

FINAL DRAINAGE LETTER

Seder Subdivision
(A Replat of Lot 7, Akers Acres Subdivision No. 1)
2725 Akers Drive
El Paso County, Colorado 80922

Prepared For:
Seder Investment, LLC
2725 Akers Drive
El Paso County, Colorado 80922

Prepared By:
Baseline Engineering Corporation
1046 Elkton Drive
Colorado Springs, Colorado 80907

Steven Baggs, PE

Date: November 20, 2023

PCD Filing No.: VR2319



Engineering · Planning · Surveying

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El Paso County
Planning and Community Development
2880 International Circle, Suite 110
Colorado Springs, Colorado 80910

November 20, 2023

Re: Final Drainage Letter
For Seder Subdivision
(A Replat of Lot 7 Akers Acres Subdivision No. 1)
Located at 2725 Akers Drive
El Paso County, CO 80922

To Whom It May Concern:

Transmitted herewith is the Final Drainage Letter for Seder Subdivision, a replat of Lot 7 of Akers Acres Subdivision No. 1. The entire property encompasses 9.37 acres and is currently zoned M CAD-O. The purpose of this drainage letter is to analyze drainage conditions of the property in support of an application to El Paso County for a Vacation and Replat of Lot 7 Akers Acres Subdivision No. 1. Lot 7 of the Akers Acres Subdivision No.1 will be replatted into two lots. No improvements are proposed with this replat.

This drainage analysis was prepared in accordance with the most current El Paso County Drainage Criteria Manual. If there are any comments or questions regarding any part of this drainage analysis, please contact the undersigned.

Very truly yours,

BASELINE ENGINEERING CORP.

Steven G. Baggs, P.E.

Certification Statements

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 applicable master plan of the drainage basin. I accept responsibility for any liability caused by any negligent acts, errors or omissions on my part in preparing this report.

 Steven G Baggs, P.E. Colorado 26020

Developer’s Statement

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

Name of Developer: _____

Authorized Signature/Date: _____

Printed Name: _____

Title: _____

Address: _____

El Paso County Certification

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

 County Engineer / ECM Administrator

 Date

1) General Location and Description

a) Location

This Drainage Letter has been prepared for the Seder Subdivision, located on Lot 7 of the Akers Acres Subdivision No. 1. The property is bound to the North by Lot 6 of the Akers Acres Subdivision No. 1, the East by Marksheffel Road Right-of-Way, the South by Lot 8 of the Akers Acres Subdivision No. 1, and the West by Akers Drive Right-of-Way.

The site is located within the SE $\frac{1}{4}$ of Section 32, Township 13 S, Range 65 West of the 6th Principal Meridian.

b) Description of Property

For the purposes of this report “the site” will refer to Lot 7 of the Akers Acres Subdivision Filing No. 1, which is approximately 9.37 acres. There is an existing office/warehouse building, RAS pavement drive aisles and parking, and outdoor storage area on the property. This site was formerly an asphalt shingle recycling facility that has ceased operations. The shingle stockpiles are currently being removed from the site.

This project only proposes a replat of the property with no proposed surface improvements to be made at this time.

The existing site drains from the West to the East primarily at slopes between 2-5% into an existing water quality (sand filter basin)/detention facility at the southeast corner of the site.

The soil type at the site was identified primarily as Blakeland loamy sand, with slopes ranging from 1-9%, and a hydrologic soil grouping of “A”. The most eastern portion of the site is identified as Blendon sandy loam, with slopes ranging from 0-3%, and a hydrologic soil grouping of “B”. Soils associated with hydrologic soil group A/B have a high/moderate infiltration rate when thoroughly wet. These are deep/moderately deep, well-draining soils with a high/moderate rate of water transmission.

There are no major drainageways adjacent to the site.

There are no known existing irrigation facilities located on the site.

2) Drainage Basins & Subbasins

a) Major Basin Description

This project is within the Sand Creek Drainage Basin. Stormwater from this site drains from the West to East into an existing water quality (sand filter basin)/detention facility. The outlet facilities connect via storm sewer to an existing curb inlet in Marksheffel Road. This connection to the public storm sewer

system will be unchanged by this replat. This inlet is part of the public storm sewer system of Colorado Springs now that Marksheffel Road is under City jurisdiction.

According to the FEMA Flood Insurance Rate Map (FIRM) Panel No. 08041C0756G, effective 12/07/2018, this site is located within an area of minimal flood hazard (Zone X). Refer to the Appendix for FIRM Map.

There are no known irrigation facilities or other obstructions which could influence or be influenced by the local drainage patterns.

b) Existing Subbasin Descriptions

An Existing Conditions Drainage Plan has been included in the Appendix of this report. The existing conditions subbasins generally compare to the proposed conditions subbasins from the previous drainage report for the site. That report being the Preliminary/Final Drainage Report for Lot 7, Aker's Acres Subdivision No. 1, by Obering Wurth & Associates, last revision, April, 2013. Descriptions of the existing subbasins are as follows:

Subbasin A: This 3.45 acres subbasin represents the westerly third of the lot and includes the area developed with the office building (also a possible future building), parking lot and truck scale. Runoff from this subbasin will be directed overland around the buildings and across the yard area to the south side of the lot. Curb and gutter along the access road will then convey the runoff to the east. Runoff quantities of $Q_5 = 7.53$ cfs and $Q_{100} = 16.56$ cfs will be generated in this subbasin.

Subbasin B: This subbasin consisting of 3.19 acres represents the middle portion of the lot and includes the former stockpile area. Runoff quantities from this yard and stockpile area are estimated to be $Q_5 = 7.43$ cfs and $Q_{100} = 15.14$ cfs. As with Subbasin A the runoff generated in this subbasin will flow overland to the south to the access road. Once in the curb and gutter runoff will continue east to the existing water quality/detention facility.

Subbasin C: Subbasin C represents the final third of the lot containing approximately 1.59 acres. This portion of the lot also includes a former stockpile area and the existing water quality/detention facility at the southeast corner of the lot. Runoff generated in this subbasin will flow overland to the south into the existing water quality facility. Runoff quantities for this subbasin are $Q_5 = 3.01$ cfs and $Q_{100} = 6.73$ cfs. This runoff will flow overland to the water quality/detention facility.

Subbasin D: This minor subbasin consisting of approximately 1.03 acres represents the strip of land between this site and the concrete plant to the north, the existing diversion berm and swale, and Marksheffel Road. Minor runoff quantities of $Q_5 = 0.53$ cfs and $Q_{100} = 2.69$ cfs will sheet flow into Marksheffel Road.

Subbasin E: This minor subbasin consisting of approximately 0.05 acres represents the small strip of land at the southwest corner of the site, which drains onto Akers Drive. Minor runoff quantities of $Q_5 = 0.02$ cfs and $Q_{100} = 0.14$ cfs sheet flows into Akers Drive.

Subbasin F: This minor subbasin consisting of approximately 0.08 acres represents the small strip of land at the northwest corner of the site, which drains onto Akers Drive. Minor runoff quantities of $Q_5= 0.02$ cfs and $Q_{100}= 0.16$ cfs sheet flows into Akers Drive.

Offsite runoff does not have a significant impact at the site. Runoff from adjacent streets will not enter the site nor does runoff from the lot to the south. Runoff from the construction storage lot and concrete batch plant to the north has been quantified based on the Offsite Basin Map included in the Appendix. Two subbasins identified as OS-1 and OS-2 have been utilized to estimate flows from this offsite area. The property line between Lot 7 and Lot 6 is the approximate boundary between subbasins. Subbasin OS-1 runoff ($Q_5= 2.82$ cfs and $Q_{100}= 7.20$ cfs) flows off the southwest corner of Lot 6 to Aker's Drive and will not enter the site. The remainder of Lot 6 represented by OS-2 should not enter the Lot 7 site and is directed to Marksheffel Road by a diversion berm and swale as designed in the previous drainage report for the site. These runoff quantities are $Q_5= 15.35$ cfs and $Q_{100}= 39.14$ cfs.

c) Proposed Drainage Characteristics

There will be no alteration of the existing drainage characteristics at this time. This project does not propose any surface improvements of the site. No new drainage improvements are recommended as a result of this subdivision replat. At the time of any further development, a Site Development Plan will be required with associated submittal items including a Final Drainage Report that evaluates proposed drainage conditions. There is no Proposed Conditions Drainage Plan for this replat.

3) Drainage Design Criteria

a) Development Criteria References

This drainage analysis has been prepared in accordance with the current El Paso County Drainage Criteria Manual Volumes 1 & 2, as well as applicable portions of the City of Colorado Springs Drainage Criteria Manual Volumes 1 & 2.

This site is contained within the Sand Creek Drainage Basin Planning Study, by Kiowa Engineering Corporation, dated October 1995. The site was also analyzed in the Preliminary/Final Drainage Report for Lot 7, Aker's Acres Subdivision No. 1, by Obering Wurth & Associates, filed by El Paso County on June 3, 2013.

b) Hydrologic Criteria

The design rainfall depths for the site were determined from the NOAA Atlas 14, Volume 8, Version 2. Design rainfall depths have been included in the appendix of this report.

The Rational Method was used to determine developed flow volumes for historic and developed conditions. The Rational Formula is $Q = CiA$, where Q , the maximum rate of runoff is equal to the runoff coefficient C , times the rainfall intensity (I), times the area (A).

The minor and major design storms were analyzed as the 5-yr and 100-yr storm events in this report.

4) General Concept

The existing drainage patterns of the property will not be modified by this subdivision replat.

Four Step Process: The four-step process for minimizing adverse impacts of urbanization must be applied to all new or redevelopment projects for which construction activities disturb greater than or equal to one acre, including projects less than one acre that are part of a larger common plan of development or sale. The four steps have been applied to this site as follows:

Step 1: Reduce runoff by disconnecting impervious area, eliminating “unnecessary” impervious area and encouraging infiltration into soils that are suitable.

The existing site employs step one through disconnecting impervious areas and encouraging infiltration into suitable soils. The existing site limits impervious area by utilizing compacted gravel instead of asphalt paving throughout, and promotes infiltration through the gravel storage areas and grass buffers on the perimeters of the site prior to runoff being captured by an existing sand filter water quality basin.

Step 2: Treat and slowly release the WQCV.

This site has an existing water quality sand filter basin at its southeast corner that slowly treats and releases the WQCV. This existing water quality basin was analyzed in this report; however, no improvements will be made until further development of the site.

Step 3: Stabilize stream channels.

All new and re-development projects are required to construct or participate in the funding of channel stabilization measures. There are no major drainage ways that are adjacent to the site. There will be no change to the existing drainage conditions on site.

Step 4: Implement source controls.

There will be no development at this time, no source controls will be implemented at this time. At the time of further development, a Stormwater Management Plan that utilizes construction control measures, proper housekeeping practices, and spill containment procedures must be developed.

5) Drainage & Bridge Fees

No drainage fees were previously assessed for this property. Due to the replat of the property at this time, there are associated Drainage and Bridge fees for the Sand Creek Drainage Basin. The 2023 Drainage Fee for the Sand Creek Drainage Basin is \$23,821/acre of impervious land. The 2023 Bridge Fee for the Sand Creek Drainage Basin is \$9,743/acre of impervious land. The Sand Creek Basin fee does not include pond land, pond facilities, or surcharge fees. For this Final Drainage Letter, the Drainage and Bridge fees will be determined based on the existing developed Lot 1 and the potential Recreational Vehicle and Boat Storage Lot concept on Lot 2. The Lot 1 impervious acreage includes the existing impervious area of the lot and a future potential building. The calculated impervious percentage of Lot

Unresolved for from review 1. For a lot that is zoned industrial, impervious coverage is typically 85%. Revise drainage fees to include that impervious coverage in the calculation.

1 is 71%, so the impervious area of percentage of Lot 2 is 66% based on the preliminary concept plan for Lot 2, so the impervious area of Lot 2 is 6.98 AC x 0.66 = 4.34 AC. The total impervious area for Seder Subdivision is 6.3 acres. Fee calculations are shown in the table below.

Seder Subdivision 2023 Drainage & Bridge Fees Sand Creek Drainage Basin						
	Impervious Area (acres)	Fee / Impervious Acre	Bridge Fee / Impervious Acre	Fee Due	Fee Due at Platting	Drainage Fee Credit
Drainage Fee	6.3	\$23,821	----	\$150,072.30	\$150,072.30	\$0.00
Bridge Fee	6.3	---	\$9,743	\$ 61,380.90	\$ 61,380.90	
				\$211,453.20	\$211,453.20	

6) Conclusion

There are no proposed improvements to the site as a part of this subdivision replat. Therefore, it is proposed that no further analysis, modifications, or improvements be made to the site as a result of this replat. The existing drainage facilities will remain in operation and continue to be subject to the existing Operation & Maintenance Agreement. Further development of the site will require a Site Development Plan application with El Paso County. A Final Drainage Report will be required to address new development conditions and verify water quality/detention impacts on the existing drainage facilities.

APPENDIX

- A. Vicinity Map**
- B. Floodplain Map**
- C. Soils Map**
- D. Hydrologic Calculations**
- E. Drainage Map**



APPENDIX A

2725 Akers Dr Vicinity Map



APPENDIX B

104° 41' 15.00"

30.00"

00 FT

ELECTRONIC DR

AKERS DR

32
SITE

EL PASO COUNTY
UNINCORPORATED AREAS
080059

T. 13 S.
T. 14 S.

Tributary To
Sand Creek - East Fork
Reach No. 6

LIMIT OF

ZONE
AE

E

D

Sand Creek
East Fork Subtributary

RED GRANITE

ZONE AE

CONSTITUTION AVE

1% ANNUAL CHANCE
FLOOD DISCHARGE
CONTAINED IN CULVERT

ZONE AE

1% ANNUAL CHANCE
FLOOD DISCHARGE
CONTAINED IN CULVERT

NOTRE WAY

ZONE AE

250 0 500 1000 FEET

0 150 300 METERS



MAP SCALE 1" = 500'

NFIP

PANEL 0756G

FIRM

FLOOD INSURANCE RATE MAP
EL PASO COUNTY,
COLORADO
AND INCORPORATED AREAS

PANEL 756 OF 1300

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
COLORADO SPRINGS, CITY OF	080060	0756	G
EL PASO COUNTY	080059	0756	G

Notice: This map was reissued on 05/15/2020 to make a correction. This version replaces any previous versions. See the Notice-to-User Letter that accompanied this correction for details.

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
08041C0756G

MAP REVISED
DECEMBER 7, 2018

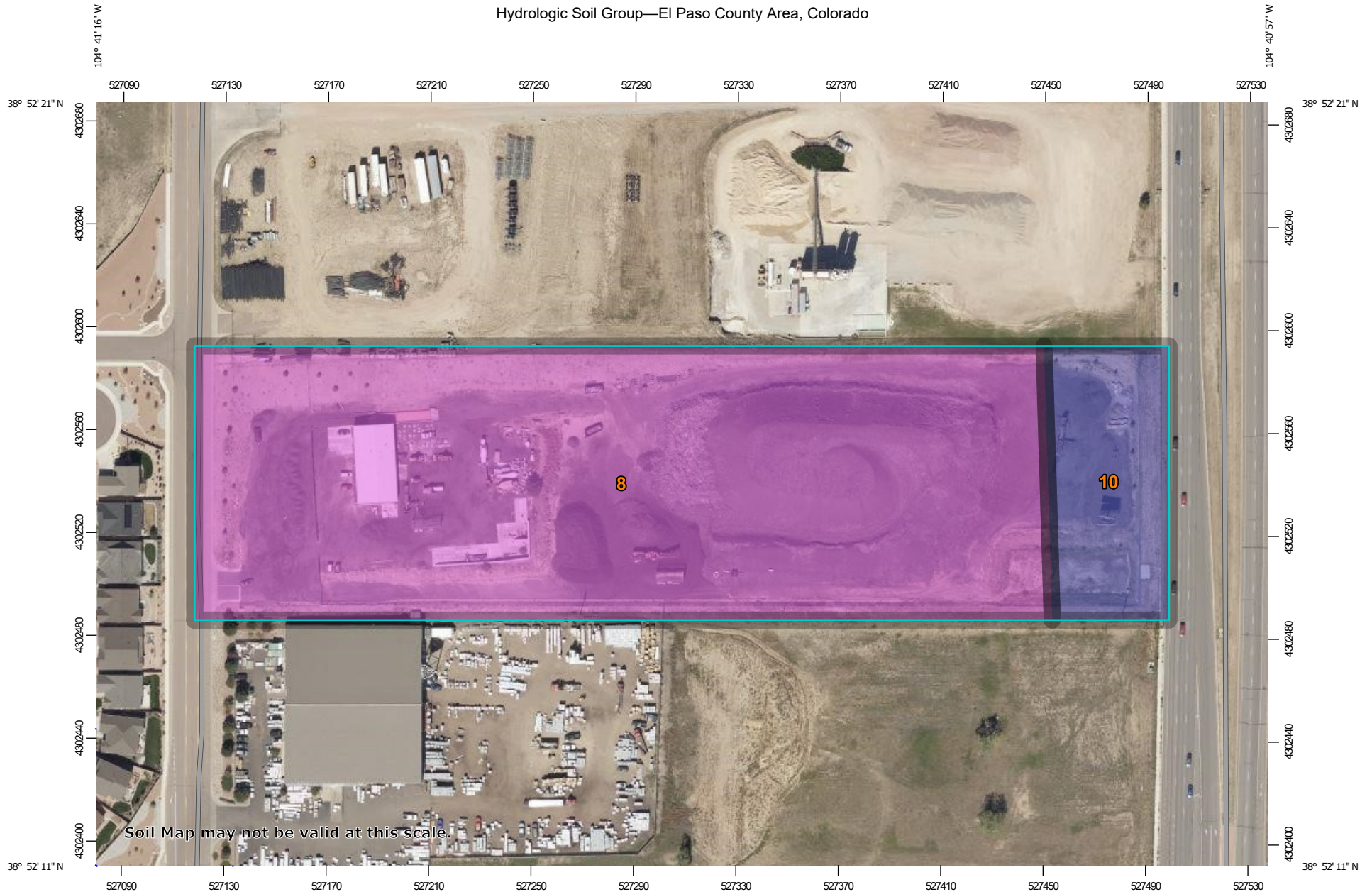
Federal Emergency Management Agency

This is an official FIRMette showing a portion of the above-referenced flood map created from the MSC FIRMette Web tool. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For additional information about how to make sure the map is current, please see the Flood Hazard Mapping Updates Overview Fact Sheet available on the FEMA Flood Map Service Center home page at <https://msc.fema.gov>.

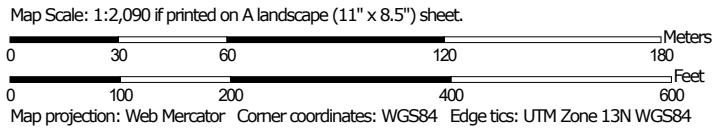


APPENDIX C

Hydrologic Soil Group—El Paso County Area, Colorado



Soil Map may not be valid at this scale.



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 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: 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.

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	8.8	87.6%
10	Blendon sandy loam, 0 to 3 percent slopes	B	1.2	12.4%
Totals for Area of Interest			10.1	100.0%

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher



APPENDIX D



Engineering · Planning · Surveying

PROJECT: SEDER SUBDIVISION
 JOB NO.: 35072
 CALC. BY: SPC
 DATE: 8/15/2023

= FORMULA CELLS
 = USER INPUT CELLS

Project Location	
User Input	▼

IDF Rainfall Data

D	P ₁ : 1-hour Rainfall Depths (inches)	
	Minor Storm	Major Storm
	5-Year	100-Year
Minutes	1.26	2.65
5	5.56	8.47
10	4.68	6.63
20	3.81	4.80
30	3.30	3.72
40	2.94	2.96
50	2.65	2.37
60	2.42	1.88

Figure 6-5 $I_5 = -P_1 \ln(D) + 7.583$; $I_{100} = -P_1 \ln(D) + 12.735$
 I = rainfall intensity (inches per hour)
 P₁ = 1-hour point rainfall depth (inches)
 D = storm duration (minutes)

Reference:

- 1) El Paso County - Drainage Criteria Manual Volume I, Revised 1987
- 2) City of Colorado Springs - Drainage Criteria Manual Volume I, May 2014
- 3) Rainfall depths determined via the NOAA Atlas 14, Volume 8, Version 2
https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html?bkmrk=co

PROJECT: SEDER SUBDIVISION
 JOB NO.: 35072
 CALC. BY: SPC
 DATE: 8/15/2023

= FORMULA CELLS
 = USER INPUT CELLS



Runoff Coefficients & Impervious Values for Rational Method - per CS DCM Vol I, Table 6-6.

	Impervious Percentage	C ₂	C ₅	C ₁₀	C ₂₅	C ₅₀	C ₁₀₀
Drive and Walks	100%	0.89	0.90	0.92	0.94	0.95	0.96
Roofs	90%	0.71	0.73	0.75	0.78	0.80	0.81
S- Gravel	80%	0.57	0.59	0.63	0.66	0.68	0.70
Lawns	0%	0.02	0.08	0.15	0.25	0.30	0.35

	Impervious Percentage	C ₂	C ₅	C ₁₀	C ₂₅	C ₅₀	C ₁₀₀
I- Light Areas	80%	0.57	0.59	0.63	0.66	0.68	0.70
Land Use	0%	0.00	0.00	0.00	0.00	0.00	0.00
Land Use	0%	0.00	0.00	0.00	0.00	0.00	0.00
Land Use	0%	0.00	0.00	0.00	0.00	0.00	0.00

Hydrologic Soil Group

A or B

PROPOSED COMPOSITE IMPERVIOUSNESS

Basin	Area (ac)	Weighted Impervious and C Values							Areas (ac)							
		Imp.	C ₂	C ₅	C ₁₀	C ₂₅	C ₅₀	C ₁₀₀	Drive and Walks	Roofs	S- Gravel	Lawns	I- Light Areas	Land Use	Land Use	Land Use
Existing Conditions Subbasins																
A	3.45	60%	0.45	0.48	0.53	0.57	0.60	0.63	0.24	0.23	2.02	0.95				
B	3.19	75%	0.54	0.56	0.60	0.63	0.66	0.68			2.99	0.20				
C	1.59	59%	0.43	0.46	0.51	0.55	0.58	0.61			1.18	0.41				
D	1.03	7%	0.07	0.13	0.19	0.29	0.34	0.38	0.00		0.09	0.93				
E	0.05	0%	0.02	0.08	0.15	0.25	0.30	0.35				0.05				
F	0.08	0%	0.02	0.08	0.15	0.25	0.30	0.35				0.08				
OS-1	1.50	80%	0.57	0.59	0.63	0.66	0.68	0.70					1.50			
OS-2	7.88	80%	0.57	0.59	0.63	0.66	0.68	0.70					7.88			
LOT 1	2.76	71%	0.53	0.56	0.60	0.64	0.66	0.68	0.26	0.23	1.87	0.40				
EX. WQ BASIN	8.23	66%	0.48	0.51	0.55	0.59	0.62	0.64	0.24	0.23	6.20	1.56				

STANDARD FORM SF-1

TIME OF CONCENTRATION SUMMARY

 Calculated By: SPC
 Date: 8/15/2023

 Project: SEDER SUBDIVISION
 Job No.: 35072
 Checked By: SGB

SUB-BASIN DATA				INITIAL/OVERLAND TIME (t _i)			TRAVEL TIME (t _t)					t _c CHECK (URBANIZED BASINS)				FINAL t _c	REMARKS
Basin	i	C _s	AREA	LENGTH	SLOPE	t _i	LENGTH	C _v	SLOPE	VEL.	t _t	COMP.	TOT. LENGTH	S _o	tc (Equation 6-7)		
(1)	(2)	(3)	Ac	Ft	%	Min	Ft		%	FPS	Min	t _c	Ft	%	Min	Min	
Existing Conditions Subbasins																	
A	0.60	0.48	3.45	100	15.0	4.58	588	20	2.7	3.29	2.98	7.6	688	4.49	18.9	7.56	
B	0.75	0.56	3.19	100	2.6	7.13	528	20	2.9	3.41	2.58	9.7	628	2.85	16.4	9.72	
C	0.59	0.46	1.59	100	2.7	8.35	346	20	3.1	3.52	1.64	10.0	446	3.01	18.4	9.99	
D	0.07	0.13	1.03	53	25.0	4.42	815	15	2.4	2.32	5.85	10.3	868	3.78	32.2	10.27	
E	0.00	0.08	0.05	43	7.0	6.35							43	7.00	26.3	6.35	
F	0.00	0.08	0.08	100	1.6	15.77	60	7	5.1	1.58	0.63	16.4	160	2.91	27.7	16.40	
OS-1	0.80	0.59	1.50	100	0.5	11.57	92	20	3.2	3.58	0.43	12.0	192	1.79	13.6	12.00	
OS-2	0.80	0.59	7.88	100	1.8	7.66	862	20	4.5	4.24	3.39	11.0	962	4.21	16.3	11.04	

$$t_c = t_i + t_t$$

$$t_t = ((0.395(1.1 - C_s) \text{SQRT}(L)) / (S_o^{0.33}))$$

$$V = C_v * S_w^{0.5}$$

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 and shallow paved swales	20

*For buried riprap, select C_v value based on type of vegetative cover.

= FORMULA CELLS
 = USER INPUT CELLS

Calculated By: **SPC**
 Date: **8/15/2023**
 Checked By: **SGB**
 5-Year
 1-hour rainfall= **1.26**

STANDARD FORM SF-2
 STORM DRAINAGE SYSTEM DESIGN
 (RATIONAL METHOD PROCEDURE)

Project: **SEDER SUBDIVISION**
 Job No.: **35072**
 Design Storm: **5-Year**

= FORMULA CELLS
 = USER INPUT CELLS

BASIN	DIRECT RUNOFF								TOTAL RUNOFF				STREET		PIPE			LENGTH (FT)	VELOCITY (FPS)	t _c (MIN)	REMARKS
	DESIGN POINT	AREA DESIGN	AREA (AC)	RUNOFF COEFF	t _c (MIN)	C * A (AC)	I (IN/HR)	Q (CFS)	t _c (MIN)	S (C * A) (CA)	I (IN/HR)	Q (CFS)	SLOPE (%)	STREET FLOW	DESIGN FLOW (CFS)	SLOPE (%)	PIPE DIAM. (IN.)				
	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
Existing Conditions Subbasins																					
A	1	3	3.45	0.48	7.6	1.66	4.55	7.53													
B	2	3	3.19	0.56	9.7	1.78	4.17	7.43													
C	3	3	1.59	0.46	10.0	0.73	4.13	3.01													
D	OS	OS	1.03	0.13	10.3	0.13	4.09	0.53													
E	OS	OS	0.05	0.08	6.4	0.00	3.99	0.0													
F	OS	OS	0.08	0.08	16.4	0.01	2.74	0.0													
OS-1	OS	OS	1.50	0.59	12.0	0.89	3.16	2.8													
OS-2	OS	OS	7.88	0.59	11.0	4.65	3.28	15.2													

Calculated By: **SPC**
 Date: **8/15/2023**
 Checked By: **SGB**
 100-Year
 1-hour rainfall= **2.65**

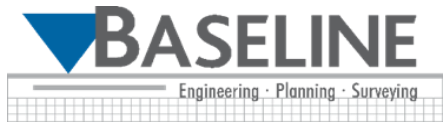
STANDARD FORM SF-2
 STORM DRAINAGE SYSTEM DESIGN
 (RATIONAL METHOD PROCEDURE)

Project: **SEDER SUBDIVISION**
 Job No.: **35072**
 Design Storm: **100-Year**

= FORMULA CELLS
 = USER INPUT CELLS

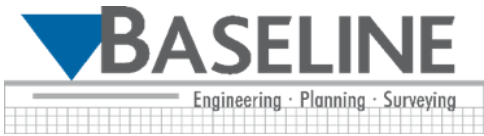
BASIN	DIRECT RUNOFF								TOTAL RUNOFF				STREET		PIPE			LENGTH (FT)	VELOCITY (FPS)	t _c (MIN)	REMARKS
	DESIGN POINT	AREA DESIGN	AREA (AC)	RUNOFF COEFF	t _c (MIN)	C * A (AC)	I (IN/HR)	Q (CFS)	t _c (MIN)	S (C * A) (CA)	I (IN/HR)	Q (CFS)	SLOPE (%)	STREET FLOW	DESIGN FLOW (CFS)	SLOPE (%)	PIPE DIAM. (IN.)				
	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
Existing Conditions Subbasins																					
A	1	3	3.45	0.63	7.6	2.17	7.64	16.56													
B	2	3	3.19	0.68	9.7	2.16	7.01	15.14													
C	3	3	1.59	0.61	10.0	0.97	6.93	6.73													
D	OS	OS	1.03	0.38	10.3	0.39	6.87	2.69													
E	OS	OS	0.05	0.35	6.4	0.02	8.08	0.14													
F	OS	OS	0.08	0.35	16.4	0.03	5.76	0.2													
OS-1	OS	OS	1.50	0.70	12.0	1.05	6.65	7.0													
OS-2	OS	OS	7.88	0.70	11.0	5.52	6.89	38.0													

PROJECT: SEDER SUBDIVISION
 JOB NO.: 35072
 CALC. BY: SPC
 DATE: 8/15/2023



DIRECT RUNOFF SUMMARY										
BASIN LABEL	DESIGN POINT	AREA [ac]	Imp. %	C5	C100	LOCAL (CFS)		ACCUMULATIVE (CFS)		Notes
						Q5	Q100	Q5	Q100	
Existing Subbasins										
A	1	3.45	60%	0.48	0.63	7.53	16.56			
B	2	3.19	75%	0.56	0.68	7.43	15.14			
C	3	1.59	59%	0.46	0.61	3.01	6.73			
D	OS	1.03	7%	0.13	0.38	0.53	2.69			
E	OS	0.05	0%	0.08	0.35	0.02	0.14			
F	OS	0.08	0%	0.08	0.35	0.02	0.16			
OS-1	OS	1.50	80%	0.59	0.70	2.80	6.99			
OS-2	OS	7.88	80%	0.59	0.70	15.23	38.00			

PROJECT: SEDER SUBDIVISION
 JOB NO.: 35072
 CALC. BY: SPC
 DATE: 8/15/2023



DESIGN POINT SUMMARY					
DESIGN POINT	LOCATION / STRUCTURE	DESCRIPTION	TOTAL FLOW (CFS)		CONTRIBUTING BASINS
			Q5	Q100	
EXISTING CONDITIONS DESIGN POINT SUMMARY					
1	SUBBASIN COMBINATION	SUBBASIN A DRAINS INTO SUBBASIN B	7.53	16.56	(A)
2	SUBBASIN COMBINATION	SUBBASIN A & B DRAIN INTO SUBBASIN C	14.96	31.70	(A,B)
3	OUTFALL	WQ BASIN OUTLET STRUCTURE	17.97	38.44	(A,B,C)



NOAA Atlas 14, Volume 8, Version 2
Location name: Colorado, USA*
Latitude: 38.8713°, Longitude: -104.6851°
Elevation: 6497 ft**
 * source: ESRI Maps
 ** source: USGS



POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Deborah Martin, Sandra Pavlovic, Ishani Roy, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Michael Yekta, Geoffery Bonnin

NOAA, National Weather Service, Silver Spring, Maryland

[PF_tabular](#) | [PF_graphical](#) | [Maps_&_aerials](#)

PF tabular

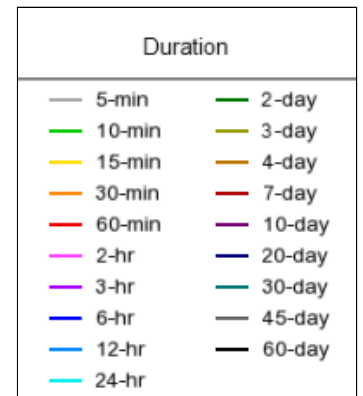
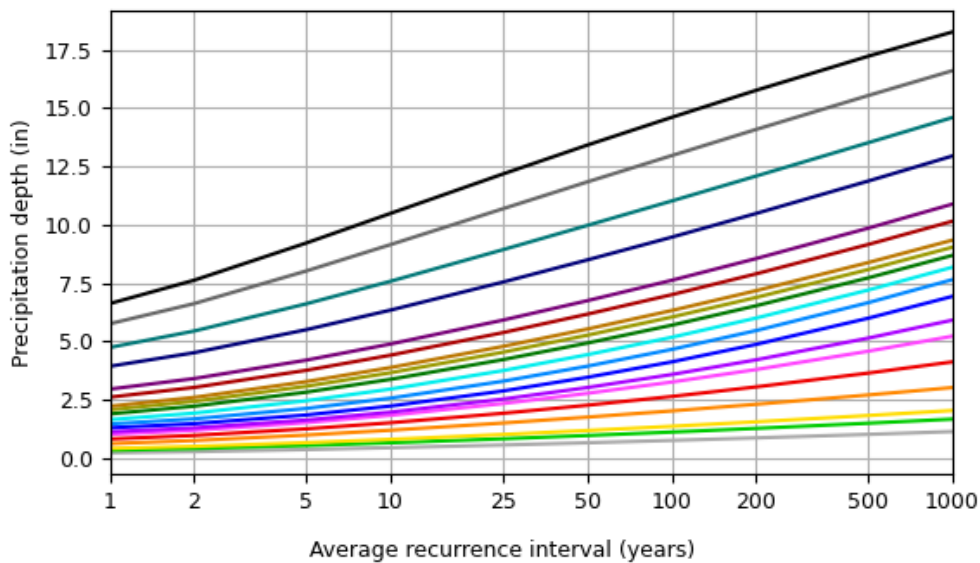
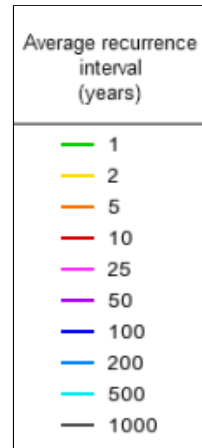
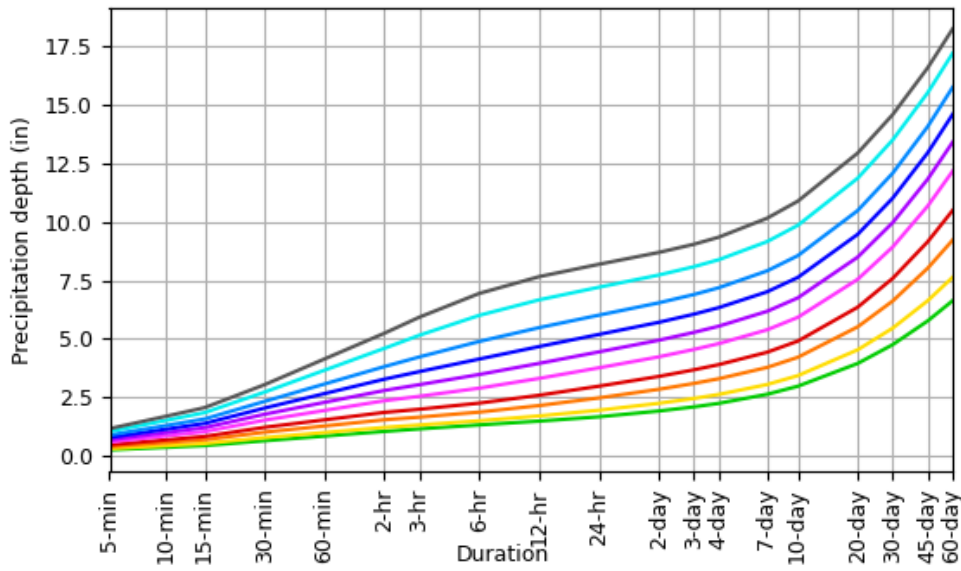
PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.237 (0.197-0.287)	0.288 (0.239-0.349)	0.376 (0.312-0.458)	0.455 (0.375-0.556)	0.572 (0.456-0.731)	0.667 (0.518-0.863)	0.768 (0.574-1.02)	0.876 (0.625-1.19)	1.03 (0.702-1.44)	1.15 (0.760-1.62)
10-min	0.346 (0.288-0.420)	0.421 (0.350-0.511)	0.551 (0.457-0.670)	0.667 (0.549-0.815)	0.837 (0.668-1.07)	0.977 (0.758-1.26)	1.12 (0.840-1.49)	1.28 (0.915-1.75)	1.50 (1.03-2.11)	1.68 (1.11-2.38)
15-min	0.422 (0.352-0.512)	0.513 (0.427-0.623)	0.672 (0.557-0.818)	0.813 (0.669-0.994)	1.02 (0.815-1.31)	1.19 (0.925-1.54)	1.37 (1.02-1.82)	1.56 (1.12-2.13)	1.83 (1.25-2.57)	2.05 (1.36-2.90)
30-min	0.629 (0.524-0.762)	0.763 (0.635-0.926)	0.997 (0.826-1.21)	1.20 (0.992-1.47)	1.51 (1.21-1.93)	1.76 (1.37-2.28)	2.03 (1.52-2.69)	2.32 (1.65-3.16)	2.71 (1.85-3.80)	3.03 (2.01-4.29)
60-min	0.829 (0.690-1.00)	0.982 (0.816-1.19)	1.26 (1.04-1.54)	1.52 (1.25-1.86)	1.93 (1.55-2.49)	2.27 (1.77-2.96)	2.65 (1.98-3.53)	3.06 (2.19-4.19)	3.65 (2.50-5.13)	4.13 (2.74-5.85)
2-hr	1.03 (0.864-1.24)	1.20 (1.01-1.45)	1.53 (1.28-1.84)	1.84 (1.53-2.24)	2.34 (1.90-3.02)	2.78 (2.19-3.61)	3.27 (2.47-4.34)	3.80 (2.75-5.19)	4.58 (3.17-6.42)	5.23 (3.49-7.36)
3-hr	1.14 (0.958-1.36)	1.30 (1.10-1.56)	1.64 (1.38-1.97)	1.98 (1.65-2.39)	2.53 (2.08-3.27)	3.03 (2.40-3.94)	3.59 (2.74-4.77)	4.22 (3.07-5.76)	5.15 (3.58-7.20)	5.92 (3.97-8.29)
6-hr	1.31 (1.11-1.56)	1.48 (1.26-1.77)	1.86 (1.57-2.22)	2.24 (1.88-2.69)	2.88 (2.39-3.71)	3.47 (2.78-4.49)	4.13 (3.18-5.47)	4.88 (3.58-6.63)	6.00 (4.21-8.35)	6.94 (4.68-9.65)
12-hr	1.47 (1.26-1.74)	1.69 (1.45-2.00)	2.14 (1.82-2.53)	2.58 (2.18-3.07)	3.30 (2.75-4.20)	3.94 (3.17-5.05)	4.66 (3.61-6.11)	5.47 (4.04-7.36)	6.66 (4.70-9.20)	7.65 (5.21-10.6)
24-hr	1.66 (1.43-1.94)	1.94 (1.67-2.27)	2.46 (2.12-2.90)	2.97 (2.53-3.51)	3.75 (3.13-4.70)	4.43 (3.58-5.61)	5.18 (4.03-6.71)	6.01 (4.46-8.00)	7.20 (5.11-9.84)	8.18 (5.61-11.2)
2-day	1.90 (1.66-2.22)	2.23 (1.94-2.60)	2.83 (2.45-3.31)	3.38 (2.91-3.97)	4.22 (3.54-5.22)	4.93 (4.01-6.17)	5.70 (4.46-7.30)	6.53 (4.88-8.61)	7.72 (5.52-10.5)	8.69 (6.00-11.9)
3-day	2.08 (1.82-2.41)	2.44 (2.13-2.83)	3.08 (2.68-3.59)	3.66 (3.17-4.29)	4.54 (3.81-5.57)	5.27 (4.30-6.54)	6.05 (4.74-7.70)	6.89 (5.16-9.02)	8.08 (5.79-10.9)	9.04 (6.27-12.3)
4-day	2.23 (1.96-2.58)	2.61 (2.29-3.02)	3.28 (2.87-3.81)	3.89 (3.37-4.54)	4.79 (4.03-5.85)	5.53 (4.53-6.84)	6.33 (4.98-8.02)	7.18 (5.39-9.36)	8.38 (6.02-11.2)	9.34 (6.50-12.7)
7-day	2.62 (2.31-3.01)	3.04 (2.68-3.50)	3.77 (3.31-4.35)	4.42 (3.86-5.12)	5.38 (4.55-6.52)	6.17 (5.08-7.57)	7.00 (5.54-8.82)	7.90 (5.97-10.2)	9.15 (6.62-12.2)	10.2 (7.11-13.7)
10-day	2.96 (2.63-3.39)	3.42 (3.03-3.92)	4.20 (3.71-4.83)	4.90 (4.29-5.66)	5.91 (5.02-7.13)	6.75 (5.57-8.24)	7.62 (6.06-9.55)	8.55 (6.48-11.0)	9.85 (7.15-13.1)	10.9 (7.66-14.6)
20-day	3.94 (3.52-4.48)	4.52 (4.04-5.15)	5.51 (4.90-6.29)	6.35 (5.61-7.28)	7.54 (6.43-8.97)	8.49 (7.06-10.3)	9.47 (7.57-11.7)	10.5 (8.00-13.4)	11.9 (8.67-15.6)	12.9 (9.18-17.3)
30-day	4.74 (4.26-5.37)	5.45 (4.89-6.18)	6.61 (5.91-7.52)	7.58 (6.74-8.66)	8.93 (7.63-10.5)	9.97 (8.31-11.9)	11.0 (8.83-13.6)	12.1 (9.25-15.3)	13.5 (9.90-17.6)	14.6 (10.4-19.4)
45-day	5.76 (5.20-6.49)	6.62 (5.98-7.48)	8.02 (7.20-9.07)	9.15 (8.17-10.4)	10.7 (9.15-12.5)	11.8 (9.89-14.1)	13.0 (10.4-15.8)	14.1 (10.8-17.7)	15.5 (11.4-20.1)	16.6 (11.9-22.0)
60-day	6.62 (6.00-7.44)	7.63 (6.90-8.58)	9.22 (8.31-10.4)	10.5 (9.40-11.9)	12.2 (10.4-14.1)	13.4 (11.2-15.9)	14.6 (11.8-17.7)	15.8 (12.1-19.7)	17.2 (12.7-22.2)	18.3 (13.1-24.1)

¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).
 Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.
 Please refer to NOAA Atlas 14 document for more information.

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PF graphical

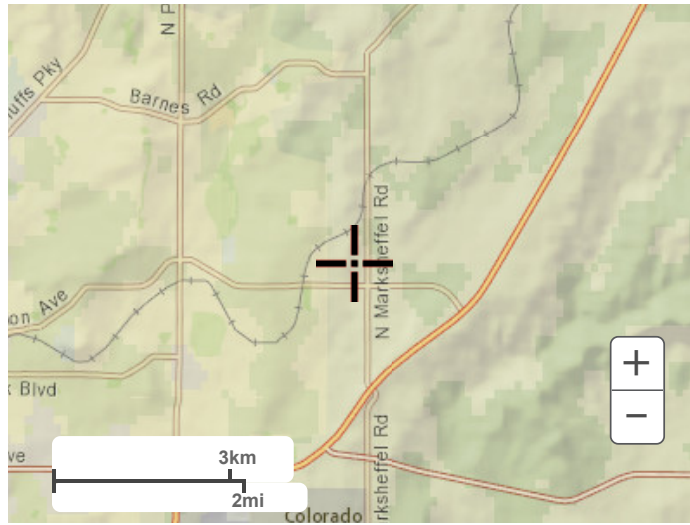
PDS-based depth-duration-frequency (DDF) curves
 Latitude: 38.8713°, Longitude: -104.6851°



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Maps & aerials

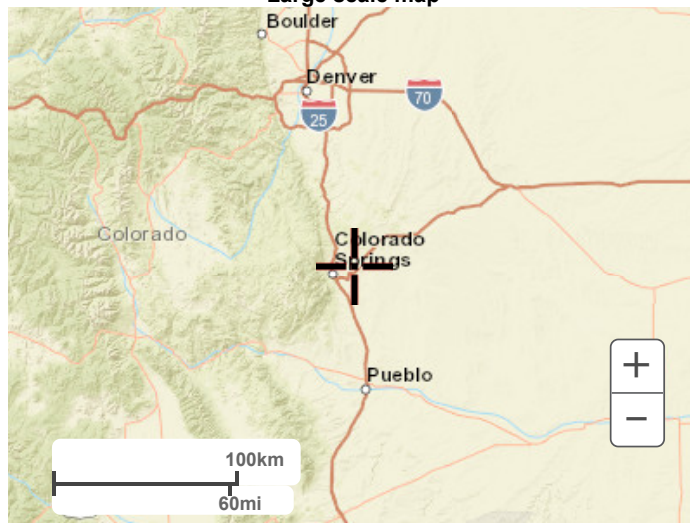
Small scale terrain



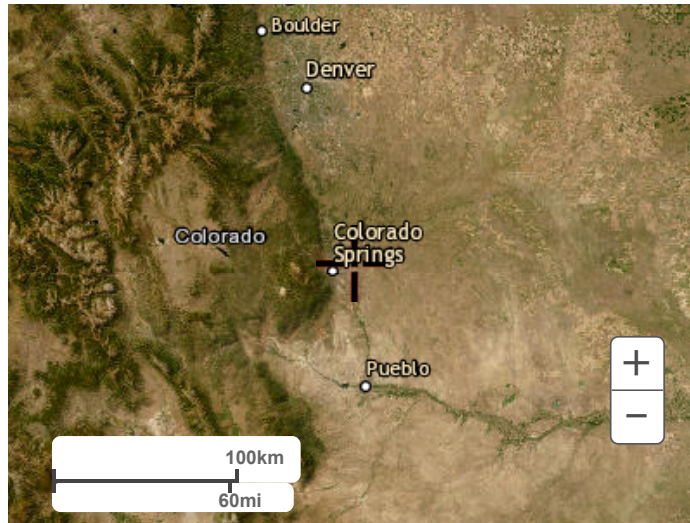
Large scale terrain



Large scale map



Large scale aerial



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[National Oceanic and Atmospheric Administration](#)
[National Weather Service](#)
[National Water Center](#)
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

[Disclaimer](#)



APPENDIX E

DESIGNED BY: SPC
DRAWN BY: SPC
CHECKED BY: SGB

PREPARED BY: DATE:

REVISION DESCRIPTION:

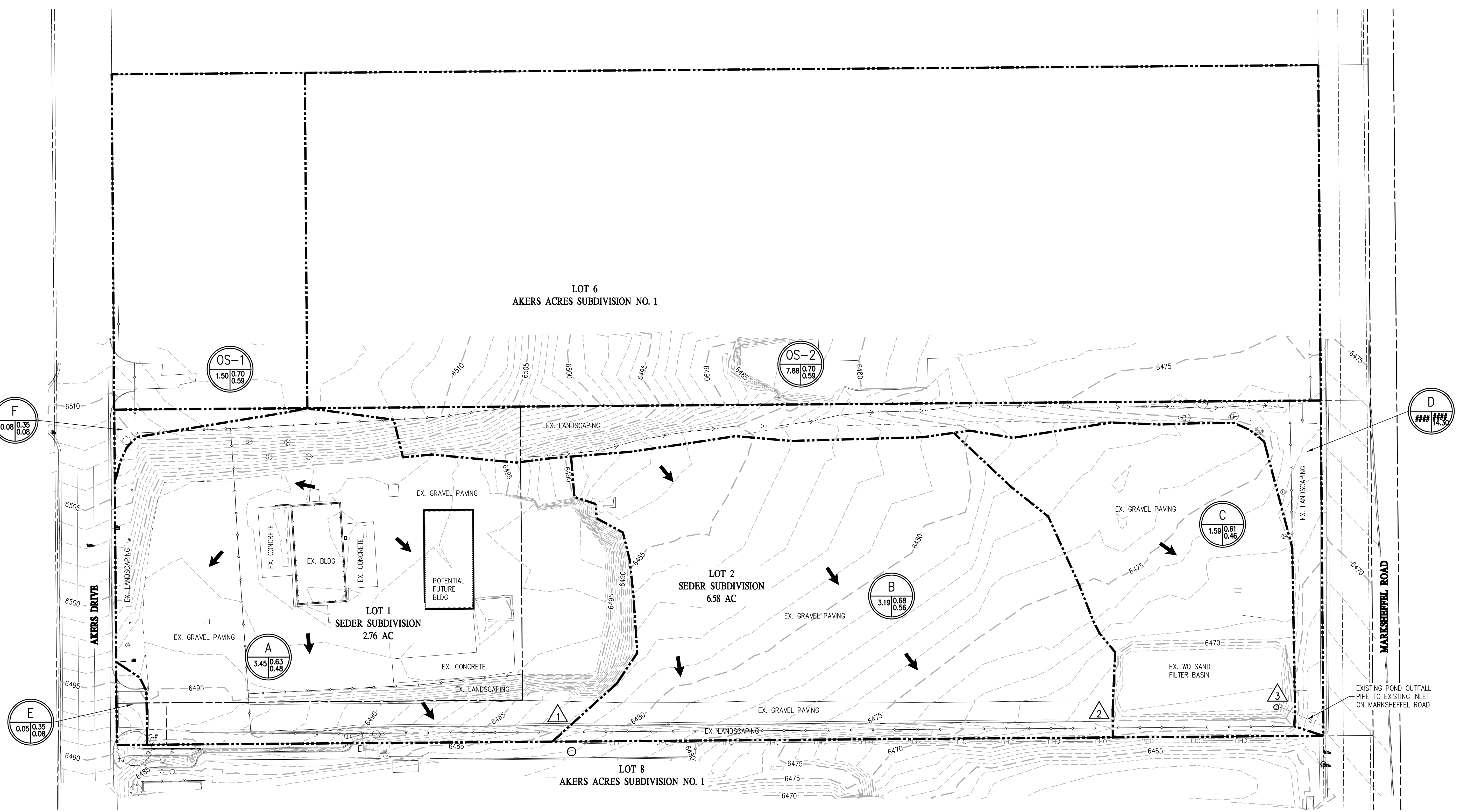
EL PASO COUNTY
SEDER SUBDIVISION
2725 AKERS DRIVE
DRAINAGE PLAN

UNINCORPORATED

SEDER INVESTMENT, LLC
SEDER SUBDIVISION
2725 AKERS DRIVE
DRAINAGE PLAN

FOR AND ON BEHALF OF
BASELINE CORPORATION

INITIAL SUBMITTAL: XX/XX/XX
DRAWING SIZE: 24" X 36"
SURVEY FIRM: SURVEY DATE: 07/21/23
JOB NO.: C035072
DRAWING NAME: 35072 - Drainage Maps.dwg
SHEET: 01 OF 01
DNG01



LEGEND

EXISTING LINETYPES	PROPOSED LINETYPES	
81	81	MINOR CONTOUR (1' INTERVAL)
5280	5280	MAJOR CONTOUR (5' INTERVAL)
		LOT LINE
		EASEMENT
		EDGE OF ASPHALT
		CURB AND GUTTER (SPILL/CATCH)
		EDGE OF BUILDING
		RETAINING WALL
		WIRE FENCE
ST ST		STORM SEWER
		DRAINAGE BASIN

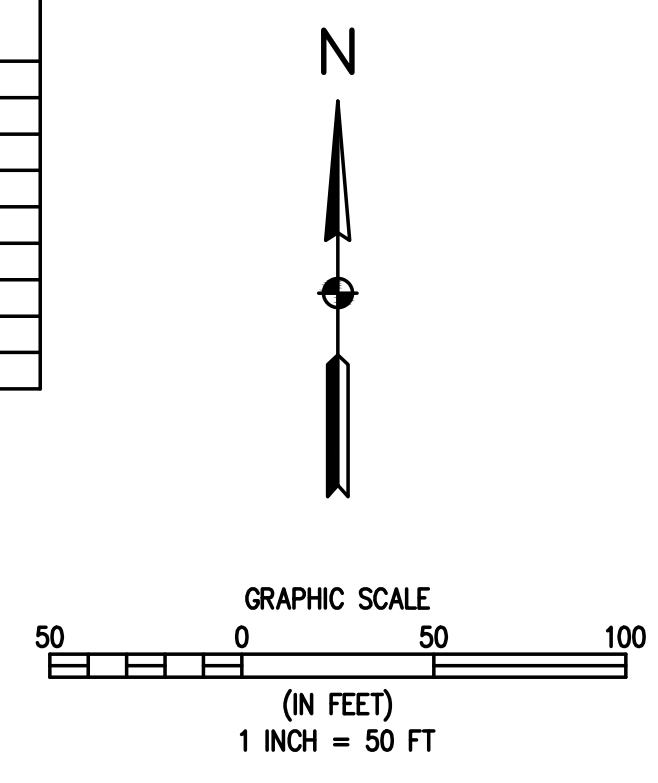
EXISTING SYMBOLS	PROPOSED SYMBOLS	
●	●	FOUND PROPERTY PIN AS DESCRIBED
▶	▶	NOMINAL SLOPE ON CUT OR FILL
→	→	FLOW DIRECTION, TYPICALLY ON PAVED SURFACES
⊙	⊙	FIRE HYDRANT
⊕	⊕	WATER VALVE
⊙	⊙	SANITARY MANHOLE
⊙	⊙	STORM DRAIN MANHOLE
⊙	⊙	TYPE 'C' INLET
⊙	⊙	LIGHT POLE
⊙	⊙	SIGN

DESIGN POINT DESIGNATION	
A	A = BASIN ID
B	B = BASIN AREA (ACRES)
C	C = 100YR COEFFICIENT
D	D = 5YR COEFFICIENT

DIRECT RUNOFF SUMMARY										
BASIN LABEL	DESIGN POINT	AREA [ac]	Imp. %	C5	C100	LOCAL (CFS)		ACCUMULATIVE (CFS)		Notes
						Q5	Q100	Q5	Q100	
Existing Subbasins										
A	1	3.45	60%	0.48	0.63	7.53	16.56			
B	2	3.19	75%	0.56	0.68	7.43	15.14			
C	3	1.59	59%	0.46	0.61	3.01	6.73			
D	OS	1.03	7%	0.13	0.38	0.53	2.69			
E	OS	0.05	0%	0.08	0.35	0.02	0.14			
F	OS	0.08	0%	0.08	0.35	0.02	0.16			
OS-1	OS	1.50	80%	0.59	0.70	2.82	7.20			
OS-2	OS	7.88	80%	0.59	0.70	15.35	39.14			

DESIGN POINT SUMMARY					
DESIGN POINT	LOCATION / STRUCTURE	DESCRIPTION	TOTAL FLOW (CFS)		CONTRIBUTING BASINS
			Q5	Q100	
EXISTING CONDITIONS DESIGN POINT SUMMARY					
1	SUBBASIN COMBINATION	SUBBASIN A DRAINS INTO SUBBASIN B	7.53	16.56	(A)
2	SUBBASIN COMBINATION	SUBBASIN A & B DRAIN INTO SUBBASIN C	14.96	31.70	(A,B)
3	OUTFALL	WQ BASIN OUTLET STRUCTURE	17.97	38.44	(A,B,C)
* Pond Outlet	OUTLET STRUCTURE	DATE RELEASE DATE	5.70	14.30	

*PER PRELIMINARY/FINAL DRAINAGE REPORT FOR LOT 7, AKERS ACRES SUBDIVISION NO 1 BY OBERING WURTH & ASSOCIATES, 2013



1 DRAINAGE PLAN
DNG01 DNG01