site (0.2 cfs) =	

Pond

The proposed pond will serve as a sand filter with full spectrum detention. This includes an underdrain and an outlet structure to release storm water at an allowable 100-year rate of 10.5 cfs. The allowed 100-year release from the Pond is the maximum allowed release from the Project site, 10.7 cfs, minus the flows from Basins 10 (0.2 cfs) that pass off-site undetained and untreated. This structure is anticipated to outlet into the existing storm system in Sky Hawk Avenue and ultimately into the box culvert in Hancock Expressway. An emergency spillway is also proposed at the south side of the pond and outlets to the existing concrete channel.

A 4.5-foot high retaining wall is proposed for the south side of the pond. The wall is proposed to start at the bottom of the Pond and is needed to provide the minimum volume required.

The Pond is private and shall be owned and maintained by the HOA. Regular maintenance will include removal of debris and landscaping. The pond and outlet structure can be accessed from the north by the emergency access road. Preliminary volume calculations are included in Appendix B and the Pond was sized per a composite imperviousness of 61.5% of 7.3-acres. The calculations result in required volumes of 5,115 ft^3 for WQCV, 23,895 ft^3 for EURV, and 36,169 ft^3 for the 100-year storm.

Storm Infrastructure

The storm infrastructure in Painted Sky View is provided to collect on-site stormwater. Inlets are located to meet street capacity and spread requirements. The proposed storm infrastructure within the Project is entirely private. Collection systems are provided to collect stormwater from open space areas and to keep stormwater from passing off-site.

Flows being released from the Pond tie into the existing 42-inch storm pipe in Silver Hawk Avenue. A curb inlet is proposed to connect the Pond's outlet drain to the 42-inch pipe. The flow through the pipe in the proposed condition is 43.3 cfs and the depth is 1.50-feet in the pipe. The capacity was calculated using the peak flows from existing off-site basins and the allowable release rate from the Pond. Calculations and figures are provided in Appendix B.

Appendix A

Project Figures

SKYVIEW VILLAGE
PRELIMINARY DRAINAGE REPORT
CITY OF COLORADO SPRINGS, COLORADO
EXISTING CONDITION MAP

BASIN SUMMARY

Basin	Area (acres)	Impervious Percentage	Q_5 (cfs)	Q_{100} (cfs)	Q_5 (cfs/acre)	Q_{100} (cfs/acre)
X1	2.1	5%	0.6	3.2	0.3	1.5
X2	4.1	5%	1.1	6.1	0.3	1.5
X3	1.1	5%	0.5	2.6	0.4	2.4
Sum of X1-X3				11.8		
Allowable Release (90%)				10.7		
XO1	1.3	75%	3.0	6.2	2.3	4.7
E-5	REFER TO PREVIOUS DRIANAGE REPORTS FOR MY PLACE SUBDIVISION & SILVER HAWK SUBDIVISION				0.4	1.1
BASIN C					NOT FOUND	25.3

DPX1 — BASIN C (25.3) + BASIN E-5 (1.1) + XO1 (4.7) = 31.1 CFS

LEGEND

- PROPOSED CONDITION DRAINAGE BASIN BOUNDARY
- 5525 — PROPOSED CONTOUR
- 5525 — EXISTING CONTOUR
- PROPOSED STORM DRAIN SYSTEM
- PROPOSED SLOPE ARROW
- XX — BASIN IDENTIFICATION
- XX.X | XX% — IMPERVIOUSNESS / AREA (ACRES)
- XX — DESIGN POINT

PER MY PLACE SUBDIVISION FINAL DRAINAGE REPORT BASIN C Q_{100}=25.3 CFS

LOT 1 MY PLACE SUBDIVISION REC NO. 1041834

PROPERTY BOUNDARY, TYP.

E-5 | 0.34 | 5%

REFER TO SILVER HAWK SUBDIVISION FINAL DRAINAGE REPORT BASIN E-5: Q_5= 0.4 CFS & Q_{100}=1.1 CFS

X1 | 2.1 | 5%

EXISTING DIRT PATH, TYP.

SILVER HAWK SUBDIVISION REC NO. 204154550

SILVER HAWK AVENUE

S POWERS BOULEVARD

DPX1

EX. 42" RCP

EX. INLET

EX. CURB & GUTTER TYPE 2

X2 | 4.1 | 5%

X3 | 1.1 | 5%

UNPLATTED ASSESSED OWNED CITY OF COLORADO SPRINGS REC. NO. 6436100017

DPX2

XO1 | 1.3 | 75%

EX. 20'x9' CONCRETE BOX CULVER

EX. 42" RCP

APPROXIMATE LOCATION OF CONNECTION TO BOX CULVERT

EX. CONCRETE SWALE ROUTING FLOWS FROM HANCOCK EXPY TO THE CHANNEL

EX. 36" RCP

EX. TYPE R INLET

EX. 36" RCP

Hancock Expy

Hancock Expy

Hawk Ave

HANCOCK EXPRESSWAY

SOARING EAGLE SUBDIVISION FILING NO. 1 REC. NO. 202176019

SOARING EAGLE SUBDIVISION FILING NO. 1 REC. NO. 202176019

N

0' 25 50 100

SCALE: 1"=50'

SKYVIEW VILLAGE
PRELIMINARY DRAINAGE REPORT
CITY OF COLORADO SPRINGS, COLORADO
DEVELOPED CONDITION MAP

BASIN SUMMARY				
Basin	Area (acres)	Impervious Percentage	Q_5 (cfs)	Q_{100} (cfs)
1	1.06	47%	1.6	2.5
2	2.05	85%	5.9	11.4
3	0.65	75%	1.7	3.5
4	0.48	50%	0.7	1.7
5	0.35	50%	0.5	1.2
6	0.15	50%	0.2	0.3
7	0.85	50%	2.0	4.0
8	0.18	50%	0.3	0.7
9	0.24	50%	0.3	0.9
10	0.02	95%	0.1	0.2
11	0.56	10%	0.4	1.9
12	0.71	50%	1.1	2.8

DESIGN POINT FLOW SUMMARY				
Design Point (DP)	Tributary Basins	Tributary Basin Area (acres)	Q_5 (cfs)	Q_{100} (cfs)
DP1	1, 2, 7, 8	4.1	9.1	18.8
DP2	6, 5, 4, 3, 12	2.3	3.8	8.7
DP3	9	0.2	0.3	0.9
RELEASE OFF SITE	10	0.02	0.1	0.2

* FLOWS WERE CONSERVATIVELY ESTIMATED BY SUMMING INDIVIDUAL PEAK BASIN FLOWS

LEGEND

- PROPOSED CONDITION DRAINAGE BASIN BOUNDARY
- 5525 PROPOSED CONTOUR
- 5525 EXISTING CONTOUR
- PROPOSED STORM DRAIN SYSTEM (PUBLIC)
- PROPOSED STORM DRAIN SYSTEM (PRIVATE)
- PROPERTY BOUNDARY
- PROPOSED SLOPE ARROW
- XX / XX.X | XX% — BASIN IDENTIFICATION / IMPERVIOUSNESS / AREA (ACRES)
- XX DESIGN POINT

N

0' 20 40 80

SCALE: 1"=40'

PER MY PLACE SUBDIVISION FINAL DRAINAGE REPORT BASIN C Q_{100}=25.3 CFS

LOT 1 MY PLACE SUBDIVISION REC NO. 1041834

REFER TO SILVER HAWK SUBDIVISION FINAL DRAINAGE REPORT BASIN E-5: Q_5= 0.4 CFS & Q_{100}=1.1 CFS

SILVER HAWK SUBDIVISION REC NO. 204154550

SILVER HAWK AVENUE

SPOWERS BOULEVARD

PAINTED SKY VIEW

HANCOCK EXPRESSWAY

8 — 0.18 | 50%
1 — 1.06 | 46%
10 — 0.02 | 95%
E-5 — 0.34 | 5%
2 — 2.05 | 85%
9 — 0.24 | 50%
7 — 0.85 | 75%
3 — 0.65 | 75%
XO1 — 1.3 | 90%
6 — 0.15 | 50%
5 — 0.35 | 50%
4 — 0.48 | 50%
12 — 0.71 | 50%
11 — 0.56 | 10%

PRIVATE STORM
PROPERTY BOUNDARY, TYP.
18" PVC
TYPE R INLET
18" RCP
5' DIA. SDMH
PR 6" CURB & GUTTER PER DETAIL 6B TYPE 5
TRACT A
TRACT B
TRACT C
TRACT D
TRACT E
TRACT F
TRACT G
TRACT H
STREET A
STREET B
STREET C
STREET D
TYPE 13 VALLEY INLET
15' GRAVEL MAINTENANCE ACCESS
10' MAINTENANCE ACCESS
DP1
DP2
DP3
DP4
RETAINING WALL
OUTLET STRUCTURE
EMERGENCY SPILLWAY
EX. 42" RCP
EX. 9'x20' RCBC
EX. CONCRETE CHANNEL

POND 1
- SAND FILTER WITH FULL SPECTRUM DETENTION
- SITE ALLOWED RELEASE = 10.7 CFS
- POND ALLOWED RELEASE = 10.7 - 2.0 = 8.7 CFS
- APPROXIMATE 100YR VOL = 36,130 CF

MY PLACE SUBDIVISION DRAINAGE REPORT
BASIN C

Basin C generates 25.3 C.F.S. and outfalls into a future public street on the south boundary into a site which this developer has an option to purchase. A temporary rubble check dam will need to be constructed at this point to diffuse the flow and prevent downstream erosion. This future street will be the main entrance to the M.H.P. when Hancock Boulevard is developed.

Basin D generates 12.8 C.F.S. and discharges into Eldon Drive South. This flow is shown on the drainage report for Valerie Acres Filing No. 3 and the street has the capacity to accept the flow.

Basin E generates 1.7 C.F.S. which will sheet flow into the future Park.

Basin F and G generate 19 and 20 C.F.S. respectively into the future Hancock Road. No disposition of these flows is made at this time since they fall outside the subdivision.

DRAINAGE FACILITIES

The catchbasins and storm sewer required are shown on the attached drainage plan.

COST ESTIMATE

2	12' Catch Basins	@ $2700.00 =	$ 5,400.00
2	Manholes	@ 750.00 =	1,500.00
500	L.F. of 30" R.C.P.	@ 35.00 =	17,500.00
650	L.F. of 36" R.C.P.	@ 45.00 =	29,250.00
			$53,650.00
	Engineering and Contingency		8,047.50
			$61,697.50

PRIVATE COSTS N.R.N.

The 1983 Peterson Field Drainage Basin fees are $1755.00 per acre times 61.734 acres equals $108,343.17. The bridge fees are $181.00 per acre times 61.734 equals $11,173.85.

The developer is requesting that he be allowed to put up a letter of credit for his entire drainage fees even though his cost of facilities for this subdivision is less than the fees. Hancock Road will be the future access for this M.H.P. and the developer has an option to purchase the two sites on the north side of Hancock. If he acquires these properties, he will have an obligation to share in the cost of constructing the future 10' x 8' concrete channel. This is estimated at 1500 L.F. times $100.00 equals $150,000.00. If the developer does not assume the liability for the major drainage channel, he will be responsible for paying the cash fees due at that time.

MAJOR BASIN	SUB BASIN	AREA Planim Read	AREA MILE	BASIN LENGTH	BASIN HEIGHT	Tc	K	SOIL GROUP	DEV. TYPE	CURVE NO.	FLOW Q	FLOW qp	q/s
A		16.76	0.02618	1700	20	0.20		B	MHP	85	0.87	1080	24.6
B		16.19	0.0229	1500	22	0.19		B	MHP	85	0.87	1090	24.0
C		17.22	0.0269	1400	16	0.20		B	MHP	85	0.87	1080	25.3
D		7.35	0.0115	700	12	0.10		B	MHP	85	0.87	1280	12.8
E		1.0	0.00156	200	6	0.03		B	MHP	85	0.87	1280	1.7
F		10.5	0.01609	900	12	0.12		B	R-5	86	0.92	1260	18.7
G		7.9	0.01234	800	10	0.11		B	COMM	92	1.33	1220	20.0

HYDROLOGIC COMPUTATION – BASIC DATA

PROJ: MY PLACE M.H.P. By: JJW Date: 3-27-83

WEISS CONSULTING ENGINEERS, INC.

"MY PLACE SUBDIVISION"
DRAINAGE REPORT

REVISED COST SHEET

Basin C generates 25.3 C.F.S. and outfalls into a future public street on the south boundary into a site which this developer has an option to purchase. A temporary rubble check dam will need to be constructed at this point to diffuse the flow and prevent downstream erosion. This future street will be the main entrance to the M.H.P. when Hancock Boulevard is developed.

Basin D generates 12.8 C.F.S. and discharges into Eldon Drive South. This flow is shown on the drainage report for Valerie Acres Filing No. 3 and the street has the capacity to accept the flow.

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DRAINAGE FACILITIES

The catchbasins and storm sewer required are shown on the attached drainage plan.

COST ESTIMATE

PRIVATE COSTS N.R.N.

Public N.R.N.

2	12' Catch Basins	@ $2700.00	=	$ 5,400.00
2	Manholes	@ 750.00	=	1,500.00
500	L.F. of 30" R.C.P.	@ 35.00	=	17,500.00
650	L.F. of 36" R.C.P.	@ 45.00	=	29,250.00
				$53,650.00
	Engineering and Contingency			8,047.50
				$61,697.50

The 1983 Peterson Field Drainage Basin fees are $1755.00 per acre times ~~61.734~~ 66.381 acres equals ~~$108,343.17~~ 116,498.66. The bridge fees are $181.00 per acre times ~~61.734~~ 66.381 equals $11,173.85 12,014.96.

MY PLACE

REVISED DEVELOPMENT PLAN

DRAINAGE PLAN

SCALE: 1"=100'

100 50 0 100

JANUARY 31, 1983

EXISTING MOBILE HOME PARK

MHP

HARDY PL

HARDY DRIVE

DICKENS DRIVE

PROPOSED PARK

6' WROUGHT IRON FENCE

GATE

OPEN PLAY AREA & MANAGERS OFFICE

PRIVATE

Public Facility

SECURITY GATE

ELDON DR.

SOUTH (SECONDARY ACCESS)

VALERIE ACRES FILING NO. 3

VALERIE ACRES FILING NO. 2

VALERIE ACRES FILING NO. 1

R-1 6000

R-5 MULTI FAMILY

10.3 ACRES

PBC COMMERCIAL

7.9 ACRES

PBC COMMERCIAL

42' RADIUS TURNAROUND TEMPORARY RUBBLE CHECK DAM TO DIFFUSE FLOW

STORAGE AREA

STORAGE AREA WITH 6' HIGH SCREEN WALL

SEE AREA PLAN

POWERS BOULEVARD PROPOSED

MASON STREET

(Closed as per Powers Blvd. temporary access agreement)

EMERGENCY ACCESS

6' HIGH NOISE REDUCTION FENCE

FUTURE 8'X6' CONCRETE CHANNEL AS SHOWN ON PETERFIELD MASTER PLAN

GARRISON

GALLIE

NICKS

SAMS

BROADVIEW SUB.

A-1

KARR

SAIN

GEORGE

HANCOCK

VICINITY MAP

NOT TO SCALE

SITE

Academy Boulevard

Powers Blvd

Fountain Blvd

Chelton

Hancock

Drennan Road

1100 MASTER REPORT

4530 INFLOW

3860 OUTFLOW

MASTER REPORT

DATA:

NUMBER OF SPACES

MH	496	
RV	3	
TOTAL	499	61.73 Ac.
	8.1 du/ac	

ADDITIONAL PARKING 180 spaces

STORAGE AREA 3.34 ac.

POWERS BLVD. (Proposed) 4.66 ac.

LOTS SUBJECT TO VARIANCE (*)

LOT NO.	SQ. FT.
46	4770
52	5949.5
120	36002
367	6853
377	5826.5
392	5299.8
406	6284.3
430	6876.2
475	40627
478	36007
481 RV Lot	2100
484	36922
485	4185.2
494	5045.6
496	4472.8

ALL MH LOTS WILL PROVIDE A MINIMUM OF 3600 SQ.FT.

OWNER:

BVR

5550 NORTH UNION BOULEVARD

COLORADO SPRINGS, COLORADO 80918

~~(303) 593-1400~~

PREPARED BY:

W.K. CLARK & ASSOCIATES

5170 NORTH UNION BOULEVARD

COLORADO SPRINGS, COLORADO 80918

~~(303) 593-9440~~

REVISIONS: (CT-82-1006-103 DP)

September 21, 1982

September 30, 1982

January 31, 1983

FUTURE 10'X8' CONC CHANNEL SHOWN ON MASTER REPORT

FINAL DESIGN WILL DETERMINE LOCATION AND SIZE

BJ Weiss PE-4124 3-22-83

DRAINAGE PLAN

WEISS CONSULTING ENGINEERS, INC.

COLORADO SPRINGS, COLORADO

SILVER HAWK SUBDIVISION DRAINAGE REPORT
BASIN E-5

in Rusty Nail Point and Windrider Heights. Two 8' inlets are proposed in Rusty Nail Point at its intersection with Windrider Heights to collect a portion of the runoff from Subbasin E-3. The remainder of the Subbasin E-3 runoff as well as the Subbasin E-2 runoff will continue South in Windrider Heights to a low point just North of the Windrider Heights and Hancock Expressway intersection. D-10-R curb inlets will be located on both sides of the street at the low point with a 10' opening inlet on the East side and a 15' opening inlet on the West. The proposed curb inlets will be connected with 24" HDPE pipe to Water Quality Facility No. 3 (WQ-3), which is located at the Northwest corner of the Windrider Heights and Hancock Expressway intersection. Runoff quantities of Q_5=19.5 cfs and Q_{100}=40.5 cfs are anticipated to enter WQ-3 as estimated at Summary Point 6. The water quality overflow outlet will connect to the public 36" RCP as shown on the Drainage Plan.

Subbasin E-4 runoff (Q_5=3.0 cfs, Q_{100}=6.5 cfs) will be directed into Water Quality Facility No. 4 (WQ-4). A landscape swale situated between the rear lot lines and the proposed 10' wide concrete trail will carry the runoff to WQ-4 near the Northeast corner of the Windrider Heights and Hancock Expressway Intersection. WQ-4 is proposed sand filter basin that will have a grated inlet overflow outlet that will connect to the public 36" RCP in Windrider Heights.

The 36" RCP stub is a public storm sewer that will need to be extended through the site to Blake Drive on the North. Runoff in Blake Drive is generated from 10 acres of single family and mobile home park development to the North of this subdivision. Summary Point OS estimates the flow in Blake Drive under current drainage criteria is Q_5=28.2 cfs and Q_{100}=58.0 cfs. A 100 year collection system is proposed since there is not an adequate overflow route through the site. A 25' opening D-10-R inlet in sump condition is proposed at the end of Blake Drive to collect all off this runoff. A 36" RCP storm sewer will then extend through Painted Sky View and Windrider Heights to a proposed manhole in Hancock Expressway as shown on the Drainage Plan. A public utility and drainage easement will be provided for the storm sewer across the site.

The final portion of this Eastern half of the site is Subbasin E-5. This subbasin generates runoff of Q_5=0.4 cfs and Q_{100}=1.1 cfs from the rear half of approximately six lots. This runoff will sheet flow across a grass buffer and enter Silver Hawk Avenue. This runoff will enter an existing public 10' D-10-R inlet at a low point in Silver Hawk Avenue. No new drainage facilities are required for Subbasin E-4.

WATER QUALITY

The proposed Silver Hawk Subdivision Filing No. 1 is subject to the water quality requirements of the City of Colorado Springs Drainage Criteria Manual, Volume 2. Water quality facility locations have been identified on the Drainage Plan. The facilities will consist of a Grass Swale and Sand Filter Basins as shown on the Final Drainage Plan. Since no detention is required at this site, 100 year overflow outlets will be provided to direct runoff from large storm events into

RATIONAL METHOD FOR RUNOFF COMPUTATIONS

BASIN	AREA	GEOMETRY		C		Tc	INTENSITY,in/hr		PEAK FLOW cfs	
	(acres)	Length	Height	5 yr	100 yr	min.	5 yr	100yr	5 yr	100yr
W-1	1.02	600	8	0.52	0.6	6	4.9	8.65	2.6	5.3
W-2	1.59	600	10	0.78	0.84	5	5.1	9.07	6.3	12.1
W-3	0.34	175	2	0.45	0.54	5	5.1	9.07	0.8	1.7
W-4	1.23	540	9	0.48	0.56	5	5.1	9.07	3	6.2
W-5	1.84	665	10	0.78	0.84	5	5.1	9.07	7.3	14
W-6	0.96	450	9	0.37	0.46	5	5.1	9.07	1.8	4
E-1	0.68	760	8	0.43	0.53	8	4.5	8	1.3	2.9
E-2	2.49	1070	11	0.6	0.7	5	5.1	9.07	7.6	15.8
E-3	3.89	1020	11	0.6	0.7	5	5.1	9.07	11.9	24.7
E-4	1.35	600	10	0.43	0.53	5	5.1	9.07	3	6.5
E-5	0.34	90	1	0.25	0.35	5	5.1	9.07	0.4	1.1
OS-1	0.2	35	1	0.25	0.35	5	5.1	9.07	0.3	0.6
OS-2	0.6	35	1	0.25	0.35	5	5.1	9.07	0.8	1.9
OS-3	1.3	710	10	0.9	0.95	5	5.1	9.07	6	11.2
OS-4	1.18	745	13	0.9	0.95	5	5.1	9.07	5.4	10.2

OBERING, WURTH & ASSOCIATES
CONSULTING CIVIL ENGINEERS
PROFESSIONAL LAND SURVEYORS

SILVER HAWK SUBDIVISION
OWA PROJECT NO. 02027
September, 2003

SUMMARY POINT	Q_5, cfs	Q_{100}, cfs
SP-1	2.8	5.9
SP-2	9.3	18.2
SP-3	16.7	32.4
SP-4	18.4	36.1
SP-5	2.0	4.6
SP-6	19.5	40.5
SP-7	10.9	20.4
OS	28.2	58.0

NOTE:
100 YEAR FLOODPLAIN DOES NOT ENCROACH ON THE SILVER HAWK SUBDIVISION FILING NO. 1

LEGEND

- EXISTING 2' INTERVAL CONTOUR
- PROPOSED 2' INTERVAL CONTOUR
- SUMMARY POINT
- Q_5 = 10 cfs, Q_{100} = 20 cfs — 5-yr. FLOW, 100yr. FLOW
- A-1 / 1.00 — BASIN DESIGNATION, ACREAGE
- BASIN BOUNDARY LINE

VICINITY MAP
N.T.S.

SCALE IN FEET: 1" = 50'

NO.	DATE	REVISION	BY

SHEET TITLE: FINAL DRAINAGE PLAN

PROJECT: SILVER HAWK SUBDIVISION
COLORADO SPRINGS, COLORADO

PREPARED BY:
Obering, Wurth & Associates
Consulting Civil Engineers
Professional Land Surveyors
1015 Elkton Drive
Colorado Springs, Colorado
Phone (719) 531-6200

FIELD BOOK NO.: N/A
SCALE: 1" = 50'
DATE: 09-08-03
DESIGNED BY:
CHECKED BY: TLW
DRAWN BY: VPT
PROJECT NO.: 02027
SHEET NO.: 1
OF 1 SHEETS

PROJECT NAME: SILVER HAWK FINAL DRAINAGE PLAN

Appendix B

Hydrologic Calculations

SKYVIEW VILLAGE
HISTORIC CONDITIONS IMPERVIOUSNESS SUMMARY

Basin	Total Area	Composite Imperviousness
	(ac)	(%)
EXISTING BASIN CONDITION		
X1	2.1	**5%**
X2	4.1	**5%**
X3	1.1	**5%**
XO1	1.3	**75%**
E-5	REFER TO PREVIOUS DRIANAGE REPORTS FOR MY PLACE SUBDIVISION & SILVER HAWK SUBDIVISION	
BASIN C		

STANDARD FORM SF-2
TIME OF CONCENTRATION - HISTORIC CONDITIONS

BY: LLH
DATE: 26-Apr-21
CHECKED BY: JMM

PROJECT: SKYVIEW VILLAGE
JOB NUMBER: FINAL DRAINAGE REPORT
NRCS SOIL TYPE: TYPE A

SUB-BASIN DATA			INITIAL TIME (Ti) (COCS Eq. 6-8)			TRAVEL TIME (Tt) (COCS Eq. 6-9)					Tc URBANIZED CHECK (COCS Eq. 6-9 & 6-10)				FINAL T_c	REMARKS	NRCS SOIL TYPES									COMPOSITE		
BASIN	AREA	C_5	LENGTH	SLOPE	T_i	LENGTH	SLOPE	C_v	VEL.	T_t	COMP. T_c	TOTAL LENGTH	SLOPE	COMP. T_c			Type A/B Area (SF)	Type C/D Area (SF)	% Type A/B	% Type C/D	Check	$C_{5A/B}$	$C_{100A/B}$	$C_{5C/D}$	$C_{100C/D}$	C_5	C_{100}	Imperv.
	ac		ft	%		ft	%		fps				%		MIN													%
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)													
EXISTING BASINS																												
X1	2.1	0.11	195	2.0%	20.1	708	2.0%	7.0	1.0	11.9	32.0	NON-URBANIZED			**32.0**		91,476	0	100%	0%	100%	0.11	0.38	0.00	0.00	0.11	0.38	5%
X2	4.1	0.11	208	2.0%	20.8	714	2.0%	7.0	1.0	12.0	32.8	NON-URBANIZED			**32.8**		178,596	0	100%	0%	100%	0.11	0.38	0.00	0.00	0.11	0.38	5%
X3	1.1	0.11	82	2.0%	13.0	0	2.0%	7.0	1.0	0.0	13.0	NON-URBANIZED			**13.0**		47,916	0	100%	0%	100%	0.11	0.38	0.00	0.00	0.11	0.38	5%
XO1	1.3	0.54	60	2.0%	6.3	435	2.0%	20.0	2.8	2.6	8.9	NON-URBANIZED			**8.9**		56,628	0	100%	0%	100%	0.54	0.66	0.00	0.00	0.54	0.66	75%
E-5	REFER TO PREVIOUS DRIANAGE REPORTS FOR MY PLACE SUBDIVISION & SILVER HAWK SUBDIVISION																											
BAISN C																												

Equation Summary

(6) $Ti = (0.395(1.1-C5)L^{0.5}) / S^{0.33}$
(10) $V = C_v * S_w^{0.5}$
(11) Tt = Lt/(60Vt)
(12) Tc = Ti + Tt

(15) Tc = (L/180)+10

COCS Drainage Criteria Manual V1

Eq 6-8
Eq 6-9
Eq 6-16
Eq. 6-7 (Use a Time of 5 if (12) produces lesser Tc)

Eq. 6-10 (In urban catchments, choose the lesser of (12) and (15))

COCS Manual V1 - Table 6-7. Conveyance Coefficient, C_v

Type of Land Surface	*Conveyance Factor , C_v*
Heavy meadow	2.5
Tilage/Field	5
Riprap (not buried)	6.5
Short Pasture and Lawns	7
Nearly Bare Ground	10
Grassed Waterway	15
Paved Areas	20

STANDARD FORM SF-3
PEAK BASIN RUNOFF CALCULATIONS - HISTORIC CONDITIONS
(RATIONAL METHOD PROCEDURE)

CALCULATED BY: LLH
DATE: 26-Apr-21
CHECKED BY: JMM

P_1= 1.50

PROJECT: SKYVIEW VILLAGE
JOB NUMBER: FINAL DRAINAGE REPORT
DESIGN STORM: 5-YEAR

DIRECT RUNOFF								TOTAL RUNOFF						OVERLAND			TRAVEL TIME		REMARKS
DESIGN	BASIN	AREA	C	tc	CA	I	Q	TC	CA	I	Q	AREA	C	K	Slope	Velocity	Length	TT	
X1	X1	2.1	0.11	32.0	0.23	2.4	0.6												
X2	X2	4.1	0.11	32.8	0.45	2.3	1.1												
X3	X3	1.1	0.11	13.0	0.12	3.7	0.5												
XO1	XO1	1.3	0.54	8.9	0.70	4.3	3.0												
E-5	REFER TO PREVIOUS DRIANAGE REPORTS FOR MY PLACE SUBDIVISION & SILVER HAWK SUBDIVISION						0.4												
BASIN C							NOT FOUND												

STANDARD FORM SF-3
PEAK BASIN RUNOFF CALCULATIONS - HISTORIC CONDITIONS
(RATIONAL METHOD PROCEDURE)

CALCULATED BY: LLH
DATE: 26-Apr-21
CHECKED BY: JMM

P_1= 2.52

PROJECT: SKYVIEW VILLAGE
JOB NUMBER: DRAINAGE REPORT
DESIGN STORM: 100-YEAR

DIRECT RUNOFF								TOTAL RUNOFF						OVERLAND			TRAVEL TIME		REMARKS
DESIGN	BASIN	AREA	C	tc	CA	I	Q	TC	CA	I	Q	AREA	C	K	Slope	Velocity	Length	TT	
X1	X1	2.1	0.38	32.0	0.79	4.0	3.2												
X2	X2	4.1	0.38	32.8	1.54	3.9	6.1												
X3	X3	1.1	0.38	13.0	0.41	6.3	2.6												
XO1	XO1	1.3	0.66	8.9	0.85	7.2	6.2												
E-5	REFER TO PREVIOUS DRIANAGE REPORTS FOR MY PLACE SUBDIVISION & SILVER HAWK SUBDIVISION						1.1												
BASIN C							25.3												

BASIN SUMMARY						
Basin	**Area (acres)**	**Impervious Percentage**	**Q_5 (cfs)**	**Q_{100} (cfs)**	**Q_5 (cfs/acre)**	**Q_{100} (cfs/acre)**
X1	2.1	5%	0.6	3.2	0.3	1.5
X2	4.1	5%	1.1	6.1	0.3	1.5
X3	1.1	5%	0.5	2.6	0.4	2.4
Sum of X1-X3				11.8		
Allowable Release (90%)				10.7		
XO1	1.3	75%	3.0	6.2	2.3	4.7
E-5	REFER TO PREVIOUS DRIANAGE REPORTS FOR MY PLACE SUBDIVISION & SILVER HAWK SUBDIVISION		0.4	1.1		
BASIN C			NOT FOUND	25.3		

SKYVIEW VILLAGE
DEVELOPED CONDITIONS IMPERVIOUSNESS SUMMARY

Basin	Total Area	Paved	Lawns	Walks	Roofs	Composite Imperviousness
	(ac)	(ac)	(ac)	(ac)	(ac)	(%)
PROPOSED ON-SITE BASIN CONDITION						
1	1.06	0.00	0.53	0.16	0.37	46.5%
2	2.05	0.75	0.56	0.40	0.34	85.0%
3	0.65	0.16	0.29	0.09	0.11	75.0%
4	0.48	0.15	0.17	0.06	0.09	50.0%
5	0.35	0.00	0.21	0.07	0.07	50.0%
6	0.15	0.03	0.07	0.02	0.03	50.0%
7	0.85	0.26	0.34	0.08	0.17	75.0%
8	0.18	0.00	0.11	0.02	0.04	50.0%
9	0.24	0.00	0.14	0.03	0.07	50.0%
10	0.02	0.01	0.01	0.00	0.00	95.0%
11	0.56	0.00	0.54	0.02	0.00	10.0%
12	0.71	0.00	0.42	0.12	0.17	50.0%
P1.0	**7.3**					**61.5%**

UDFCD Table 6-3. Recommended Percentage Imperviousness Values

Land Use or Surface Characteristics	*Percentage Imperviousness (%)*
Paved	100%
Roofs	90%
Walks	100%
Lawns	0%

STANDARD FORM SF-2
TIME OF CONCENTRATION - DEVELOPED CONDITIONS

BY: LLH
DATE: 26-Apr-21
CHECKED BY: JMM

PROJECT: SKYVIEW VILLAGE
JOB NUMBER: FINAL DRAINAGE REPORT
NRCS SOIL TYPE: TYPE A

SUB-BASIN DATA			INITIAL TIME (Ti) (COCS Eq. 6-8)			TRAVEL TIME (Tt) (COCS Eq. 6-9)					Tc URBANIZED CHECK (COCS Eq. 6-9 & 6-10)				FINAL T_c	REMARKS	NRCS SOIL TYPES										COMPOSITE		
BASIN	AREA ac	C_5	LENGTH ft	SLOPE %	T_i	LENGTH ft	SLOPE %	C_v	VEL. fps	T_t	COMP. T_c	TOTAL LENGTH	SLOPE %	COMP. T_c	MIN		Type A/B Area (SF)	Type C/D Area (SF)	% Type A/B	% Type C/D	Check	$C_{5A/B}$	$C_{100A/B}$	$C_{5C/D}$	$C_{100C/D}$	C_5	C_{100}	Imperv. %
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)													
1	1.06	0.33	46	2.0%	7.6	12	2.0%	7.0	1.0	0.2	7.8	58.0	2.0%	10.3	**7.8**		46,174		100%	0%	100%	0.33	0.52	0.00	0.00	0.33	0.52	47%
2	2.05	0.66	30	2.0%	3.5	807	2.0%	20.0	2.8	4.8	8.3	837.0	2.0%	14.7	**8.3**		89,298		100%	0%	100%	0.66	0.75	0.00	0.00	0.66	0.75	85%
3	0.65	0.54	33	2.0%	4.7	273	2.0%	20.0	2.8	1.6	6.3	306.0	2.0%	11.7	**6.3**		28,314		100%	0%	100%	0.54	0.66	0.00	0.00	0.54	0.66	75%
4	0.48	0.35	81.5	2.0%	9.8	228	2.0%	20.0	2.8	1.3	11.2	309.5	2.0%	11.7	**11.2**		20,909		100%	0%	100%	0.35	0.53	0.00	0.00	0.35	0.53	50%
5	0.35	0.35	55	2.0%	8.1	222	2.0%	7.0	1.0	3.7	11.8	277.0	2.0%	11.5	**11.5**		15,246		100%	0%	100%	0.35	0.53	0.00	0.00	0.35	0.53	50%
6	0.15	0.35	77	2.0%	9.6	44	2.0%	20.0	2.8	0.3	9.8	121.0	2.0%	10.7	**9.8**		6,534		100%	0%	100%	0.35	0.53	0.00	0.00	0.35	0.53	50%
7	0.85	0.54	77	2.0%	7.2	300	2.0%	20.0	2.8	1.8	8.9	377.0	2.0%	12.1	**8.9**		37,026		100%	0%	100%	0.54	0.66	0.00	0.00	0.54	0.66	75%
8	0.18	0.35	55	2.0%	8.1	127	2.0%	7.0	1.0	2.1	10.2	182.0	2.0%	11.0	**10.2**		7,841		100%	0%	100%	0.35	0.53	0.00	0.00	0.35	0.53	50%
9	0.24	0.35	48	2.0%	7.6	172	2.0%	7.0	1.0	2.9	10.5	220.0	2.0%	11.2	**10.5**		10,454		100%	0%	100%	0.35	0.53	0.00	0.00	0.35	0.53	50%
10	0.02	0.81	15	2.0%	1.6	12	2.0%	20.0	2.8	0.1	5.0	27.0	2.0%	10.2	**5.0**		871		100%	0%	100%	0.81	0.88	0.00	0.00	0.81	0.88	95%
11	0.56	0.14	30	15.0%	3.9	0	2.0%	7.0	1.0	0.0	5.0	30.0	15.0%	10.2	**5.0**		24,394		100%	0%	100%	0.14	0.40	0.00	0.00	0.14	0.40	10%
12	0.71	0.35	60	2.0%	8.5	0	2.0%	7.0	1.0	0.0	8.5	60.0	2.0%	10.3	**8.5**		30,928		100%	0%	100%	0.35	0.53	0.00	0.00	0.35	0.53	50%

Runoff coefficients derived using values from Table 6-6 of the COCS DCM V1.

Equation Summary

(6) $Ti = (0.395(1.1-C5)L^{0.5}) / S^{0.33}$	COCS Drainage Criteria Manual V1 Eq 6-8
(10) $V = C_v * S_{ave}^{0.5}$	Eq 6-9
(11) Tt = Lt/(60Vt)	Eq 6-9
(12) Tc = Ti + Tt	Eq. 6-9 (Use a Time of 5 if (12) produces lesser Tc)
(15) Tc = (L/180)+10	Eq. 6-10 (In urban catchments, choose the lesser of (12) and (15))

COCS Manual V1 - Table 6-7. Conveyance Coefficient, C_v

Type of Land Surface	*Conveyance Factor , C_v*
Heavy meadow	2.5
Tillage/Field	5
Riprap (not buried)	6.5
Short Pasture and Lawns	7
Nearly Bare Ground	10
Grassed Waterway	15
Paved Areas	20

STANDARD FORM SF-3
PEAK BASIN RUNOFF CALCULATIONS - DEVELOPED CONDITIONS
(RATIONAL METHOD PROCEDURE)

CALCULATED BY: LLH
DATE: 26-Apr-21
CHECKED BY: JMM

P_1= 1.50

PROJECT: SKYVIEW VILLAGE
JOB NUMBER: DRAINAGE REPORT
DESIGN STORM: 5-YEAR

	DIRECT RUNOFF							TOTAL RUNOFF						OVERLAND			TRAVEL TIME		
DESIGN POINT	BASIN	AREA	C	tc	CA	I	Q	TC	CA	I	Q	AREA	C	K	Slope	Velocity	Length	TT	
PROPOSED BASINS																			
CB-1.0 & 1.1	1	1.06	0.33	7.8	0.35	4.5	1.6												
	2	2.05	0.66	8.3	1.35	4.4	5.9												
AI-1.0	7	0.85	0.54	8.9	0.46	4.3	2.0												
	8	0.18	0.35	10.2	0.06	4.1	0.3												
DP1								10.2	2.22	4.1	9.1	4.14	0.54						
CB-2.0	6	0.15	0.35	9.8	0.05	4.2	0.2												
	12	0.71	0.35	8.5	0.25	4.4	1.1												
	5	0.35	0.35	11.5	0.12	3.9	0.5												
CB-2.1	4	0.48	0.35	11.2	0.17	4.0	0.7												
AI-2.0	3	0.65	0.54	6.3	0.35	4.8	1.7												
DP2								11.5	0.94	4.1	3.8	2.34	0.40						
DP3	9	0.24	0.35	10.5	0.08	4.1	0.3												
	11	0.56	0.14	5.0	0.08	5.2	0.4												
RELEASE OFF SITE	10	0.02	0.81	5.0	0.02	5.2	0.1												

STANDARD FORM SF-3
PEAK BASIN RUNOFF CALCULATIONS - DEVELOPED CONDITIONS
(RATIONAL METHOD PROCEDURE)

CALCULATED BY: LLH
DATE: 26-Apr-21
CHECKED BY: JMM

P_1= 2.52

PROJECT: FLYWHEEL EAST
JOB NUMBER: DRAINAGE REPORT
DESIGN STORM: 100-YEAR

DIRECT RUNOFF								TOTAL RUNOFF						OVERLAND			TRAVEL TIME		REMARKS
DESIGN POINT	BASIN	AREA	C	tc	CA	I	Q	TC	CA	I	Q	AREA	C	K	Slope	Velocity	Length	TT	
PROPOSED BASINS																			
CB-1.0 & 1.1	1	1.06	0.52	7.8	0.55	4.5	2.5												
	2	2.05	0.75	8.3	1.54	7.4	11.4												
AI-1.0	7	0.85	0.66	8.9	0.56	7.2	4.0												
	8	0.18	0.53	10.2	0.09	6.9	0.7												
DP1								10.2	2.74	6.9	18.8	4.14	0.66						
CB-2.0	6	0.15	0.53	9.8	0.08	4.2	0.3												
	12	0.71	0.53	8.5	0.37	7.4	2.8												
	5	0.35	0.53	11.5	0.18	6.6	1.2												
CB-2.1	4	0.48	0.53	11.2	0.25	6.6	1.7												
AI-2.0	3	0.65	0.66	6.3	0.43	8.1	3.5												
DP2								11.5	1.32	6.6	8.7	2.34	0.56						
DP3	9	0.24	0.53	10.5	0.13	6.8	0.9												
	11	0.56	0.40	5.0	0.22	8.7	1.9												
RELEASE OFF-SITE																			
RELEASE OFF SITE	10	0.02	0.88	5.0	0.02	8.7	0.2												

BASIN SUMMARY				
Basin	**Area (acres)**	**Impervious Percentage**	**Q_5 (cfs)**	**Q_{100} (cfs)**
1	1.06	47%	1.6	2.5
2	2.05	85%	5.9	11.4
3	0.65	75%	1.7	3.5
4	0.48	50%	0.7	1.7
5	0.35	50%	0.5	1.2
6	0.15	50%	0.2	0.3
7	0.85	75%	2.0	4.0
8	0.18	50%	0.3	0.7
9	0.24	50%	0.3	0.9
10	0.02	95%	0.1	0.2
11	0.56	10%	0.4	1.9
12	0.71	50%	1.1	2.8

42-inch Storm Pipe Capacity Calculation

Proposed Condition Estimation

Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Monday, Apr 26 2021

EX. 42-INCH RCP

Circular

Diameter (ft)	= 3.50
Invert Elev (ft)	= 5967.82
Slope (%)	= 1.09
N-Value	= 0.012

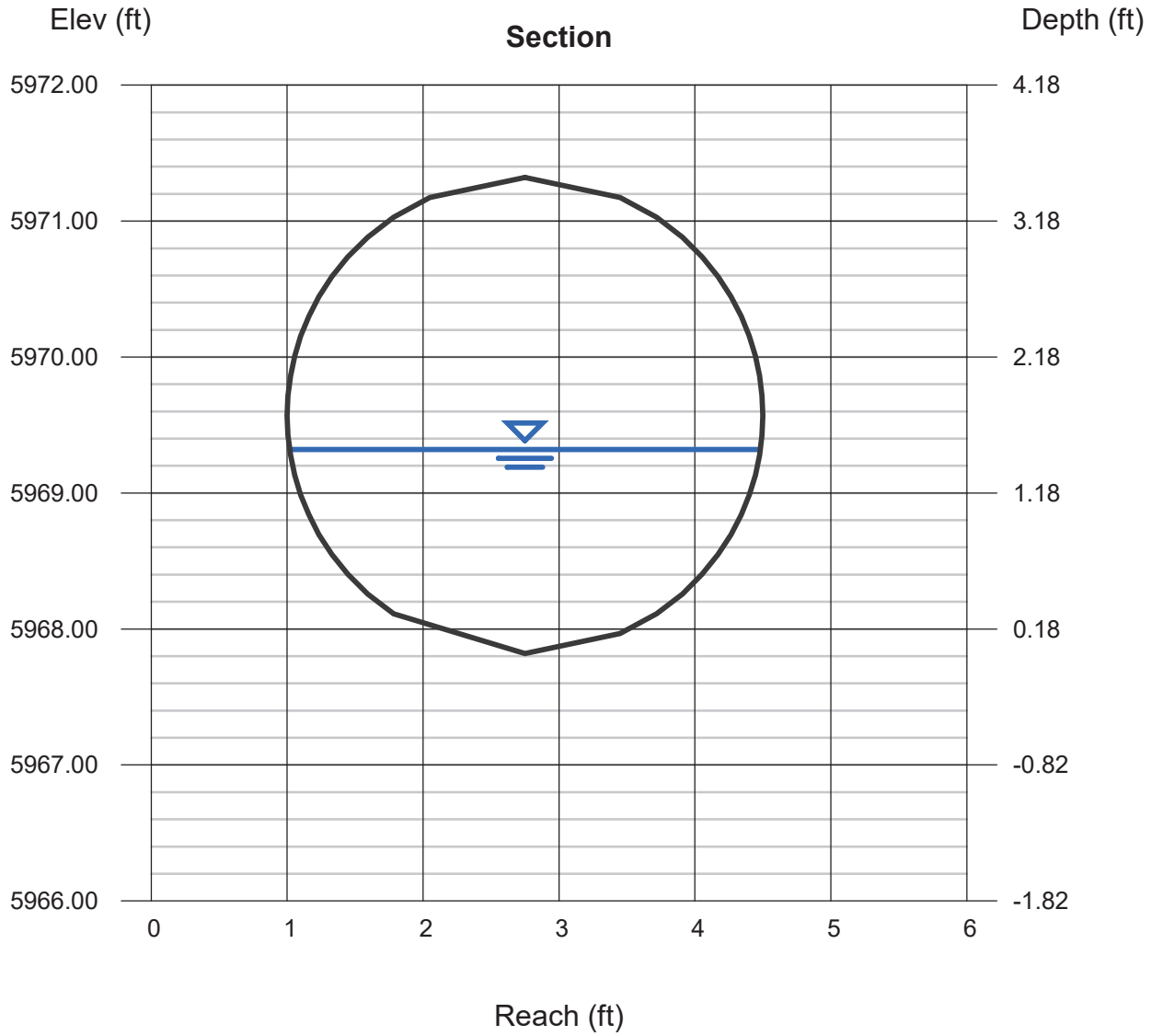
Calculations

Compute by:	Known Q
Known Q (cfs)	= 43.30

Highlighted

Depth (ft)	= 1.50
Q (cfs)	= 43.30
Area (sqft)	= 3.95
Velocity (ft/s)	= 10.95
Wetted Perim (ft)	= 5.00
Crit Depth, Yc (ft)	= 2.05
Top Width (ft)	= 3.47
EGL (ft)	= 3.36

Estimated Flow Calculation:
Basin C = 25.3 cfs
Basin E-5 = 1.1 cfs
Basin XO1 = 6.2 cfs
Allowable Release Rate = 10.7 cfs
25.3cfs + 1.1cfs + 6.2cfs + 10.7cfs = 43.3cfs



Preliminary Pond Sizing

Date: 23-Apr-21
By: JMM

Skyview Village - Preliminary Pond Sizing

(UDFCD Manual Volume 2, Chapter 12)

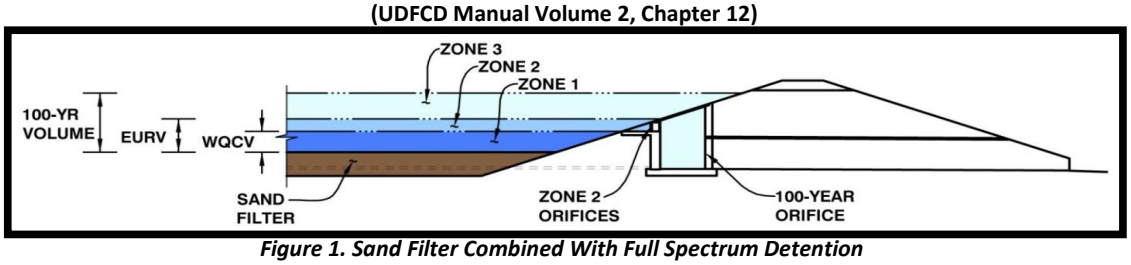


Figure 1. Sand Filter Combined With Full Spectrum Detention

SECTION 1 - POND SIZING REQUIREMENTS

(1) 100-Year Volume (Zone 1-3)

A. Sized using Full Spectrum Simplified Equations. Total basin area is less than 10-acres.

B. The 100-Yr volume and UDFCD does not recommend adding any part of the WQCV or EURV to the 100-Yr volume.

C. Designed to drain within 48 hours per FAA guidelines and requirements.

(2) Water Quality Capture Volume (Zone 1)

A. Pond C implements the sand filter concept for water quality treatment in accordance with Volume 3 of the UFCD Manual. The recommended drain time for the sand filter is 12 hours.

(3) Excess Urban Runoff Volume (Zone 1 + Zone 2)

A. Sized using Full Spectrum Simplified Equations. Total basin area is less than 10-acres.

SECTION 2 - COMPOSITE IMPERVIOUSNESS SUMMARY

Basins	Area, A (sf)	Composite Imperviousness, I	NOTES
12	317,988	61.5%	

SECTION 3 - WATER QUALITY CONTROL VOLUME SIZING

Basins	A (sf)	I (%)	WQCV (in)	V Req'd (cf)	A_f Req'd (sf)	A_f Provided (sf)	$D_{12\text{-HR}}$ (in)
12	317,988	61.5%	0.193	5,115	2,445		1.5

Equations

$WQCV = 0.8*(0.91*I^3-1.19I^2+0.78*I)$

$A_f = 0.0125*A*I$ (Minimum Required Filter Area) (UDFCD Eq. SF-2, Vol. 3, COS DCM Eq. 3-1)

$D_{12\text{-HR}} = (V/1{,}414*y^{0.41})^{0.5}$ (Orifice Diameter) (UDFCD Eq. SF-3, Vol. 3) y = 3

SECTION 4 - EXCESS URBAN RUNOFF VOLUME SIZING

Basins	Area (sf)	Imperv. (%)	A Soil (%)	B Soil (%)	C/D Soil (%)	EURV (in.)	EURV Req'd (cf)
12	317,988	61.5%	100%	0%	0%	0.90	23,895

Equations

$EURV_A = 1.68*i^{1.28}$ (Watershed Inches) UDFCD Equation 12-1

Date: 23-Apr-21
By: JMM

Skyview Village - Preliminary Pond Sizing

(UDFCD Manual Volume 2, Chapter 12)

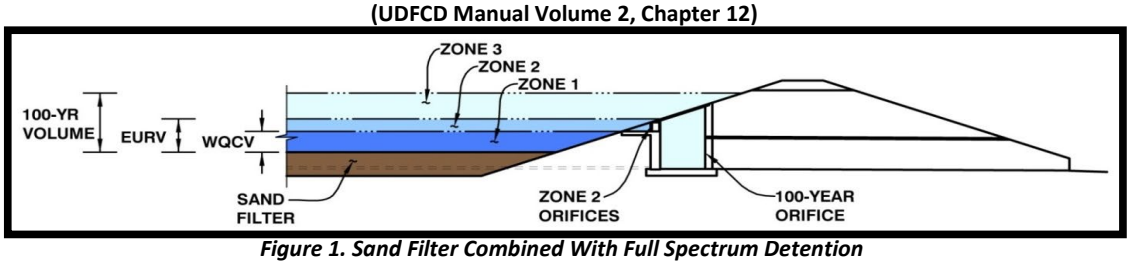


Figure 1. Sand Filter Combined With Full Spectrum Detention

SECTION 5 - 100 YEAR DETENTION SIZING

Basins	Imperv. (%)	P1 (in)	A Soil (%)	B Soil (%)	C/D Soil (%)	V_{100} (in)	V_{100} Req'd (cf)
12	61.5%	2.52	100%	0%	0%	1.37	36,196

Equations UDFCD Equation 12-4

$$V_{100}=P1[(0.806*I^{1.225}+0.109*I^{0.225})A\%+(0.412*I^{1.371}+0.371*I^{0.371})B\%+(0.341*I^{1.389}+0.398*I^{0.389})CD\%)]$$

SECTION 6 - POND SIZING SUMMARY

100-Yr Vol. =	**36,196**	**cf**
100-Yr WSE =		
EURV =	**23,895**	**cf**
EURV WSE =		
WQCV =	**5,115**	**cf**
WQCV WSE =		

Date: 23-Apr-21
By: JMM

Skyview Village - Preliminary Pond Sizing

(UDFCD Manual Volume 2, Chapter 12)

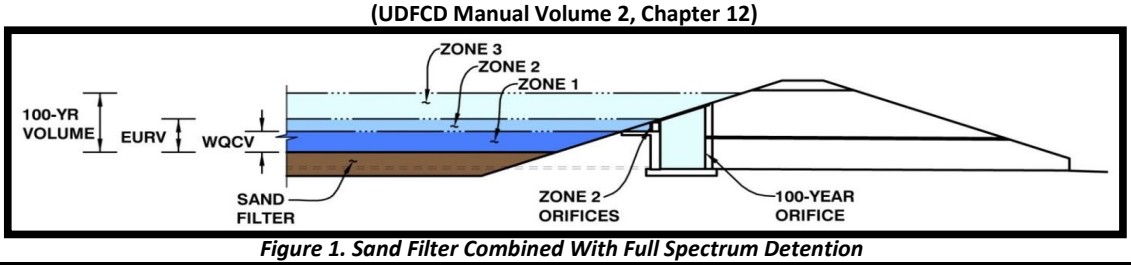


Figure 1. Sand Filter Combined With Full Spectrum Detention

SECTION 7 - ALLOWABLE RELEASE RATE

Method: Use Estimated Flow Rates and Reduce by 90%

X1-X3 Release Rate (cfs)	Allowable Release (cfs)	Released Off-Site (cfs)	Allowable Release Rate From Pond
11.8	10.7	0.2	10.5

*Unit release rate established from estimated 100-Yr discharge from Basins X1-X3

*Basins 10 & 12 are released off-site and are subtracted from allowable release from the Pond

Appendix C

Reference Documents

NCRS WEB SOIL SURVEY

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

February 1, 2021

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.

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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: 1:1,910 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 25 50 100 150

Feet: 0 50 100 200 300

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.

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

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

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

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

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

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

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 18, Jun 5, 2020

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

Date(s) aerial images were photographed: Aug 19, 2018—Sep 23, 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	15.6	90.8%
95	Truckton loamy sand, 1 to 9 percent slopes	1.6	9.2%
Totals for Area of Interest		**17.2**	**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: Hills, flats
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 capacity: 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

Pleasant

Percent of map unit: 1 percent

Landform: Depressions
Hydric soil rating: Yes

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

95—Truckton loamy sand, 1 to 9 percent slopes

Map Unit Setting
National map unit symbol: 36bd
Elevation: 6,000 to 7,000 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
Truckton and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Truckton

Setting
Landform: Hills, flats
Landform position (three-dimensional): Side slope, talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Arkosic alluvium derived from sedimentary rock and/or arkosic residuum weathered from sedimentary rock

Typical profile
A - 0 to 8 inches: loamy sand
Bt - 8 to 24 inches: sandy loam
C - 24 to 60 inches: coarse 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 (1.98 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 5.4 inches)

Interpretive groups
Land capability classification (irrigated): 4e

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: 4 percent
Hydric soil rating: No

Pleasant

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

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 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

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:

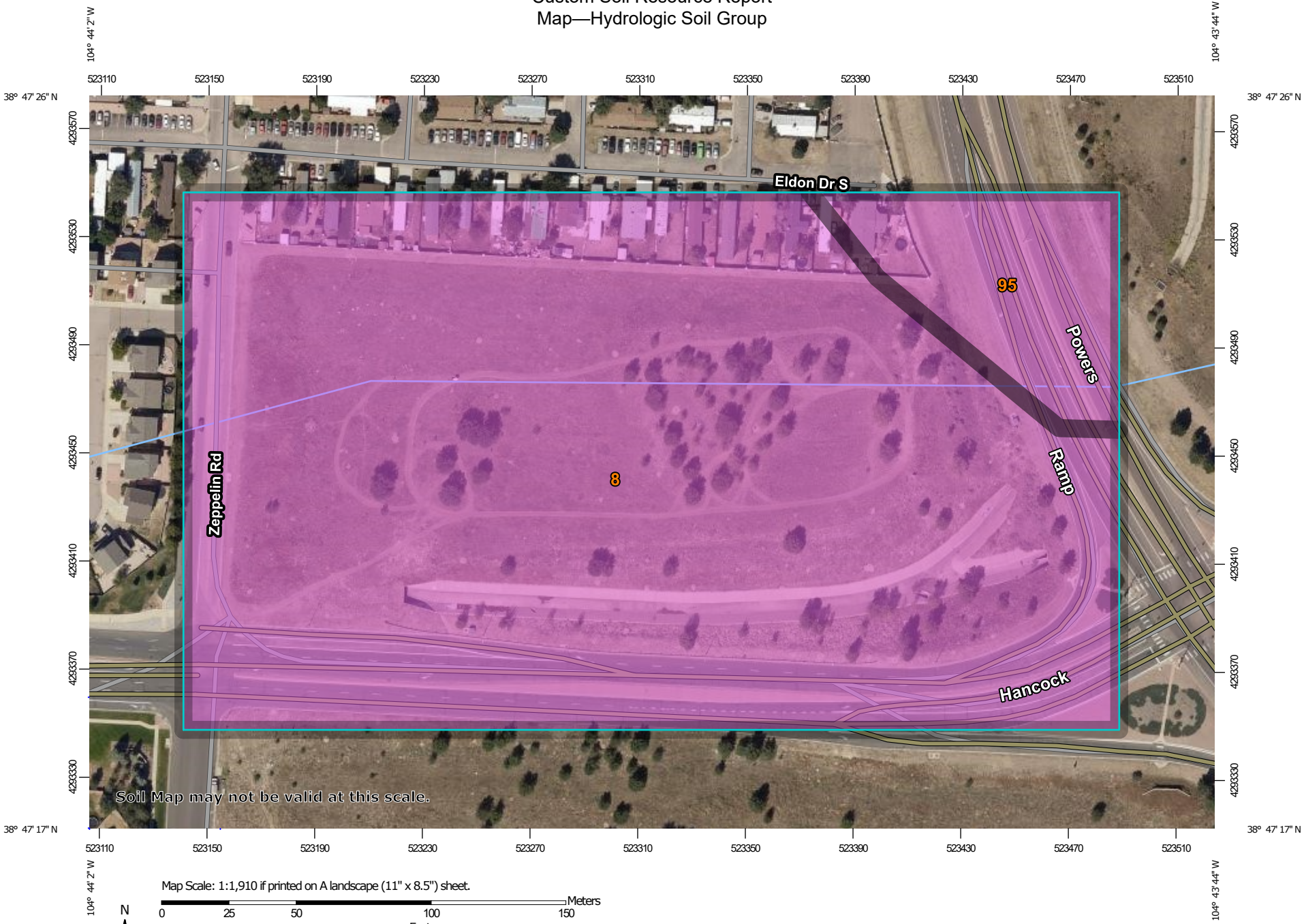
Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

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.



Map Scale: 1:1,910 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 25 50 100 150

Feet
0 50 100 200 300

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.

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

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

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

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

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

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

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 18, Jun 5, 2020

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

Date(s) aerial images were photographed: Aug 19, 2018—Sep 23, 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

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
8	Blakeland loamy sand, 1 to 9 percent slopes	A	15.6	90.8%
95	Truckton loamy sand, 1 to 9 percent slopes	A	1.6	9.2%
Totals for Area of Interest			**17.2**	**100.0%**

Rating Options—Hydrologic Soil Group

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

References

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FEMA PANEL

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.

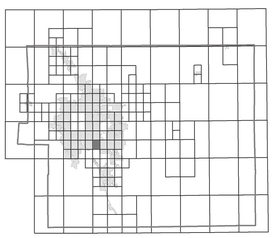
Contact **FEMA Map Service Center** (MSC) via the FEMA Map Information eXchange (FMIX) 1-877-336-2627 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this 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

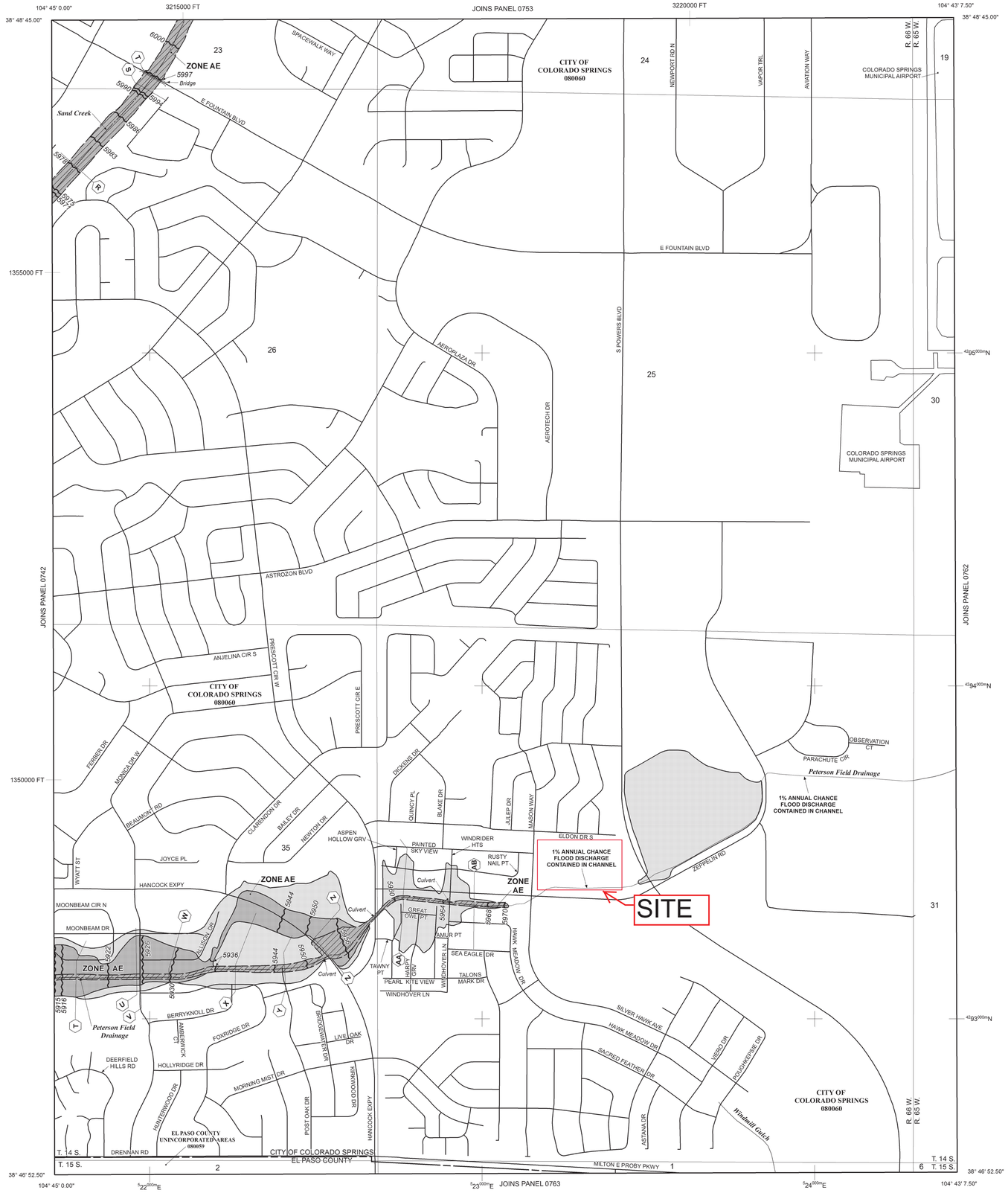
Flooding Source	Vertical Datum Offset (ft)
REFER TO SECTION 3.3 OF THE EL PASO COUNTY FLOOD INSURANCE STUDY FOR STREAM BY STREAM VERTICAL DATUM CONVERSION INFORMATION	

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.



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)
- 4375000mN — 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" = 500'

250 0 500 1000 FEET

150 0 150 300 METERS

NFIP

PANEL 0761G

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

EL PASO COUNTY, COLORADO AND INCORPORATED AREAS

PANEL 761 OF 1300

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
COLORADO SPRINGS, CITY OF	080060	0761	G
EL PASO COUNTY	080059	0761	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
08041C0761G

MAP REVISED
DECEMBER 7, 2018

Federal Emergency Management Agency