



Drainage Letter

Pair-A-Dise Subdivision

Filing No. 1

MVE Project No. 61155

August 15, 2023

PCD File No. SF-22-015

Drainage Letter

for

Pair-A-Dise Subdivision
Filing No. 1
El Paso County, Colorado

Project No. 61155

August 15, 2023

prepared for:

Sarah J Atwood
515 Struthers Loop
Colorado Springs, CO 80921

prepared by:

MVE, Inc.
1903 Lelaray Street, Suite 200
Colorado Springs, CO 80909
719.576.0311

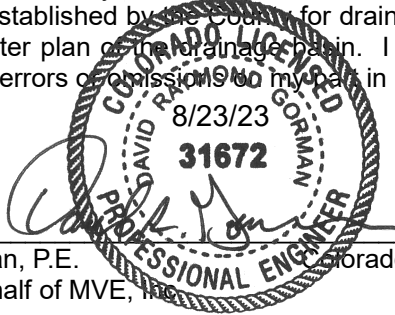
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61155 Drainage Letter.odt

Statements and Acknowledgments

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.



David R Gorman, P.E. Colorado No. 31672
For and on Behalf of MVE, Inc.

8/23/2023
Date

Developer's Statement

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

A handwritten signature in black ink, appearing to read "Sarah Atwood".

Sarah Atwood, Owner
515 Struthers Loop
Colorado Springs, CO 80921

8/22/23
Date

El Paso County

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.

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

Date

Conditions:

Drainage Letter

Introduction

The purpose of this Drainage Letter for Pair-A-Dise Subdivision Filing No. 1 is to fulfill the drainage requirements of the proposed Pair-A-Dise Subdivision. The owner intends to replat the subdivision as two (2) 2.5 acre lots. Splitting the current 5 acre lot (Zoned RR-2.5) in half.

The existing subdivision known as “Pair-A-Dise Subdivision” is located in the Northeast One-Quarter of Section 36, Township 11 South, Range 67 West of the 6th P.M., El Paso County, Colorado. The current addresses for the property is 515 Struthers Loop, Colorado Springs, CO 80921, which is currently a vacant lot. The subdivision is located approximately 1000 feet southwest of the intersection of Baptist Road, and Leather Chaps Drive. The site is located in the Jackson Creek Drainage Basin (FOMO4400), which is a tributary to Monument Creek. The subdivision is 5.04± acres in area and is zoned RR-2.5.

The site is bounded on all sides by the Chaparral Hills Subdivision. Lots 43 & 44 border the site to the north, lot 56 borders the site to the south, lot 37 borders the site to the west, and lots 39 & 40 border the site to the east.

Floodplain and Soil Information

According to the Federal Emergency Management Agency's Flood Insurance Rate Map (FIRM) Community Panel Number 08041C0287G, dated December 7, 2018, for El Paso County, Colorado the site is not located within any Federal Emergency Management Agency (FEMA) designated Special Flood Hazard Areas (SFHA). A portion of the **FIRM** is included with this Drainage Letter for reference.

According to the Natural Resources Conservation Service Web National Cooperative Soil Survey, there are two soil types located within the site. The majority of the soil (81.0%) is Tomah-Crowfoot complex (map unit 93), which is part of hydrologic soil group B. The Tomah-crowfoot complex is typically deep and well drained. The permeability of the soil is moderate to rapid, surface runoff is medium and hazard of erosion is moderate.

The other soil located within the site (19.0%) is Peyton-Pring Complex (map unit 68), which is part of hydrologic soil group B. The Peyton-Pring Complex soil is typically deep and well drained. The permeability of the soil is moderate to rapid, surface runoff is medium and hazard of erosion is moderate. A portion of the **National Cooperative Soil Survey Map** is included with this Drainage Letter.

Existing Drainage Conditions

The existing onsite drainage conditions are detailed in this Drainage Letter by three (3) onsite sub-basins, three (3) offsite sub-basins, and two (2) design points which are described in more detail below.

Offsite sub-basin OSA1 lies north of the site and extends to the east. This sub-basin is 23.72 acres in area and generates peak storm runoff discharges of $Q_5 = 10.4$ cfs and $Q_{100} = 46.3$ cfs (existing flows) which drains overland into sub-basin EX-A1.

Offsite sub-basin OSA2, located east of the site, is 5.01 acres in area. Sub-basin OSA2 generates peak storm runoff discharges of $Q_5 = 2.9$ cfs and $Q_{100} = 12.3$ cfs (existing flows) that drains overland into sub-basin EX-A1.

Offsite Sub-basin OSC1, located east of the site and south of sub-basin OSA1, is 11.85 acres in area and generates peak storm runoff discharges of $Q_5 = 4.8$ cfs and $Q_{100} = 23.5$ cfs (existing flows) which drains overland into sub-basin EX-C2.

Sub-basin EX-A3, located on the northern portion of the site, is an existing onsite sub-basin made up of pasture/meadow with some tree coverage around an existing swale on the northwestern corner of the site. Sub-basin EX-A3 is 2.13 acres in area and generates peak storm runoff discharges of $Q_5 = 0.6$ cfs and $Q_{100} = 4.7$ cfs (existing flows) which flow west offsite in the aforementioned swale. These flows combine with the flows from sub-basins OSA1, and OSA2 at design point 1 (EX-DP1). The combined peak storm runoff discharges at EX-DP1 are $Q_5 = 13.1$ cfs and $Q_{100} = 59.1$ cfs (existing flows).

Sub-basin EX-B1, located in the central portion of the site, is an existing sub-basin containing areas of pasture/meadow. Sub-basin EX-B1 is 1.29 acres in area and generates peak storm runoff discharges of $Q_5 = 0.4$ cfs and $Q_{100} = 2.9$ cfs (existing flows) which drains overland to the west into adjacent properties.

Sub-basin EX-C2, located on the southern portion of the site, is 1.58 acres in area and contains pasture/meadow. Sub-basin EX-C2 generates peak storm runoff discharges of $Q_5 = 0.5$ cfs and $Q_{100} = 3.5$ cfs (existing flows), which flow overland to the southwest into the adjacent properties. The flows from OSC1 and EX-C1 combine at Design Point 2 (EX-DP2) to produce peak storm runoff discharges of $Q_5 = 5.0$ cfs and $Q_{100} = 25.6$ cfs (existing flows).

Proposed Drainage Conditions

The proposed subdivision will not alter the existing basic drainage patterns of the site. The site will continue to drain off-site to the west as in existing conditions. There is a swale located in the northwestern corner of the site that appears to carry significant flows through the site. The swale will not be affected by the future developments of the site. The offsite sub-basins will experience the same developed flows as in existing conditions. The proposed flows in the onsite sub-basins are described below.

Sub-basin A3, located on the northern portion of the site, is an existing onsite sub-basin made up of pasture/meadow with some tree coverage around an existing swale on the northwestern corner of the site. The proposed sub-basin is to be developed into a RR-2.5 zoned site with a single family residence. Sub-basin A3 is 2.13 acres in area and generates peak storm runoff discharges of $Q_5 = 1.0$ cfs and $Q_{100} = 5.1$ cfs (proposed flows) which drains overland into the adjacent properties as in existing conditions. These flows combine with the flows from sub-basins OSA1, and OSA2 at design point 1 (DP1). The combined peak storm runoff discharges at DP1 are $Q_5 = 13.3$ cfs and $Q_{100} = 59.4$ cfs (proposed flows). Representing an increase of 0.51% for the 100 year flows.

Sub-basin B1, located in the central portion of the site, is an existing sub-basin, which contains areas of pasture/meadow, is 1.29 acres in area. The proposed sub-basin is to be developed into a RR-2.5 zoned site with a single family residence. Sub-basin B1 generates peak storm runoff discharges of $Q_5 = 0.6$ cfs and $Q_{100} = 3.1$ cfs (proposed flows) which drains overland to the adjacent property to the west. Representing an increase of 6.90% for the 100 year flows.

Sub-basin C2, located on the southern portion of the site, is 1.58 acres in area and contains pasture/meadow. The proposed sub-basin is to be developed into a RR-2.5 zoned site with a single family residence. Sub-basin C2 generates peak storm runoff discharges of $Q_5 = 0.8$ cfs and $Q_{100} = 3.9$ cfs (proposed flows), which flow overland to the southwest and into adjacent properties. The flows from OSC1 and C1 combine at Design Point 2 (DP2) to produce peak storm runoff discharges of $Q_5 = 5.3$ cfs and $Q_{100} = 26.0$ cfs (proposed flows). Representing an increase of 1.56% for the 100 year flows.

If cumulative soil disturbance for the future development of these two lots exceeds 1 acre, an El Paso County Erosion and Stormwater Quality Control Permit (ESQCP) is required prior to construction.

Four Step Process

The El Paso County Engineering Criteria Manual (Appendix I, Section I.7.2) requires the consideration of a “Four Step Process for receiving water protection that focuses on reducing runoff volumes, treating the water quality capture volume (WQCV), stabilizing drainageways, and implementing long term source controls”. The Four Step Process is incorporated in this project and the elements are discussed below.

The site will be excluded from Post Construction Stormwater Management requirements by ECM I.7.1.B.5 due to the low development density as 2.5-acre lots. This exclusion only applies if the site impervious remains below 10%. It is anticipated that site imperviousness for each rural residential lot will be below 10%.

1) Runoff Reduction Practices are employed in this project. Impervious surfaces have been reduced as much as practically possible with the low residential density. All impervious surfaces on the site will drain to the surrounding pervious areas allowing infiltration and water quality mitigation. Minimized Directly Connected Impervious Areas (MDCIA) is employed on the project because runoff from the impervious areas of the future home sites will pass over the adjacent natural grassed areas for a distance of 25 feet to 300 feet before entering a roadside ditch or natural drainage way.

2) All drainage paths on the site will remain stabilized with the natural native grass lining. Disturbed areas will be reseeded. All culverts will have rip-rap aprons at entrance and exits. The swale with the existing stable vegetative cover consisting of the natural native grasses on the site are adequate to convey the minor and major storm flows without erosion and sedimentation. No further stabilization is required.

3) The project contains no potentially hazardous uses. The site is exempted from the use of WQCV BMPs by ECM 1.7.1.B.5 by virtue of the large lot rural residential nature of the site having percent imperviousness of less than 10%. The site includes the use of permanent rip rap aprons at the culvert crossings to control potential sedimentation. The runoff in the roadside ditches of the public roadway will infiltrate into the ground, evaporate, or evapotranspire a quantity of water equal to at least 60% of what the calculated WQCV would be if all impervious area for the applicable development site discharged without infiltration.

4) The site contains no storage of potentially harmful substances or use of potentially harmful substances. No Site Specific or Other Source Control BMPs are required.

No drainage improvements will be required for the project.

Drainage Fees

The Jackson Creek Drainage Basin is a studied basin and drainage fees are required for the increased impervious acreage associated with the subdivision. No Bridge Fees are due for the proposed Pair-A-Dise Subdivision. As these lots are vacant and newly formed, no prior drainage fees have been paid for either lot. The drainage fees are based upon expected impervious area for each type of development for fully developed conditions. The imperviousness of the site is set at 11.0% for 2.5 acre residential according to table 3-1 of the El Paso County Drainage Criteria Manual Volume 1.

The Pair-A-Dise Subdivision site contains 5.005 acres of land. The Board of County Commissioners, County of El Paso, State of Colorado Resolution No. 20-424 allows the drainage basin fee to be based on impervious acreage. The drainage fees for these lots have not been previously paid as it was not noted on the most recent plat made in 1971 (Filed under Reception No.

SF-71030). Therefore the drainage fees for this subdivision will be based on an imperviousness of 11%.

The resolution also allows a fee reduction of 25% for those portions of the development that consist entirely of 2.5 acre lots. The Pair-A-Dise Subdivision site has lots which are all greater than the 2.5 acre limit and therefore qualify for the reduction.

FEE CALCULATION (2023 Fees)

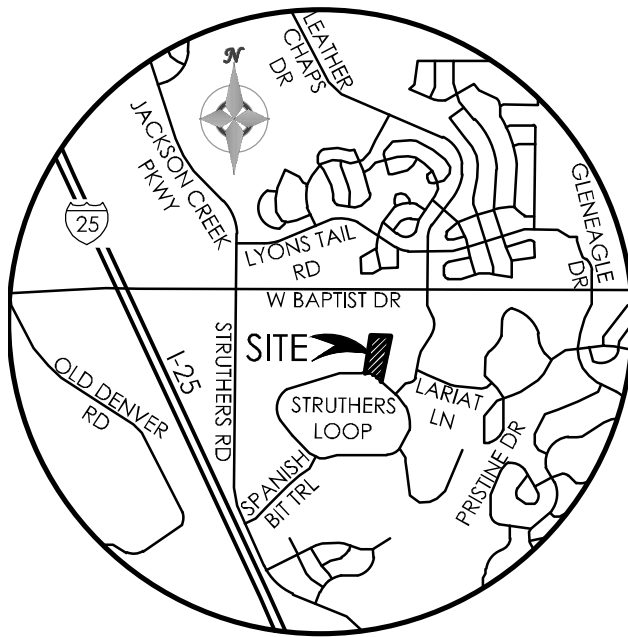
Jackson Creek Drainage Basin

Drainage fee:	\$9,135 / Impervious Acre X 5.005 Acres X 0.11	= \$ 5,030
25% Fee Reduction		= <u>(\$ 1,258)</u>
	Grand Total Fees	= \$ 3,772

Conclusion

In Conclusion, the drainage patterns generated by the Pair-A-Dise Subdivision site under proposed developed conditions are essentially the same as those which existed for the existing Plan. The site and drainage are substantially in accordance with the previously approved Drainage Map prepared by Colorado Engineers Inc. (Filed under Reception No. SF-71030, July 1971). The proposed development as described in this Drainage Letter will have no adverse impacts to downstream and surrounding developments or downstream drainage ways or storm drain facilities.

| Attachments



VICINITY MAP

NOT TO SCALE

Job No.: 61155
 Project: 515 Struthers Loop

Date: 10/11/2021 9:48
 Calcs By: WCG
 Checked By: _____

Time of Concentration (Modified from Standard Form SF-1)

Sub-Basin	Sub-Basin Data				Overland			Shallow Channel				Channelized				t _c Check		t _c (min)
	Area (Acres)	C ₅	C ₁₀₀ /CN	% Imp.	L ₀ (ft)	S ₀ (%)	t _i (min)	L _{0t} (ft)	S _{0t} (ft/ft)	v _{0sc} (ft/s)	t _t (min)	L _{0c} (ft)	S _{0c} (ft/ft)	v _{0c} (ft/s)	t _c (min)	L (min)	t _{c,alt} (min)	
OSA1	23.72	0.15	0.40	9%	100	7%	9.0	1166	0.049	1.5	12.6	707	0.041	5.7	2.1	1973	21.0	21.0
OSA2	5.01	0.16	0.41	12%	100	3%	11.8	511	0.041	1.4	6.0	0	0.000	0.0	0.0	611	13.4	13.4
EX-A3	2.13	0.08	0.35	0%	100	5%	10.8	313	0.077	1.9	2.7	0	0.000	0.0	0.0	413	12.3	12.3
EX-B1	1.29	0.08	0.35	0%	100	5%	10.8	125	0.072	1.9	1.1	0	0.000	0.0	0.0	225	11.3	11.3
OSC1	11.85	0.13	0.39	7%	100	8%	8.8	1493	0.054	1.6	15.3	0	0.000	0.0	0.0	1593	18.9	18.9
EX-C2	1.58	0.08	0.35	0%	100	5%	10.8	215	0.042	1.4	2.5	0	0.000	0.0	0.0	315	11.8	11.8

Job No.: **61155**
 Project: **515 Struthers Loop**
 Design Storm: **5-Year Storm (20% Probability)**
 Jurisdiction: **UDFCD**

Date: **10/11/2021 9:48**
 Calcs By: **WCG**
 Checked By: _____

Sub-Basin and Combined Flows (Modified from Standard Form SF-2)

DP	Sub-Basin	Area (Acres)	C5	Direct Runoff				Combined Runoff				Streetflow			Pipe Flow					Travel Time		
				t _c (min)	CA (Acres)	I5 (in/hr)	Q5 (cfs)	t _c (min)	CA (Acres)	I5 (in/hr)	Q5 (cfs)	Slope (%)	Length (ft)	Q (cfs)	Q (cfs)	Slope (%)	Mnngs n	Length (ft)	D _{Pipe} (in)	Length (ft)	V _{disc} (ft/s)	t _t (min)
DP1	OSA1	23.72	0.15	21.0	3.62	2.88	10.42															
	OSA2	5.01	0.16	13.4	0.80	3.59	2.87															
	EX-A1	30.86	0.15					21.4	4.68	2.85	13.3											
DP2	EX-B1	1.29	0.08	11.3	0.10	3.87	0.40															
	OSC1	11.85	0.13	18.9	1.57	3.04	4.79															
	EX-C2	1.58	0.08	11.8	0.13	3.80	0.48															
		13.43	0.13					19.8	1.79	2.96	5.3											

Rainfall Intensity: $I = (28.5 * P1) / (10 + tc)^{0.786}$
 P1: 1.5

Job No.: **61155**
 Project: **515 Struthers Loop**
 Design Storm: **100-Year Storm (1% Probability)**
 Jurisdiction: **UDFCD**

Date: **10/11/2021 9:48**
 Calcs By: **WCG**
 Checked By: _____

Sub-Basin and Combined Flows (Modified from Standard Form SF-2)

DP	Sub-Basin	Area (Acres)	C100	Direct Runoff				Combined Runoff				Streetflow			Pipe Flow					Travel Time		
				t _c (min)	CA (Acres)	I100 (in/hr)	Q100 (cfs)	t _c (min)	CA (Acres)	I100 (in/hr)	Q100 (cfs)	Slope (%)	Length (ft)	Q (cfs)	Q (cfs)	Slope (%)	Mnngs n	Length (ft)	D _{Pipe} (in)	Length (ft)	V _{disc} (ft/s)	t _t (min)
DP1	OSA1	23.72	0.40	21.0	9.57	4.84	46.26															
	OSA2	5.01	0.41	13.4	2.03	6.03	12.27															
	EX-A3	2.13	0.35	12.3	0.75	6.26	4.66															
		30.86	0.40					21.4	12.41	4.79	59.4											
DP2	EX-B1	1.29	0.35	11.3	0.45	6.50	2.94															
	OSC1	11.85	0.39	18.9	4.60	5.11	23.51															
	EX-C2	1.58	0.35	11.8	0.55	6.38	3.52															
		13.43	0.39					19.8	5.21	4.98	26.0											

Rainfall Intensity: $I = (28.5 * P1) / (10 + tc)^{0.786}$
 P1: 2.52

Sub-Basin OSA1 Runoff Calculations

Job No.: 61155
 Project: 515 Struthers Loop
 Jurisdiction: **UDFCD**
 Runoff Coefficient: **Surface Type**

Date: 10/11/2021 9:48
 Calcs by: WCG
 Checked by: _____
 Soil Type: **B**
 Urbanization: **Urban**

Basin Land Use Characteristics

Surface	Area		Runoff Coefficient						% Imperv.
	(SF)	(Acres)	C2	C5	C10	C25	C50	C100	
Pasture/Meadow	934,898	21.46	0.02	0.08	0.15	0.25	0.3	0.35	0%
Paved	66,200	1.52	0.89	0.9	0.92	0.94	0.95	0.96	100%
Roofs	31,267	0.72	0.71	0.73	0.75	0.78	0.8	0.81	90%
Gravel	902	0.02	0.57	0.59	0.63	0.66	0.68	0.7	80%
Combined	1,033,267	23.72	0.10	0.15	0.22	0.31	0.36	0.40	9.2%

1033267

Basin Travel Time

	Shallow Channel	Ground Cover	Short Pasture/Lawns				
	$L_{max,Overland}$	300 ft	C_v	7			
	L (ft)	ΔZ_0 (ft)	S_0 (ft/ft)	v (ft/s)	t (min)	t_{Alt} (min)	
Total	1,973	93	-	-	-	-	
Initial Time	100	7	0.070	-	9.0	21.0	UDFCD Formula RO-3
Shallow Channel	1,166	57	0.049	1.5	12.6	-	UDFCD Formula RO-4
Channelized	707	29	0.041	5.7	2.1	-	V-Ditch
				t_c	21.0 min.		

Rainfall Intensity & Runoff

	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Intensity (in/hr)	2.28	2.88	3.36	3.84	4.32	4.84
Runoff (cfs)	5.3	10.4	17.4	28.3	36.6	46.3
Release Rates (cfs/ac)	-	-	-	-	-	-
Allowed Release (cfs)	5.3	10.4	17.4	28.3	36.6	46.3

UDFCD: $I = (28.5 * P1) / (10 + t_c)^{0.786}$

PI 1.19 1.5 1.75 2 2.25 2.52

Notes

Sub-Basin OSA2 Runoff Calculations

Job No.: 61155
 Project: 515 Struthers Loop
 Jurisdiction: **UDFCD**
 Runoff Coefficient: **Surface Type**

Date: 10/11/2021 9:48
 Calcs by: WCG
 Checked by: _____
 Soil Type: **B**
 Urbanization: **Urban**

Basin Land Use Characteristics

Surface	Area		Runoff Coefficient						% Imperv.
	(SF)	(Acres)	C2	C5	C10	C25	C50	C100	
Pasture/Meadow	188,001	4.32	0.02	0.08	0.15	0.25	0.3	0.35	0%
Gravel	20,513	0.47	0.57	0.59	0.63	0.66	0.68	0.7	80%
Roofs	6,598	0.15	0.71	0.73	0.75	0.78	0.8	0.81	90%
Paved	3,268	0.08	0.89	0.9	0.92	0.94	0.95	0.96	100%
Combined	218,380	5.01	0.11	0.16	0.22	0.31	0.36	0.41	11.7%

218380

Basin Travel Time

	Shallow Channel Ground Cover		Short Pasture/Lawns			
	L _{max,Overland} (ft)	ΔZ ₀ (ft)	S ₀ (ft/ft)	v (ft/s)	t (min)	t _{Alt} (min)
Total	611	24	-	-	-	-
Initial Time	100	3	0.030	-	11.8	13.4 UDFCD Formula RO-3
Shallow Channel	511	21	0.041	1.4	6.0	- UDFCD Formula RO-4
Channelized			0.000	0.0	0.0	- V-Ditch
				t_c	13.4 min.	

Rainfall Intensity & Runoff

	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Intensity (in/hr)	2.85	3.59	4.19	4.78	5.38	6.03
Runoff (cfs)	1.5	2.9	4.7	7.6	9.7	12.3
Release Rates (cfs/ac)	-	-	-	-	-	-
Allowed Release (cfs)	1.5	2.9	4.7	7.6	9.7	12.3

UDFCD: $I = (28.5 * P1) / (10 + t_c)^{0.786}$

PI 1.19 1.5 1.75 2 2.25 2.52

Notes

Sub-Basin OSC1 Runoff Calculations

Job No.: 61155
 Project: 515 Struthers Loop
 Jurisdiction: UDFCD
 Runoff Coefficient: Surface Type

Date: 10/11/2021 9:48
 Calcs by: WCG
 Checked by: _____
 Soil Type: B
 Urbanization: Urban

Basin Land Use Characteristics

Surface	Area		Runoff Coefficient						% Imperv.
	(SF)	(Acres)	C2	C5	C10	C25	C50	C100	
Pasture/Meadow	475,982	10.93	0.02	0.08	0.15	0.25	0.3	0.35	0%
Roofs	12,669	0.29	0.71	0.73	0.75	0.78	0.8	0.81	90%
Gravel	11,813	0.27	0.57	0.59	0.63	0.66	0.68	0.7	80%
Paved	15,860	0.36	0.89	0.9	0.92	0.94	0.95	0.96	100%
Combined	516,324	11.85	0.08	0.13	0.20	0.29	0.34	0.39	7.1%

516324

Basin Travel Time

	Shallow Channel	Ground Cover	Short Pasture/Lawns				
	$L_{max,Overland}$	300 ft	C_v	7			
	L (ft)	ΔZ_0 (ft)	S_0 (ft/ft)	v (ft/s)	t (min)	t_{Alt} (min)	
Total	1,593	89	-	-	-	-	
Initial Time	100	8	0.080	-	8.8	18.9	UDFCD Formula RO-3
Shallow Channel	1,493	81	0.054	1.6	15.3	-	UDFCD Formula RO-4
Channelized			0.000	0.0	0.0	-	V-Ditch
				t_c	18.9 min.		

Rainfall Intensity & Runoff

	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Intensity (in/hr)	2.41	3.04	3.55	4.06	4.56	5.11
Runoff (cfs)	2.2	4.8	8.4	14.1	18.4	23.5
Release Rates (cfs/ac)	-	-	-	-	-	-
Allowed Release (cfs)	2.2	4.8	8.4	14.1	18.4	23.5

UDFCD: $I = (28.5 * P1) / (10 + t_c)^{0.786}$

PI 1.19 1.5 1.75 2 2.25 2.52

Notes

Sub-Basin Ex-A3 Runoff Calculations

Job No.: 61155
 Project: 515 Struthers Loop
 Jurisdiction: **UDFCD**
 Runoff Coefficient: **Surface Type**

Date: 10/11/2021 9:48
 Calcs by: WCG
 Checked by: _____
 Soil Type: **B**
 Urbanization: **Urban**

Basin Land Use Characteristics

Surface	Area		Runoff Coefficient						% Imperv.
	(SF)	(Acres)	C2	C5	C10	C25	C50	C100	
Pasture/Meadow	92,726	2.13	0.02	0.08	0.15	0.25	0.3	0.35	0%
Combined	92,726	2.13	0.02	0.08	0.15	0.25	0.30	0.35	0.0%

Basin Travel Time

	Shallow Channel Ground Cover		Short Pasture/Lawns			
	$L_{max,Overland}$	300 ft			C_v	7
	L (ft)	ΔZ_0 (ft)	S_0 (ft/ft)	v (ft/s)	t (min)	t_{Alt} (min)
Total	413	29	-	-	-	-
Initial Time	100	5	0.050	-	10.8	12.3 UDFCD Formula RO-3
Shallow Channel	313	24	0.077	1.9	2.7	- UDFCD Formula RO-4
Channelized			0.000	0.0	0.0	- V-Ditch
				t_c	12.3 min.	

Rainfall Intensity & Runoff

	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Intensity (in/hr)	2.96	3.73	4.35	4.97	5.59	6.26
Runoff (cfs)	0.1	0.6	1.4	2.6	3.6	4.7
Release Rates (cfs/ac)	-	-	-	-	-	-
Allowed Release (cfs)	0.1	0.6	1.4	2.6	3.6	4.7

UDFCD: $I = (28.5 * P1) / (10 + t_c)^{0.786}$

PI 1.19 1.5 1.75 2 2.25 2.52

Notes

Sub-Basin Ex-B1 Runoff Calculations

Job No.: 61155
 Project: 515 Struthers Loop
 Jurisdiction: **UDFCD**
 Runoff Coefficient: **Surface Type**

Date: 10/11/2021 9:48
 Calcs by: WCG
 Checked by: _____
 Soil Type: **B**
 Urbanization: **Urban**

Basin Land Use Characteristics

Surface	Area		Runoff Coefficient						% Imperv.
	(SF)	(Acres)	C2	C5	C10	C25	C50	C100	
Pasture/Meadow	56,234	1.29	0.02	0.08	0.15	0.25	0.3	0.35	0%
Combined	56,234	1.29	0.02	0.08	0.15	0.25	0.30	0.35	0.0%

Basin Travel Time

	Shallow Channel Ground Cover		Short Pasture/Lawns				
	$L_{max,Overland}$	300 ft			C_v	7	
	L (ft)	ΔZ_0 (ft)	S_0 (ft/ft)	v (ft/s)	t (min)	t_{Alt} (min)	
Total	225	14	-	-	-	-	
Initial Time	100	5	0.050	-	10.8	11.3	UDFCD Formula RO-3
Shallow Channel	125	9	0.072	1.9	1.1	-	UDFCD Formula RO-4
Channelized			0.000	0.0	0.0	-	V-Ditch
				t_c	11.3 min.		

Rainfall Intensity & Runoff

	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Intensity (in/hr)	3.07	3.87	4.51	5.16	5.80	6.50
Runoff (cfs)	0.1	0.4	0.9	1.7	2.2	2.9
Release Rates (cfs/ac)	-	-	-	-	-	-
Allowed Release (cfs)	0.1	0.4	0.9	1.7	2.2	2.9

UDFCD: $I = (28.5 * P1) / (10 + t_c)^{0.786}$

PI 1.19 1.5 1.75 2 2.25 2.52

Notes

Sub-Basin Ex-C2 Runoff Calculations

Job No.: 61155
 Project: 515 Struthers Loop
 Jurisdiction: **UDFCD**
 Runoff Coefficient: **Surface Type**

Date: 10/11/2021 9:48
 Calcs by: WCG
 Checked by: _____
 Soil Type: **B**
 Urbanization: **Urban**

Basin Land Use Characteristics

Surface	Area		Runoff Coefficient						% Imperv.
	(SF)	(Acres)	C2	C5	C10	C25	C50	C100	
Pasture/Meadow	68,650	1.58	0.02	0.08	0.15	0.25	0.3	0.35	0%
Combined	68,650	1.58	0.02	0.08	0.15	0.25	0.30	0.35	0.0%

Basin Travel Time

	Shallow Channel Ground Cover		Short Pasture/Lawns			
	L _{max,Overland} (ft)	ΔZ ₀ (ft)	S ₀ (ft/ft)	v (ft/s)	t (min)	t _{Alt} (min)
Total	315	14	-	-	-	-
Initial Time	100	5	0.050	-	10.8	11.8 UDFCD Formula RO-3
Shallow Channel	215	9	0.042	1.4	2.5	- UDFCD Formula RO-4
Channelized			0.000	0.0	0.0	- V-Ditch
				t_c	11.8 min.	

Rainfall Intensity & Runoff

	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Intensity (in/hr)	3.01	3.80	4.43	5.07	5.70	6.38
Runoff (cfs)	0.1	0.5	1.0	2.0	2.7	3.5
Release Rates (cfs/ac)	-	-	-	-	-	-
Allowed Release (cfs)	0.1	0.5	1.0	2.0	2.7	3.5

UDFCD: $I = (28.5 * P1) / (10 + t_c)^{0.786}$

PI 1.19 1.5 1.75 2 2.25 2.52

Notes

Sub-Basin A3 Runoff Calculations

Job No.: 61155
 Project: 515 Struthers Loop
 Jurisdiction: **UDFCD**
 Runoff Coefficient: **Surface Type**

Date: 10/11/2021 9:48
 Calcs by: WCG
 Checked by: _____
 Soil Type: **B**
 Urbanization: **Urban**

Basin Land Use Characteristics

Surface	Area		Runoff Coefficient						% Imperv.
	(SF)	(Acres)	C2	C5	C10	C25	C50	C100	
Pasture/Meadow	85,726	1.97	0.02	0.08	0.15	0.25	0.3	0.35	0%
Roofs	3,000	0.07	0.71	0.73	0.75	0.78	0.8	0.81	90%
Gravel	4,000	0.09	0.57	0.59	0.63	0.66	0.68	0.7	80%
Combined	92,726	2.13	0.07	0.12	0.19	0.28	0.33	0.38	6.4%

Basin Travel Time

	Shallow Channel Ground Cover		Short Pasture/Lawns			
	L _{max,Overland} (ft)	ΔZ ₀ (ft)	S ₀ (ft/ft)	v (ft/s)	t (min)	t _{Alt} (min)
Total	413	29	-	-	-	-
Initial Time	100	5	0.050	-	10.4	12.3 UDFCD Formula RO-3
Shallow Channel	313	24	0.077	1.9	2.7	- UDFCD Formula RO-4
Channelized			0.000	0.0	0.0	- V-Ditch
				t_c	12.3 min.	

Rainfall Intensity & Runoff

	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Intensity (in/hr)	2.96	3.73	4.35	4.97	5.59	6.26
Runoff (cfs)	0.4	1.0	1.8	3.0	4.0	5.1
Release Rates (cfs/ac)	-	-	-	-	-	-
Allowed Release (cfs)	0.4	1.0	1.8	3.0	4.0	5.1

UDFCD: $I = (28.5 * P1) / (10 + t_c)^{0.786}$

PI 1.19 1.5 1.75 2 2.25 2.52

Notes

Sub-Basin B1 Runoff Calculations

Job No.: 61155
 Project: 515 Struthers Loop
 Jurisdiction: **UDFCD**
 Runoff Coefficient: **Surface Type**

Date: 10/11/2021 9:48
 Calcs by: WCG
 Checked by: _____
 Soil Type: **B**
 Urbanization: **Urban**

Basin Land Use Characteristics

Surface	Area		Runoff Coefficient						% Imperv.
	(SF)	(Acres)	C2	C5	C10	C25	C50	C100	
Pasture/Meadow	52,234	1.20	0.02	0.08	0.15	0.25	0.3	0.35	0%
Gravel	4,000	0.09	0.57	0.59	0.63	0.66	0.68	0.7	80%
Combined	56,234	1.29	0.06	0.12	0.18	0.28	0.33	0.37	5.7%

Basin Travel Time

	Shallow Channel Ground Cover		Short Pasture/Lawns			
	L _{max,Overland} (ft)	ΔZ ₀ (ft)	S ₀ (ft/ft)	v (ft/s)	t (min)	t _{Alt} (min)
Total	225	14	-	-	-	-
Initial Time	100	5	0.050	-	10.4	11.3 UDFCD Formula RO-3
Shallow Channel	125	9	0.072	1.9	1.1	- UDFCD Formula RO-4
Channelized			0.000	0.0	0.0	- V-Ditch
				t_c	11.3 min.	

Rainfall Intensity & Runoff

	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Intensity (in/hr)	3.07	3.87	4.51	5.16	5.80	6.50
Runoff (cfs)	0.2	0.6	1.1	1.9	2.5	3.1
Release Rates (cfs/ac)	-	-	-	-	-	-
Allowed Release (cfs)	0.2	0.6	1.1	1.9	2.5	3.1

UDFCD: $I = (28.5 * P1) / (10 + t_c)^{0.786}$

PI 1.19 1.5 1.75 2 2.25 2.52

Notes

Sub-Basin C2 Runoff Calculations

Job No.: 61155
 Project: 515 Struthers Loop
 Jurisdiction: UDFCD
 Runoff Coefficient: Surface Type

Date: 10/11/2021 9:48
 Calcs by: WCG
 Checked by: _____
 Soil Type: B
 Urbanization: Urban

Basin Land Use Characteristics

Surface	Area		Runoff Coefficient						% Imperv.
	(SF)	(Acres)	C2	C5	C10	C25	C50	C100	
Pasture/Meadow	61,650	1.42	0.02	0.08	0.15	0.25	0.3	0.35	0%
Roofs	3,000	0.07	0.71	0.73	0.75	0.78	0.8	0.81	90%
Gravel	4,000	0.09	0.57	0.59	0.63	0.66	0.68	0.7	80%
Combined	68,650	1.58	0.08	0.14	0.20	0.30	0.34	0.39	8.6%

68650

Basin Travel Time

	Shallow Channel Ground Cover		Short Pasture/Lawns			
	$L_{max,Overland}$	300 ft			C_v	7
	L (ft)	ΔZ_0 (ft)	S_0 (ft/ft)	v (ft/s)	t (min)	t_{Alt} (min)
Total	315	14	-	-	-	-
Initial Time	100	5	0.050	-	10.2	11.8 UDFCD Formula RO-3
Shallow Channel	215	9	0.042	1.4	2.5	- UDFCD Formula RO-4
Channelized			0.000	0.0	0.0	- V-Ditch
				t_c	11.8 min.	

Rainfall Intensity & Runoff

	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Intensity (in/hr)	3.01	3.80	4.43	5.07	5.70	6.38
Runoff (cfs)	0.4	0.8	1.4	2.4	3.1	3.9
Release Rates (cfs/ac)	-	-	-	-	-	-
Allowed Release (cfs)	0.4	0.8	1.4	2.4	3.1	3.9

UDFCD: $I = (28.5 * P1) / (10 + t_c)^{0.786}$

PI 1.19 1.5 1.75 2 2.25 2.52

Notes

Combined Sub-Basin Runoff Calculations

Includes Basins OSA1 OSA2 EX-A3

Job No.:	61155	Date:	10/11/2021 9:48
Project:	515 Struthers Loop	Calcs by:	WCG
Jurisdiction	UDFCD	Checked by:	
Runoff Coefficient	Surface Type	Soil Type	B
		Urbanization	Urban

Basin Land Use Characteristics

Surface	Area		Runoff Coefficient						% Imperv.
	(SF)	(Acres)	C2	C5	C10	C25	C50	C100	
Paved	69,468	1.59	0.89	0.9	0.92	0.94	0.95	0.96	100%
Gravel	21,415	0.49	0.57	0.59	0.63	0.66	0.68	0.7	80%
Pasture/Meadow	1,215,625	27.91	0.02	0.08	0.15	0.25	0.3	0.35	0%
Roofs	37,865	0.87	0.71	0.73	0.75	0.78	0.8	0.81	90%
Combined	1,344,373	30.86	0.09	0.15	0.21	0.31	0.35	0.40	9.0%

Basin Travel Time

	Sub-basin or Channel Type	Material Type	L (ft)	Elev. ΔZ ₀ (ft)	Q _i (cfs)	Base or Dia (ft)	Sides z:1 (ft/ft)	v (ft/s)	t (min)
Furthest Reach	OSA1	-	1,973	93	-	-	-	-	21.0
Channelized-1	V-Ditch	2	153	7	46	0	2	6.4	0.4
Channelized-2									
Channelized-3									
Total			2,126	100					

2 = Natural, Winding, minimal vegetation/shallow grass

t_c (min) 21.4

Contributing Offsite Flows (Added to Runoff and Allowed Release, below.)

Contributing Basins/Areas

Q_{Minor} (cfs) - 5-year Storm

Q_{Major} (cfs) - 100-year Storm

Rainfall Intensity & Runoff

	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Intensity (in/hr)	2.26	2.85	3.32	3.80	4.27	4.79
Site Runoff (cfs)	6.50	13.09	21.99	36.01	46.66	59.11
OffSite Runoff (cfs)	-	0.00	-	-	-	0.00
Release Rates (cfs/ac)	-	-	-	-	-	-
Allowed Release (cfs)	-	13.1	-	-	-	59.1

UDFCD: $I = (28.5 * P1) / (10 + t_c)^{0.786}$

PI 1.19 1.5 1.75 2 2.25 2.52

Notes

Runoff from Offsite basins have been assumed constant, despite additional times of concentration.

Combined Sub-Basin Runoff Calculations

Includes Basins OSC1 EX-C2

Job No.:	61155	Date:	10/11/2021 9:48
Project:	515 Struthers Loop	Calcs by:	WCG
Jurisdiction	UDFCD	Checked by:	
Runoff Coefficient	Surface Type	Soil Type	B
		Urbanization	Urban

Basin Land Use Characteristics

Surface	Area		Runoff Coefficient						% Imperv.
	(SF)	(Acres)	C2	C5	C10	C25	C50	C100	
Paved	15,860	0.36	0.89	0.9	0.92	0.94	0.95	0.96	100%
Gravel	11,813	0.27	0.57	0.59	0.63	0.66	0.68	0.7	80%
Pasture/Meadow	544,632	12.50	0.02	0.08	0.15	0.25	0.3	0.35	0%
Roofs	12,669	0.29	0.71	0.73	0.75	0.78	0.8	0.81	90%
Combined	584,974	13.43	0.07	0.13	0.19	0.29	0.34	0.38	6.3%

Basin Travel Time

	Sub-basin or Channel Type	Material Type	L (ft)	Elev. ΔZ ₀ (ft)	Q _i (cfs)	Base or Dia (ft)	Sides z:1 (ft/ft)	v (ft/s)	t (min)
Furthest Reach	OSC1	-	1,593	89	-	-	-	-	18.9
Channelized-1	V-Ditch	2	315	14	24	0	2	5.3	1.0
Channelized-2									
Channelized-3									
Total		DP2		103					

2 = Natural, Winding, minimal vegetation/shallow grass

t_c (min) 19.8

Contributing Offsite Flows (Added to Runoff and Allowed Release, below.)

Contributing Basins/Areas

Q_{Minor} (cfs) - 5-year Storm

Q_{Major} (cfs) - 100-year Storm

Rainfall Intensity & Runoff

	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Intensity (in/hr)	2.35	2.96	3.46	3.95	4.45	4.98
Site Runoff (cfs)	2.20	5.04	8.99	15.31	20.07	25.65
OffSite Runoff (cfs)	-	0.00	-	-	-	0.00
Release Rates (cfs/ac)	-	-	-	-	-	-
Allowed Release (cfs)	-	5.0	-	-	-	25.6

UDFCD: $I = (28.5 * P1) / (10 + t_c)^{0.786}$

PI 1.19 1.5 1.75 2 2.25 2.52

Notes

Runoff from Offsite basins have been assumed constant, despite additional times of concentration.

Combined Sub-Basin Runoff Calculations

Includes Basins OSA1 OSA2 A3

Job No.:	61155	Date:	10/11/2021 9:48
Project:	515 Struthers Loop	Calcs by:	WCG
Jurisdiction	UDFCD	Checked by:	
Runoff Coefficient	Surface Type	Soil Type	B
		Urbanization	Urban

Basin Land Use Characteristics

Surface	Area		Runoff Coefficient						% Imperv.
	(SF)	(Acres)	C2	C5	C10	C25	C50	C100	
Paved	69,468	1.59	0.89	0.9	0.92	0.94	0.95	0.96	100%
Gravel	25,415	0.58	0.57	0.59	0.63	0.66	0.68	0.7	80%
Pasture/Meadow	1,208,625	27.75	0.02	0.08	0.15	0.25	0.3	0.35	0%
Roofs	40,865	0.94	0.71	0.73	0.75	0.78	0.8	0.81	90%
Combined	1,344,373	30.86	0.10	0.15	0.22	0.31	0.36	0.40	9.4%

Basin Travel Time

	Sub-basin or Channel Type	Material Type	L (ft)	Elev. ΔZ ₀ (ft)	Q _i (cfs)	Base or Dia (ft)	Sides z:1 (ft/ft)	v (ft/s)	t (min)
Furthest Reach	OSA1	-	1,973	93	-	-	-	-	21.0
Channelized-1	V-Ditch	2	153	7	46	0	2	6.4	0.4
Channelized-2									
Channelized-3									
Total			2,126	100					

2 = Natural, Winding, minimal vegetation/shallow grass

t_c (min) 21.4

Contributing Offsite Flows (Added to Runoff and Allowed Release, below.)

Contributing Basins/Areas

Q_{Minor} (cfs) - 5-year Storm

Q_{Major} (cfs) - 100-year Storm

Rainfall Intensity & Runoff

	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Intensity (in/hr)	2.26	2.85	3.32	3.80	4.27	4.79
Site Runoff (cfs)	6.72	13.35	22.27	36.29	46.96	59.41
OffSite Runoff (cfs)	-	0.00	-	-	-	0.00
Release Rates (cfs/ac)	-	-	-	-	-	-
Allowed Release (cfs)	-	13.3	-	-	-	59.4

UDFCD: $I = (28.5 * P1) / (10 + t_c)^{0.786}$

PI 1.19 1.5 1.75 2 2.25 2.52

Notes

Runoff from Offsite basins have been assumed constant, despite additional times of concentration.

Combined Sub-Basin Runoff Calculations

Includes Basins OSC1 C2

Job No.:	61155	Date:	10/11/2021 9:48
Project:	515 Struthers Loop	Calcs by:	WCG
Jurisdiction	UDFCD	Checked by:	
Runoff Coefficient	Surface Type	Soil Type	B
		Urbanization	Urban

Basin Land Use Characteristics

Surface	Area		Runoff Coefficient						% Imperv.
	(SF)	(Acres)	C2	C5	C10	C25	C50	C100	
Paved	15,860	0.36	0.89	0.9	0.92	0.94	0.95	0.96	100%
Gravel	15,813	0.36	0.57	0.59	0.63	0.66	0.68	0.7	80%
Pasture/Meadow	537,632	12.34	0.02	0.08	0.15	0.25	0.3	0.35	0%
Roofs	15,669	0.36	0.71	0.73	0.75	0.78	0.8	0.81	90%
Combined	584,974	13.43	0.08	0.13	0.20	0.29	0.34	0.39	7.3%

Basin Travel Time

	Sub-basin or Channel Type	Material Type	L (ft)	Elev. ΔZ ₀ (ft)	Q _i (cfs)	Base or Dia (ft)	Sides z:1 (ft/ft)	v (ft/s)	t (min)
Furthest Reach	OSC1	-	1,593	89	-	-	-	-	18.9
Channelized-1	V-Ditch	2	315	14	24	0	2	5.3	1.0
Channelized-2									
Channelized-3									
Total		DP2		103					

2 = Natural, Winding, minimal vegetation/shallow grass

t_c (min) 19.8

Contributing Offsite Flows (Added to Runoff and Allowed Release, below.)

Contributing Basins/Areas

Q_{Minor} (cfs) - 5-year Storm

Q_{Major} (cfs) - 100-year Storm

Rainfall Intensity & Runoff

	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Intensity (in/hr)	2.35	2.96	3.46	3.95	4.45	4.98
Site Runoff (cfs)	2.43	5.31	9.28	15.60	20.37	25.96
OffSite Runoff (cfs)	-	0.00	-	-	-	0.00
Release Rates (cfs/ac)	-	-	-	-	-	-
Allowed Release (cfs)	-	5.3	-	-	-	26.0

UDFCD: $I = (28.5 * P1) / (10 + t_c)^{0.786}$

PI 1.19 1.5 1.75 2 2.25 2.52

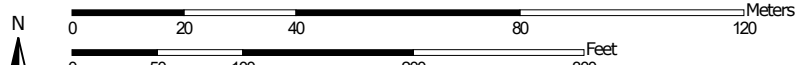
Notes

Runoff from Offsite basins have been assumed constant, despite additional times of concentration.

Custom Soil Resource Report Soil Map




Map Scale: 1:1,350 if printed on A portrait (8.5" x 11") sheet.




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
68	Peyton-Pring complex, 3 to 8 percent slopes	1.0	19.0%
93	Tomah-Crowfoot complex, 8 to 15 percent slopes	4.4	81.0%
Totals for Area of Interest		5.4	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,

Custom Soil Resource Report

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

68—Peyton-Pring complex, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 369f

Elevation: 6,800 to 7,600 feet

Farmland classification: Not prime farmland

Map Unit Composition

Peyton and similar soils: 40 percent

Pring and similar soils: 30 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Peyton

Setting

Landform: Hills

Landform position (three-dimensional): Side slope

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 12 inches: sandy loam

Bt - 12 to 25 inches: sandy clay loam

BC - 25 to 35 inches: sandy loam

C - 35 to 60 inches: sandy loam

Properties and qualities

Slope: 3 to 5 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): Moderately high (0.20 to 0.60 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water capacity: Moderate (about 7.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 4c

Hydrologic Soil Group: B

Ecological site: R049XB216CO - Sandy Divide

Hydric soil rating: No

Description of Pring

Setting

Landform: Hills

Landform position (three-dimensional): Side slope

Down-slope shape: Linear

Across-slope shape: Linear

Custom Soil Resource Report

Parent material: Arkosic alluvium derived from sedimentary rock

Typical profile

A - 0 to 14 inches: coarse sandy loam

C - 14 to 60 inches: gravelly sandy loam

Properties and qualities

Slope: 3 to 8 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Well drained

Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water capacity: Low (about 6.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 3e

Hydrologic Soil Group: B

Ecological site: R048AY222CO

Hydric soil rating: No

Minor Components

Pleasant

Percent of map unit:

Landform: Depressions

Hydric soil rating: Yes

Other soils

Percent of map unit:

Hydric soil rating: No

93—Tomah-Crowfoot complex, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 36bb

Elevation: 7,300 to 7,600 feet

Farmland classification: Not prime farmland

Map Unit Composition

Tomah and similar soils: 50 percent

Crowfoot and similar soils: 30 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Tomah

Setting

Landform: Alluvial fans, hills

Landform position (three-dimensional): Side slope, crest

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Alluvium derived from arkose and/or residuum weathered from arkose

Typical profile

A - 0 to 10 inches: loamy sand

E - 10 to 22 inches: coarse sand

C - 48 to 60 inches: coarse sand

Properties and qualities

Slope: 8 to 15 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Well drained

Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water capacity: Very low (about 2.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 6e

Hydrologic Soil Group: B

Ecological site: R049XB216CO - Sandy Divide

Hydric soil rating: No

Description of Crowfoot

Setting

Landform: Hills, alluvial fans

Landform position (three-dimensional): Side slope, crest

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Alluvium

Typical profile

A - 0 to 12 inches: loamy sand

E - 12 to 23 inches: sand

Bt - 23 to 36 inches: sandy clay loam

C - 36 to 60 inches: coarse sand

Properties and qualities

Slope: 8 to 15 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Well drained

Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)

Depth to water table: More than 80 inches

Custom Soil Resource Report

Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Ecological site: R049XB216CO - Sandy Divide
Hydric soil rating: No

Minor Components

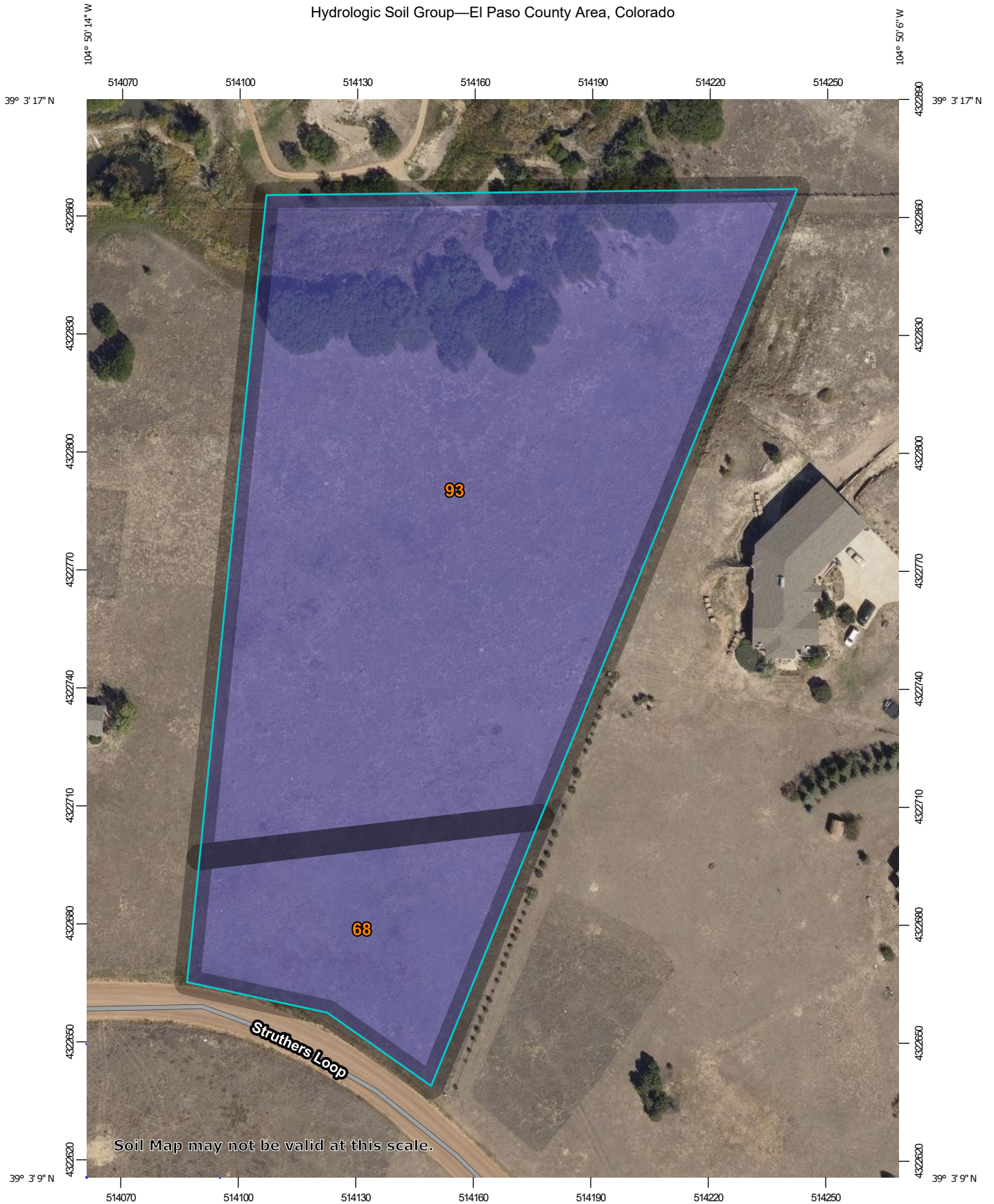
Other soils

Percent of map unit:
Hydric soil rating: No

Pleasant

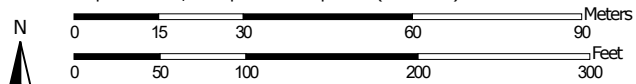
Percent of map unit:
Landform: Depressions
Hydric soil rating: Yes

Hydrologic Soil Group—El Paso County Area, Colorado



Soil Map may not be valid at this scale.

































Map Scale: 1:1,340 if printed on A portrait (8.5" x 11") sheet.



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
- Water Features**
 -  Streams and Canals
- Transportation**
 -  Rails
 -  Interstate Highways
 -  US Routes
 -  Major Roads
 -  Local Roads
- Background**
 -  Aerial Photography
- Other**
 -  C
 -  C/D
 -  D
 -  Not rated or not available

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 19, Aug 31, 2021

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
68	Peyton-Pring complex, 3 to 8 percent slopes	B	0.9	16.8%
93	Tomah-Crowfoot complex, 8 to 15 percent slopes	B	4.5	83.2%
Totals for Area of Interest			5.4	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

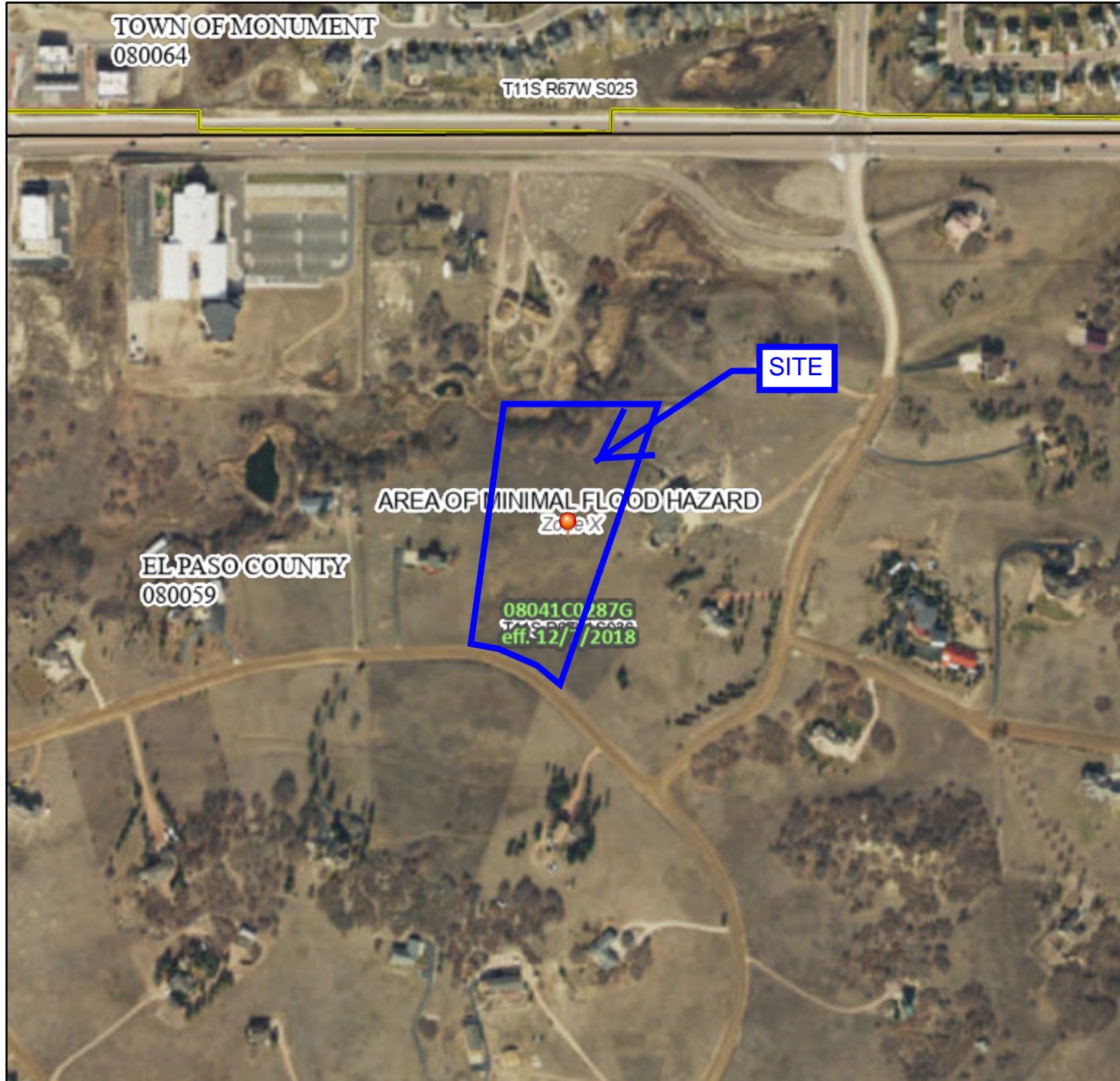
Component Percent Cutoff: None Specified

Tie-break Rule: Higher

National Flood Hazard Layer FIRMMette



104°50'29"W 39°3'27"N



Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

- | | |
|------------------------------------|---|
| SPECIAL FLOOD HAZARD AREAS | Without Base Flood Elevation (BFE)
<i>Zone A, V, A99</i>
With BFE or Depth <i>Zone AE, AO, AH, VE, AR</i>
Regulatory Floodway |
| OTHER AREAS OF FLOOD HAZARD | 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile <i>Zone X</i>
Future Conditions 1% Annual Chance Flood Hazard <i>Zone X</i>
Area with Reduced Flood Risk due to Levee. See Notes. <i>Zone X</i>
Area with Flood Risk due to Levee <i>Zone D</i> |
| OTHER AREAS | NO SCREEN Area of Minimal Flood Hazard <i>Zone X</i>
Effective LOMRs
Area of Undetermined Flood Hazard <i>Zone D</i> |
| GENERAL STRUCTURES | Channel, Culvert, or Storm Sewer
Levee, Dike, or Floodwall |
| OTHER FEATURES | Cross Sections with 1% Annual Chance Water Surface Elevation
Coastal Transect
Base Flood Elevation Line (BFE)
Limit of Study
Jurisdiction Boundary
Coastal Transect Baseline
Profile Baseline
Hydrographic Feature |
| MAP PANELS | Digital Data Available
No Digital Data Available
Unmapped |
- N
- The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 4/26/2021 at 10:10 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

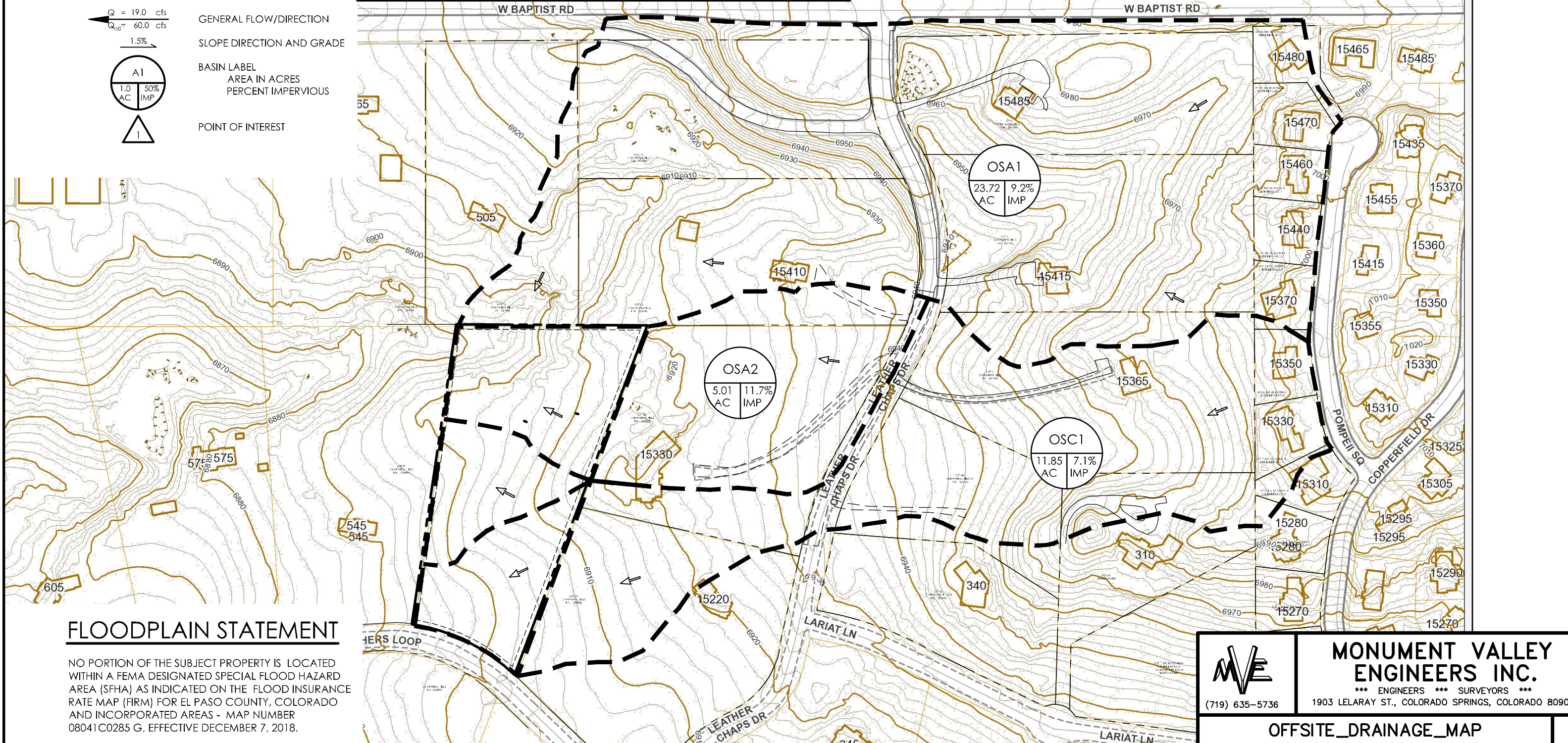
This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

LEGEND

- PROPERTY LINE
- EASEMENT LINE
- LOT LINE
- EXISTING**
- 5985 INDEX CONTOUR
- 84 INTERMEDIATE CONTOUR
- PROPOSED**
- 5985 INDEX CONTOUR
- 84 INTERMEDIATE CONTOUR
- BASIN BOUNDARY
- GENERAL FLOW/DIRECTION
- SLOPE DIRECTION AND GRADE
- BASIN LABEL
AREA IN ACRES
PERCENT IMPERVIOUS
- POINT OF INTEREST


OFF-SITE DRAINAGE SUMMARY TABLE

POINT OF INTEREST/ BASIN(S)	AREA (AC)	Tc (MIN.)	RUNOFF	
			Q5 (CFS)	Q100 (CFS)
OSA1	23.72	21.0	10.4	46.3
OSA2	5.01	13.4	2.9	12.3
OSC1	11.85	18.9	4.8	23.5



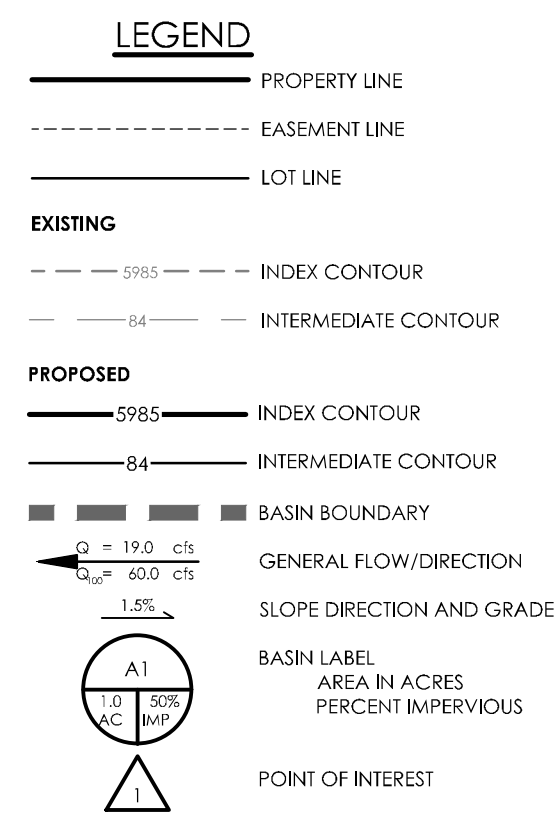
FLOODPLAIN STATEMENT

NO PORTION OF THE SUBJECT PROPERTY IS LOCATED WITHIN A FEMA DESIGNATED SPECIAL FLOOD HAZARD AREA (SFHA) AS INDICATED ON THE FLOOD INSURANCE RATE MAP (FIRM) FOR EL PASO COUNTY, COLORADO AND INCORPORATED AREAS - MAP NUMBER 08041C0285 G, EFFECTIVE DECEMBER 7, 2018.



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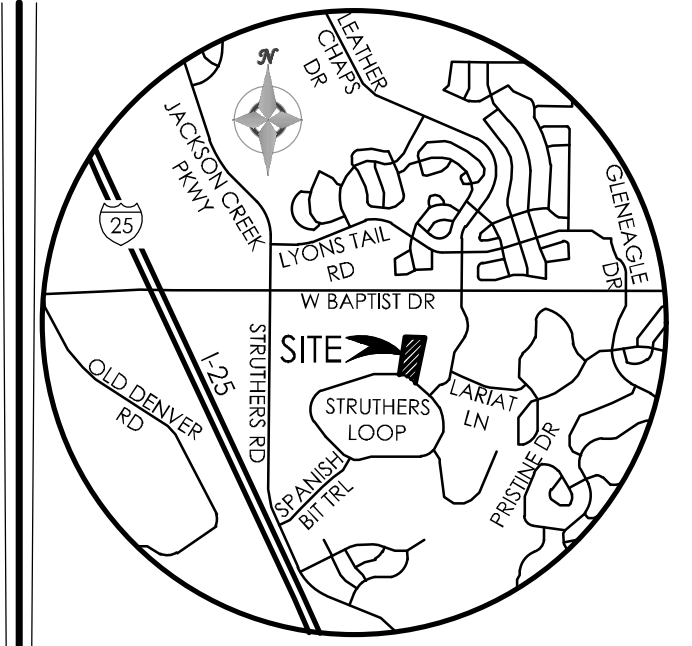
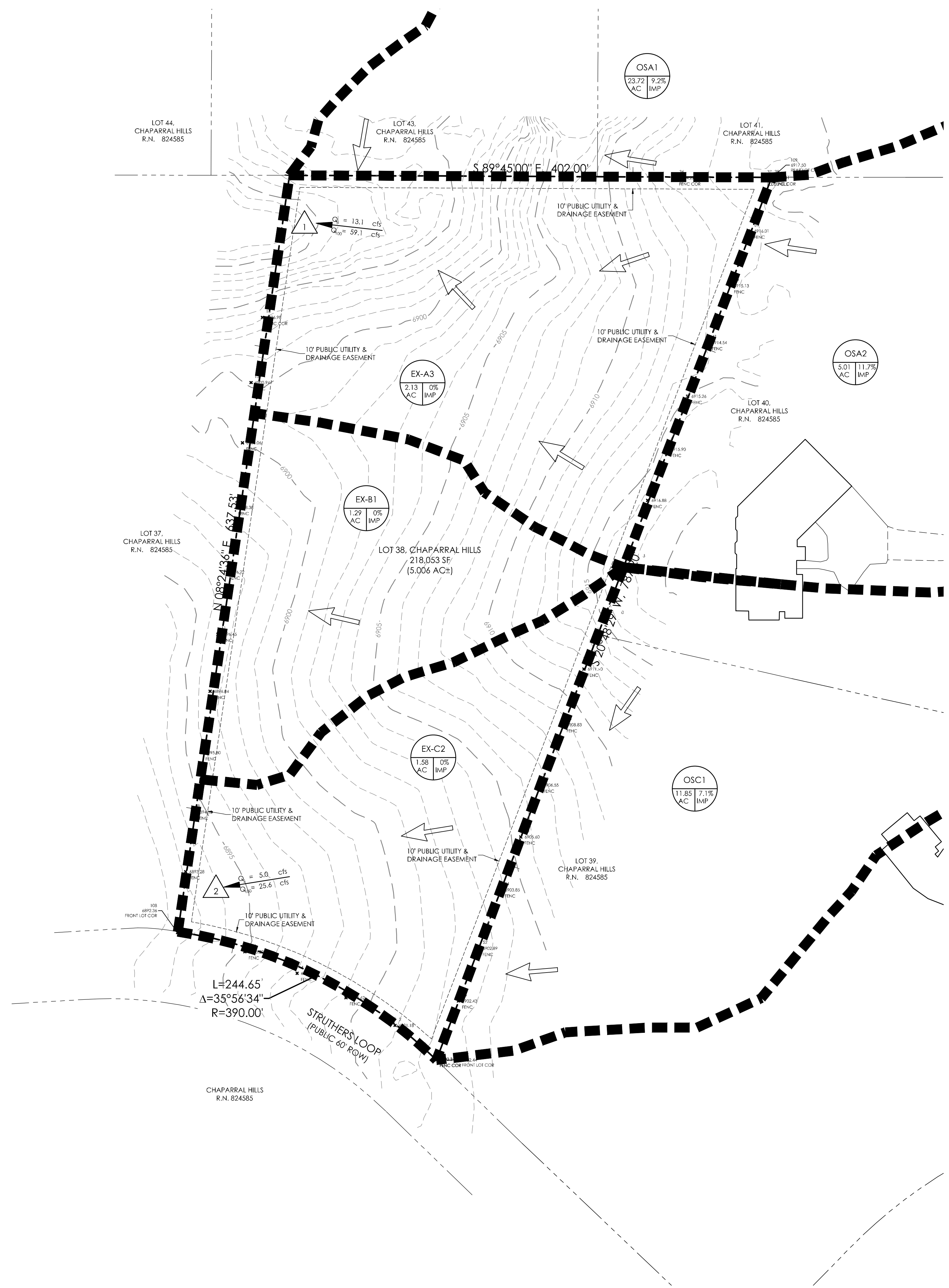
EXISTING DRAINAGE SUMMARY TABLE

POINT OF INTEREST/ BASIN(S)	AREA (AC)	T _c (MIN.)	RUNOFF	
			Q ₅ (CFS)	Q ₁₀₀ (CFS)
OSA1	23.72	21.0	10.4	46.3
OSA2	5.01	13.4	2.9	12.3
EX-A3	2.13	12.3	0.6	4.7
EX-DP1	30.86	21.4	13.1	59.1
EX-B1	1.29	11.3	0.4	2.9
OSC1	11.85	18.9	4.8	23.5
EX-C2	1.58	11.8	0.5	3.5
EX-DP2	13.43	19.8	5.0	25.6

FLOODPLAIN STATEMENT

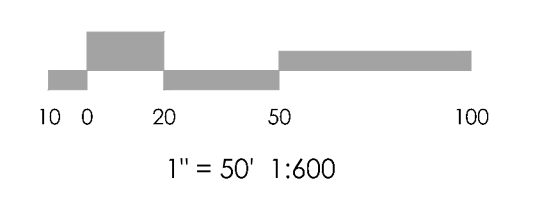
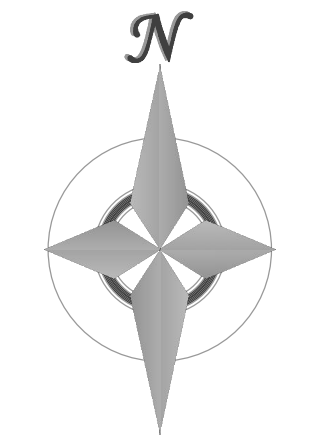
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NOTE: SEE BASIN MAP FOR OFFSITE BASIN DETAILS



VICINITY MAP
NOT TO SCALE

BENCHMARK



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REVISIONS

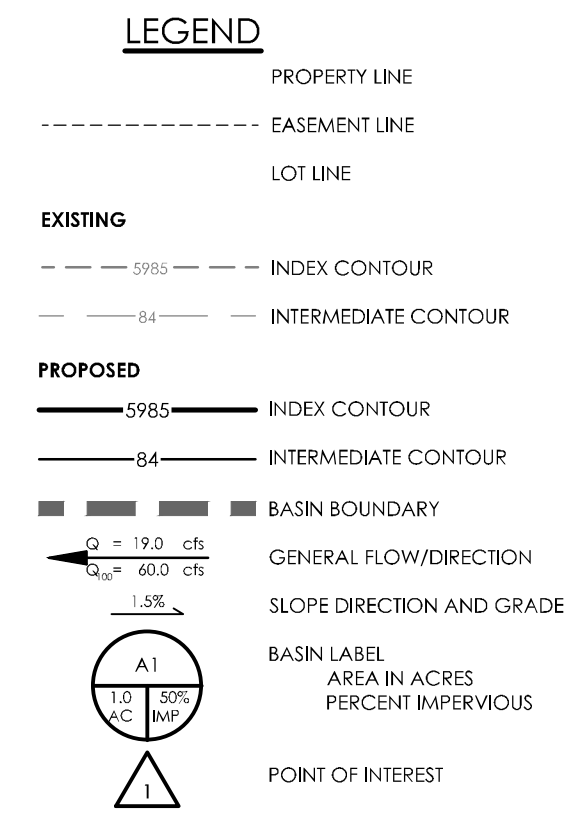
DESIGNED BY _____
DRAWN BY _____
CHECKED BY _____
AS-BUILT BY _____
CHECKED BY _____

PAIR-A-DISE SUBDIVISION
FILING NO. 1

EXISTING
DRAINAGE MAP

MVE PROJECT 61155
MVE DRAWING EX-DRN

JANUARY 21, 2022
SHEET 1 OF 1

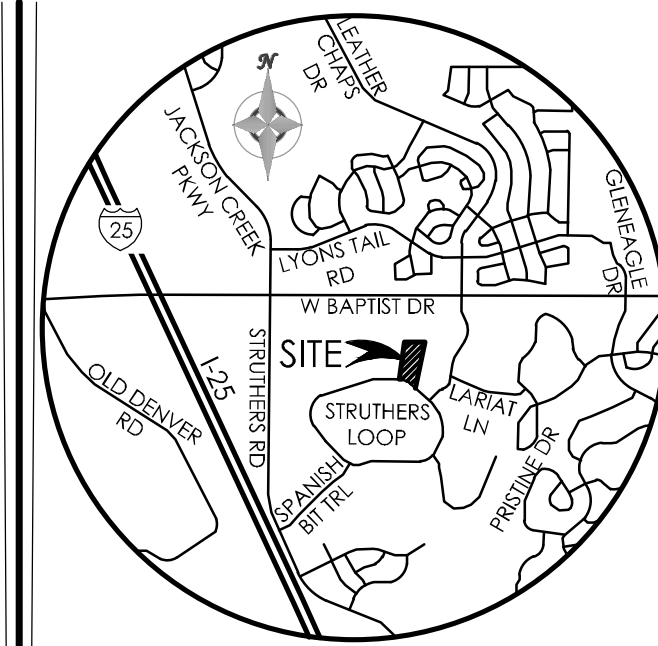
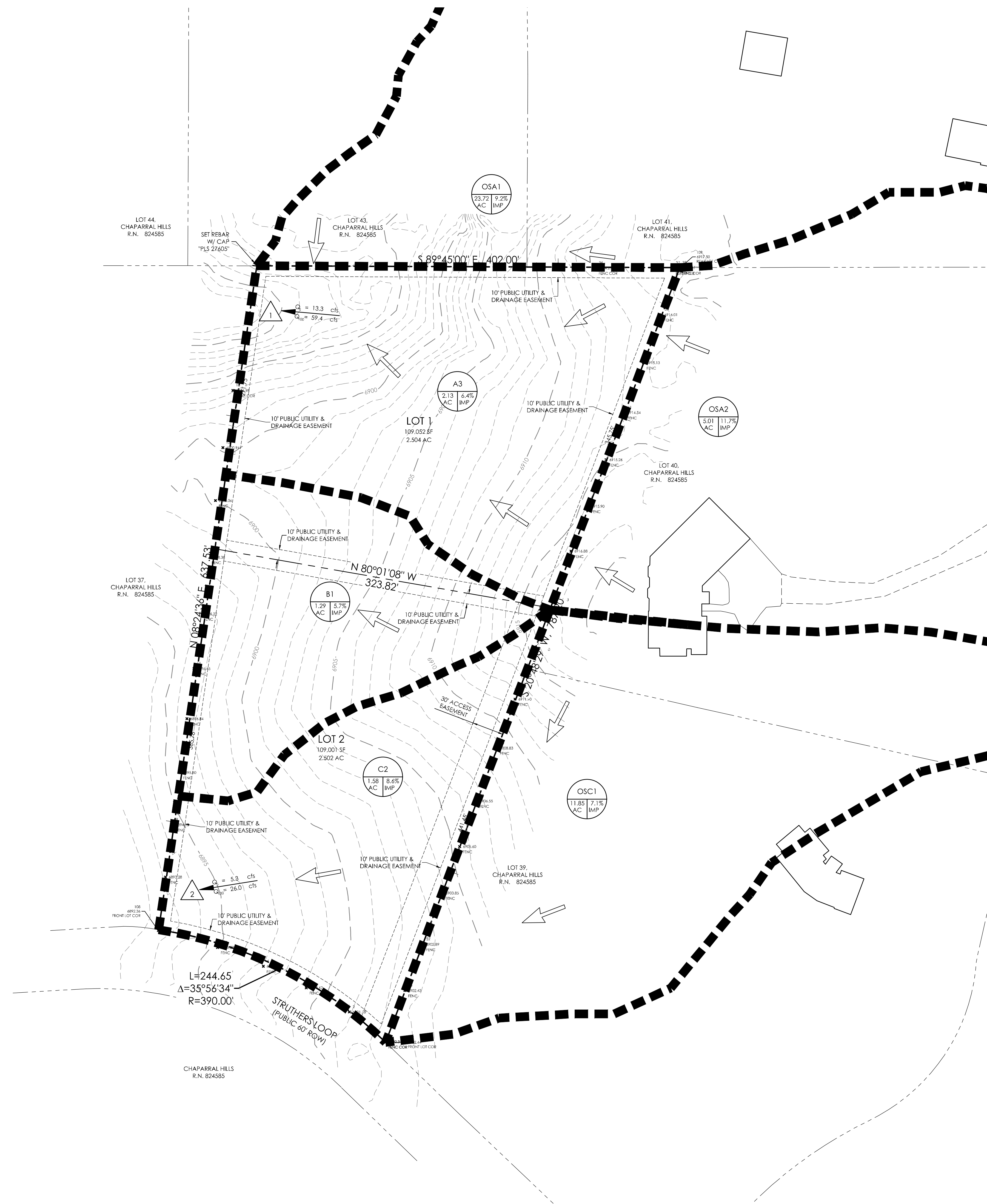


POINT OF INTEREST/ BASIN(S)	AREA (AC)	Tc (MIN.)	RUNOFF	
			Q5 (CFS)	Q100 (CFS)
OSA1	23.72	21.0	10.4	46.3
OSA2	5.01	13.4	2.9	12.3
A3	2.13	12.3	1.0	5.1
DP1	30.86	21.4	13.3	59.4
B1	1.29	11.3	0.6	3.1
OSC1	11.85	18.9	4.8	23.5
C2	1.58	11.8	0.8	3.9
DP2	13.43	19.8	5.3	26.0

FLOODPLAIN STATEMENT

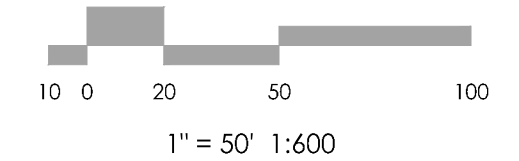
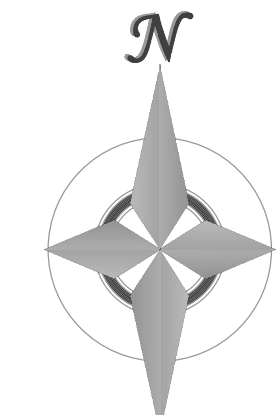
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NOTE: SEE BASIN MAP FOR OFFSITE BASIN DETAILS



VICINITY MAP
NOT TO SCALE

BENCHMARK



1" = 50' 1:600



REVISIONS

DESIGNED BY _____
 DRAWN BY _____
 CHECKED BY _____
 AS-BUILT BY _____
 CHECKED BY _____

PAIR-A-DISE SUBDIVISION
FILING NO. 1

PROPOSED
DRAINAGE MAP

MVE PROJECT 61155
 MVE DRAWING PP-DRN

JANUARY 21, 2022
 SHEET 1 OF 1