

**Drainage Memo  
for  
Lot 1, Seder Subdivision  
(A Replat of Lot 7, Akers Acres Subdivision No. 1)  
2725 Akers Drive  
El Paso County, Colorado 80922  
  
PCD File: PPR255**

Prepared for:  
CES Property Endeavors, LLC  
7755 Gary Watson Point  
Colorado Springs, Colorado 80915



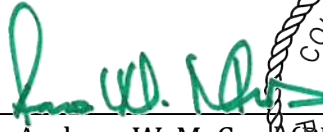
Kiowa Project No. 24060  
May 1st, 2025

## STATEMENTS AND APPROVALS

### ENGINEER'S STATEMENT:

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

Kiowa Engineering Corporation, 1604 South 21st Street, Colorado Springs, Colorado 80904

  
\_\_\_\_\_  
Andrew W. McCord (BE #25057)  
For and on Behalf of Kiowa Engineering Corporation



\_\_\_\_\_  
May 1st, 2025

\_\_\_\_\_  
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.

CES Property Endeavors, LLC

\_\_\_\_\_  
Name of Developer

  
\_\_\_\_\_  
Authorized Signature

\_\_\_\_\_  
5/5/2025

\_\_\_\_\_  
Date

Printed Name: Cory Shorette

Title: President

Address: 9818 Morning Vista Drive, Peyton, Colorado 80831

### EL PASO COUNTY:

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

6/10/2025

\_\_\_\_\_  
Joshua Palmer, P.E.  
El Paso County Engineer/ECM Administrator

\_\_\_\_\_  
Date

## **I. General Description**

This drainage memo studies a portion of the Seder Subdivision, namely Lot 1. Lot 1 of Seder Subdivision currently contains the northern portion of the subdivision access off Akers Drive, a gravel parking area, a building, gravel storage area, and some lawn areas. The development of the site is a proposed attached building addition with patios and sidewalks, paved parking area to the west with paved access off Akers Drive, retaining walls to effectively flatten the site, and landscaped areas. This drainage memo is in support of the Site Development Plan being submitted for Lot 1, Seder Subdivision. This memo has been prepared in accordance with County's Drainage Criteria Manual (DCM) Volume 1 (revised January 2021) and Volume 2 (revised December 2020) and is being submitted for approval. The property is currently platted as Lot 1 Seder Subdivision. The existing conditions are depicted in the attached Existing Site Conditions AB-1 and DNG01 as well as the proposed conditions depicted on the attached Proposed Site Layout Figure D1. It is not proposed to replat the current plat with this development.

## **II. Location**

The project site is in the Southeast Quarter of Section 32, Township 13 South, Range 65 West of the 6<sup>th</sup> Principal Meridian, El Paso County, Colorado and is currently platted. The site is currently owned by CES Property Endeavors, LLC, and is currently platted as Lot 1 Seder Subdivision. The site encompasses an area of 2.763 acres. There is a shared Roadway & Maintenance easement located just south of the property and the southwest corner of the property which encompasses 2,100 sf or 0.048 acres. We are including the shared Roadway & Maintenance easement in our drainage analysis of the property for a total area of 2.811 acres.

The site is bordered to the west by Akers Drive and residential subdivision (Hannah Ridge at Feathergrass Filing No. 1), to the north by undeveloped property (Lot 6 Akera Acres Subdivision No. 1), to the east by Lot 2 Seder Subdivision (currently rehabilitated but undeveloped), and to the south by ABC Roofing Supply Company. The project site is currently developed with a single building, gravel parking, and storage areas.

The project site drains generally from the west to east and to an existing water quality (sand filter basin)/detention facility located in the southeast corner of Lot 2 that outfalls to an existing inlet on Marksheffel Road. Runoff from the site is directed to this existing water quality/detention facility by existing curb and gutter on the south side of the overall site. This curb and gutter conveys runoff flow from the western portion of the site all the way to the existing water quality/detention facility (See Appendix D Exhibit GEC-2) and Exhibit AB-1). The detention facility discharges east to Sand Creek, then Fountain Creek, and ultimately to the Arkansas River.

The location of the site is depicted in the attached Vicinity Map (Figure 1).

### III. Drainage Memo Justification

The most recently approved drainage report that studied the Seder Subdivision site was the *Final Drainage Letter Seder Subdivision (A Replat of Lot 7, Akers Acres Subdivision No. 1)*, prepared by Baseline Engineering Corporation, and approved 2/7/2024. hereafter referred to as 'report.' This report was for the 9.34-acre parcel (Lot 7) of property located between Akers Drive and Marksheffel Road to the east.

Lot 7 was re-divided into Lot 1 and Lot 2. This Letter then analyzed Lot 1. Lot 2 still contains the existing water quality (sand filter basin)/detention facility, located in the southeast corner and adjacent to Marksheffel Road.

Of Interest in the Drainage Plan, is a potential future building (100ftX50ft) shown east of the existing building on Lot 1. Lot 1 is almost entirely with Sub-basin A, and Sub-basin A reports an impervious planning value of 60% in the Rational Calculations.

The three other 'minor' sub-basins (D,E & F) that comprise the remainder of Lot 1 show very low imperviousness values as they are predominantly the landscaped corners of the lot.

Previous to the aforementioned final drainage letter, Akers Subdivision was analyzed and approved as Preliminary/Final Drainage Report for LOT 7, AKER'S ACRES SUB. NO 1 (EDARP Project No 12017).

An excerpt of the Lot 1 (Sub-basin A) is provided:

Subbasin A: This 3.13 acres subbasin represents the westerly third of the lot and includes the area to be developed with the office buildings (one proposed, one future), 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  $Q_5 = 6.4$  cfs and  $Q_{100} = 15.2$  cfs will be generated in this subbasin.

Rational Flow Volumes were performed for Developed Condition and compared to approved and previously reported values (See Table 1):

### IV. Table 1.

Basin / Design Point	Acres	Developed	
		Q <sub>5</sub>	Q <sub>100</sub>
A	2.53 ac	4.9 cfs	11.7 cfs
D	0.16 ac	0.1 cfs	0.4 cfs
E	0.05 ac	0.2 cfs	0.4 cfs
F	0.08 ac	0.0 cfs	0.2 cfs
<b>Developed</b>	<b>2.81 ac</b>	<b>5.2 cfs</b>	<b>12.7 cfs</b>
Approved Rpt	3.13 ac	6.4 cfs	15.2 cfs
Lot 7 Replat	3.45 ac	7.5 cfs	16.6 cfs



## RATIONAL METHOD FOR RUNOFF COMPUTATIONS

### PROPOSED CONDITIONS

BASIN	AREA	GEOMETRY		C		Tc	INTENSITY, in/hr		PEAK FLOW cfs	
	(acres)	Length	Height	5 yr	100 yr	min.	5 yr	100yr	5 yr	100yr
A	3.13	535	28	0.52	0.69	11	3.95	7.04	6.4	15.2
B	4.1	720	32	0.66	0.78	11	3.95	7.04	10.7	22.5
C	1.8	460	8	0.7	0.8	13	3.68	6.55	4.6	9.4
D	0.29	--	--	0.33	0.43	5	5.1	9.07	0.5	1.1
SUM PT 1	9.03	--	--	0.62	0.75	13	3.68	6.55	20.6	44.4

OBERING, WURTH & ASSOCIATES  
CONSULTING CIVIL ENGINEERS  
PROFESSIONAL LAND SURVEYORS

LOT 7, AKER'S ACRES  
OWA PROJECT NO. 12027  
JANUARY, 2013  
REVISED MAY 2013

C:/mydocuments/12/12027/akers acres calcs.xls

The impervious value for Lot 1 is 25.47% and for Sub-basin A is 44.5%. Using the most conservative values in the Baseline and Kiowa calculations, it is shown that future developed impervious value of 45% is less than the approved report imperviousness value of 60%.

Therefore, the Baseline report should remain as the governing approved report for the entirety of the Seder Subdivision (See Table 2).

### V. Table 2.

Basin / DP	Basin or DP Area (DP contributing basins)			Soil Type	Basin % Imperv	Basin Runoff Coefficient			
						C2	C5	C10	C100
All of Lot 1									
A	110,079 sf	2.53ac	A	44.5%	0.39	0.43	0.48	0.61	
D	6,848 sf	0.16ac	A	4.5%	0.05	0.11	0.19	0.37	
E	2,181 sf	0.05ac	A	71.0%	0.63	0.66	0.71	0.81	
F	3,353 sf	0.08ac	A	2.0%	0.03	0.09	0.17	0.36	

Additionally, Water Quality Treatment Credit Values were determined under Green Infrastructure Analysis which demonstrate Runoff Reduction of 38% using non-structural best practices (See Four-Step Process - Sec VI).

## **VI. Floodplain Statement**

According to the Federal Emergency Management Agency (FEMA), the proposed development does not lie within a designated floodplain. The Floodplain Insurance Rate Map (FIRM) for El Paso County panel 08041C0756G dated December 7, 2018, was reviewed to determine any potential floodplain delineation. A FEMA National Flood Hazard Firmette can be found in the Appendix on Figure 2.

## **VII. Drainage Fees**

The site lies within the Sand Creek Drainage Basin, which has 2025 Drainage Fees of \$27,554 per impervious acre and 2025 Bridge Fees of \$11,270 per impervious acre. Drainage fees have been paid with the previous platting of Lot 1, Seder Subdivision. While the impervious acreage has decreased slightly from the previously paid fees, no reduction or repayment of fees is authorized by the County.

## **VIII. Four-Step Process**

The selection of appropriate control measures is based on the characteristics of the site and potential pollutants. The Four-Step Process provides a method of going through the selection process. The following applies the four-step process to the Development Plan for Lot 1, Seder Subdivision.

### **Step 1: Employ Runoff Reduction Practices**

The Development Plan including the Landscape Plan utilizes landscaping areas for plantings and grass or mulch wherever possible without obstructing utilities or drainageways. Given the proposed land use, the majority of the site consists of pervious surface. Where possible, roof runoff is directed to perimeter grassed receiving areas ahead of entering private storm systems. A six-inch water-quality drop edge is planned at the exchange point between upstream impervious areas and receiving pervious areas wherever possible (See Appendix C, Exhibit GI). All other areas are marginal edges which cannot be captured by grading (Area D-3, DP 0).

### **Step 2: Provide Water Quality Capture Volume**

The Development Plan and Final Drainage Report indicate the Historic existence and use of a PBMP stormwater sand filter/detention basin as a control measure for capturing storm water runoff and properly treating the storm water prior to release either via percolation into the soil or attenuated to the public storm system. The sand filter/detention basin is configured for capture of the WQCV as well as the EURV Storm Events.

Runoff Reduction for the whole site is summarized in the table below:

Water Quality Treatment Summary Table							
Bains ID	Total Area (ac)	Total Proposed Disturbed Area (ac)	Area Trib to Pond A (ac)	Disturbed Area Treated via Runoff Reduction (ac)	Disturbed Area Excluded from WQ per ECM App I.7.1.C.1 (ac)	Disturbed Area Excluded from WQ per ECM App I.7.1.B.# (ac)	Applicable WQ Exclusions (App I.7.1.B.#)
A	2.53	2.53	2.53				
D	0.16	0.16	0.16				
E	0.05	0.05	-		0.05		
F	0.08	0.08	0.08				
Total	2.82	2.82	2.77	0.00	0.05	0.00	
		Total Proposed Disturbed Area (ac)	Total Proposed Treated Area (ac)		Total Proposed Disturbed Area Excluded from WQ (ac)		Minimum Area to be Treated (ac)
		2.82	2.77		0.05		2.77

### Step 3: Stabilize Drainageways

The drainage within the site is stabilized by way of new paving, curb and gutter, and dropped edges to receiving grassy areas. Slopes are shallow and broad in receiving areas to delay runoff accumulation and to maximize opportunities for infiltration. Runoff Concentration is limited by entraining flows in broad patterns across hardened surfaces at the west side parking area. There are no unstabilized drainageways on this site.

### Step 4: Implement Site Specific and Other Source Control BMPs

Grassed swales, and shallow depression zones are proposed at the east and south margins of the building site to provide velocity checking, opportunities for infiltration and sediment solids removal. Concentrated and partially treated flows within these low-lying grassed areas are subsequently pushed south and east to an existing PBMP where they receive additional sand filtering within private systems prior to release. The PBMP was certified for its storage and performance. An excerpt of the pond's certification is provided in Appendix C. A small portion

of the site in the extreme southwest corner lies below Sub-basin A and is allowed to release to the public street gutter. The existing downstream PBMP facility appears to be functioning properly.

## **IX. Conclusions**

The Planned Development generates less Runoff than the approved condition. The existing facilities have adequate size to accommodate the planned improvements. The development, as presented, will have no adverse impact on downstream facilities or infrastructure.

## **X. References**

El Paso County & Colorado Springs Drainage Manual Volumes I & II (May 2014)

El Paso County Engineering Criteria Manual, El Paso County, Colorado, (Rev. 12/16/2013)

Colorado Urban Drainage and Flood Control District Drainage Criteria Manual, Volume I (August 2018)

Colorado Urban Drainage and Flood Control District Drainage Criteria Manual, Volume III (April 2018)

Urban Storm Drainage Criteria Manual, Volume III (November, 2015)

Sand Creek Drainage Basin Planning Study, prepared by Kiowa Engineering Corporation, dated October, 1995.

City of Colorado Springs and El Paso County Flood Insurance Study, prepared by the Federal Emergency Management Agency, dated March 1997.

Soil Survey of El Paso County Area, Colorado, prepared by United States Department of Agriculture Soil Conservation Service, dated June 1981.

FEMA Flood Online Map Service Center

United States Department of Agriculture National Resources Conservation Service

Subsurface Soil Investigation prepared by Entech Enterprises, Inc. GEOTECHNICAL AND PAVEMENT DESIGN REPORT 2725 AKERS DRIVE – ADDITION AND RETAINING WALLS COLORADO SPRINGS, COLORADO dated February 23, 2021

Final Drainage Letter Seder Sub (A Replat of Lot 7, Akers Acres Sub No 1) 2725 Akers Dr., prepared by Baseline Engineering Corporation Nov 2023.

Preliminary/Final Drainage Report for Lot 7, Aker's Acres Subdivision No 1, prepared by Obering Worth & Associates, March 2013, and revised April 2013.

## **APPENDIX**

**Figure 1: Vicinity Map**

**Figure 2: FEMA National Flood Hazard Firmette**

**Rational Calculations**

**Green Infrastructure Exhibit 'GI'**

**Runoff Reduction Calculations**

**Sand/Filter Detention Basin Pond Certification**

**Maps:**

**Existing Site Conditions AB-1**

**Existing Grading & Erosion Control Plan for Former Lot 7 'GEC-2'**

**Historic Condition Exhibit 'DNG-01'**

**Proposed Site Layout Exhibit 'D1'**

**Developed Condition in Relation to Downstream EDB/Sand Filter 'D2'**



# 2725 Akers Dr Vicinity Map



0.2 0 0.12 Miles

NAD\_1983\_StatePlane\_Colorado\_Central\_FIPS\_0502\_Feet  
© Latitude Geographics Group Ltd.

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104° 41' 15.00"

30.00"

30 FT

ELECTRONIC DR

AK RS DR

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

6488  
6491  
6482  
6480  
6479  
6478  
6473

RED GRANITE

Sand Creek  
East Fork Subtributary

D

ZONE AE

6464  
6467  
6458  
6456

C

CONSTITUTION AVE

1% ANNUAL CHANGE  
FLOOD DISCHARGE  
CONTAINED IN CULVERT

ZONE AE

SHANN  
GRV  
CONF

6448  
6445  
6444  
6442  
6440  
6438  
6437  
6436

1% ANNUAL CHANGE  
FLOOD DISCHARGE  
CONTAINED IN CULVERT

NOTRE WAY



MAP SCALE 1" = 500'



NFIP

PANEL 0756G

NATIONAL FLOOD INSURANCE PROGRAM

## 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	080058	0756	G

Notice: This map was issued 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>.

Runoff Coefficient and Percent Impervious Calculation  
Developed Condition

DEVELOPED RUNOFF COEFFICIENT SUMMARY

Basin / DP	Basin or DP Area (DP contributing basins)	Soil Type	All Disturbed Areas																Basin % Imperv				Basin Runoff Coefficient											
			Land Use Area				Comp Land Use % Imp				Land Use Area				Comp Land Use % Imp				Land Use Area				Comp Land Use % Imp				C2		C5		C10		C100	
			% Imperv	Area	Use % Imp	% Area	% Imperv	Area	Use % Imp	% Area	% Imperv	Area	Use % Imp	% Area	% Imperv	Area	Use % Imp	% Area	% Imperv	Area	Use % Imp	% Area	% Imperv	Area	Use % Imp	% Area	% Imperv	Area	Use % Imp	% Area	% Imperv	Area	Use % Imp	% Area
Tributary to Detention Basin (Full Spectrum EDB Treatment)																																		
A	110,079 sf	2.53ac	A	100%	0.60ac	24%	24%	0.60ac	55%	1%	80%	0.00ac	0%	0%	90%	0.27ac	11%	10%	100%	0.25ac	10%	10%	44.5%	0.39	0.43	0.48	0.61							
D	6,848 sf	0.16ac	A	100%	0.00ac	0%	0%	0.15ac	97%	2%	80%	0.00ac	0%	0%	90%	0.00ac	3%	3%	100%	0.00ac	0%	0%	4.5%	0.05	0.11	0.19	0.37							
E	2,181 sf	0.05ac	A	100%	0.03ac	62%	62%	0.03ac	40%	1%	80%	0.00ac	0%	0%	90%	0.00ac	9%	8%	100%	0.00ac	0%	0%	71.0%	0.63	0.66	0.71	0.81							
F	3,353 sf	0.08ac	A	100%	0.00ac	0%	0%	0.08ac	100%	2%	80%	0.00ac	0%	0%	90%	0.00ac	0%	0%	100%	0.00ac	0%	0%	2.0%	0.03	0.09	0.17	0.36							
On-Site Summary	122,460 sf	0.28ac	A	100 %	0.03ac	11%	11%	1.65ac	580%	12%	80 %	0.00ac	0%	0%	90 %	0.01ac	3%	3%	100 %	0.00ac	0%	0%	25.4%	0.29	0.64	1.11	2.22							

Runoff Coefficients and Percents Impervious (DCM Table 6-6)

Hydrologic Soil Type:		Runoff Coef Calc Method:										Weighted	
		Abb	%	C2	C5	C10	C25	C50	C100				
Land Use	Business: Downtown	BD	95%	0.79	0.81	0.83	0.85	0.87	0.88				
	Business: Suburban	BS	70%	0.45	0.49	0.53	0.58	0.60	0.62				
	Drives and Walks	DR	100%	0.89	0.90	0.92	0.94	0.95	0.96				
	Streets - Gravel (Packed)	GR	80%	0.57	0.59	0.63	0.66	0.68	0.70				
	Historic Flow Analysis	HI	2%	0.03	0.09	0.17	0.26	0.31	0.36				
	Lawns (match Historic Flow)	LA	2%	0.03	0.09	0.17	0.26	0.31	0.36				
	Off-site flow-Undeveloped	OF	45%	0.26	0.32	0.38	0.44	0.48	0.56				
	Park	PA	7%	0.05	0.12	0.20	0.30	0.34	0.39				
	Streets - Paved	PV	100%	0.89	0.90	0.92	0.94	0.95	0.96				
	Roofs	RO	90%	0.71	0.73	0.75	0.78	0.80	0.81				

Equation:  
 $C_c = (C1A1 + C2A2 + C3A3 + \dots + CnAn) / At$   
 (City of Colorado Springs DCM Equation 6-6) Where:  
 $C_c$  = composite runoff coefficient for total area  
 $C_i$  = runoff coefficient for subarea (surface type or land use)  
 $A_i$  = area of surface type corresponding to  $C_i$   
 $At$  = total area of all sub areas  
 $i$  = number of surface types in the drainage area



Time of Concentration Calculation  
Developed Condition

DEVELOPED TIME OF CONCENTRATION SUMMARY

Sub-Basin Data				Time of Concentration Estimate										Final t <sub>c</sub>			
Basin / Design Point	Contributing Basins	Area	C <sub>s</sub>	Up Elev	Down Elev	Initial/Overland Time (t <sub>i</sub> )			Travel Time (t <sub>t</sub> )					Comp.	t <sub>c</sub>		
						Length	Slope	t <sub>i</sub>	Elev	Elev	Length	Slope	Land Type			Cv	Velocity
A	Off-Site:	2.53ac	0.43	6513.00	6505.00	501f	16.0%	3.4 min.	6505.00	6497.00	2951f	2.7%	SP	7	1.2 ft/sec	4.3 min.	7.7 min.
D	On-Site:	0.16ac	0.11	6511.00	6500.00	501f	22.0%	4.6 min.	6500.00	6498.50	2321f	0.6%	GW	15	1.2 ft/sec	3.2 min.	7.8 min.
E	On-Site:	0.05ac	0.66	6496.00	6495.50	111f	4.5%	1.6 min.	6495.50	6492.00	651f	5.4%	PV	20	4.6 ft/sec	0.2 min.	5.0 min.
F	On-Site:	0.08ac	0.09	6513.00	6512.75	361f	0.7%	12.5 min.	6512.75	6508.25	1381f	3.3%	SP	7	1.3 ft/sec	1.8 min.	14.3 min.
Summary		2.81ac									Dev TC						

Equations:

$t_i$  (Overland) =  $0.395(1.1-C_s)L^{0.5}S^{-0.333}$

(DCM Equation 6-8) Where:

$C_s$  = Runoff coefficient for 5-year

$L$  = Length of overland flow (ft)

$S$  = Average basin slope (ft/ft)

$t_c$  (1st DP) =  $(18-15i) + L_s / (60(24+12)S^{0.5})$  Where:

$t_c$  (1st DP) = First DP Time of Concentration in urban catchments

$L_s$  = Length of Flow Path

$i$  = imperviousness (expressed as a decimal)

City of Colorado Springs DCM Table 6-7

Type of Land Surface	Land Type	K
Grassed Waterway	GW	15
Heavy Meadow	HM	2.5
Nearly Bare Ground	NBG	10
Paved Area/Swales	PV	20
Riprap (Not Buried)	RR	6.5
Short Pasture/Lawns	SP	7
Tillage/Fields	TF	5

$t_t = L_t / 60KS^{0.5}$  Where:

$t_t$  = Channelized flow time (travel time)(min.)

$L_t$  = Waterway length (ft)

$K$  = Conveyance Factor (see DCM Table 6-7)

$S$  = Watercourse slope (ft/ft)

# Runoff Calculation Developed Condition

WQ Treatment	Contributing Basins	Drainage Area	C <sub>2</sub>	C <sub>5</sub>	C <sub>100</sub>	Time of Concentration	Rainfall Intensity		Runoff			Q <sub>100</sub>	Basin / DP
Y/N							i <sub>5</sub>	i <sub>100</sub>	Q <sub>wqcv</sub>	Q <sub>2</sub>	Q <sub>5</sub>		
Y	A	2.53 ac	0.39	0.43	0.61	7.7 min.	4.5 in/hr	7.6 in/hr	1.8 cfs	3.6 cfs	4.9 cfs	11.7 cfs	1
Y	D	0.16 ac	0.05	0.11	0.37	7.8 min.	4.5 in/hr	7.6 in/hr	0.0 cfs	0.0 cfs	0.1 cfs	0.4 cfs	1
N	E	0.05 ac	0.63	0.66	0.81	5.0 min.	5.2 in/hr	8.7 in/hr	0.1 cfs	0.1 cfs	0.2 cfs	0.4 cfs	0
Y	F	0.08 ac	0.03	0.09	0.36	14.3 min.	3.6 in/hr	6.0 in/hr	0.0 cfs	0.0 cfs	0.0 cfs	0.2 cfs	1

Equations (taken from Fig 6-5, City of Colorado Springs DCM):

$$i_2 = -1.19 \ln(T_c) + 6.035$$

$$i_5 = -1.50 \ln(T_c) + 7.583$$

$$i_{10} = -1.75 \ln(T_c) + 8.847$$

$$i_{25} = -2.00 \ln(T_c) + 10.111$$

$$i_{50} = -2.25 \ln(T_c) + 11.375$$

$$i_{100} = -2.52 \ln(T_c) + 12.735$$

$$Q = CIA$$

Q = Peak Runoff Rate (cubic feet/second)

C = Runoff coef representing a ratio of peak runoff rate to ave rainfall intensity for a duration equal to the runoff time of concentration.

i = average rainfall intensity in inches per hour

A = Drainage area in acres

P1	Inches
WQCV	0.60 in
2 yr	1.19 in
5 yr	1.50 in
10 yr	1.75 in
25 yr	2.00 in
50 yr	2.25 in
100 yr	2.52 in

Table 2

PROJECT: SEDER SUBDIVISION

JOB NO.: 35072

CALC. BY: SPC

DATE: 8/15/2023



Engineering - Planning - Surveying

= FORMULA CELLS

= USER INPUT CELLS

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

Impervious Percentage	C <sub>2</sub>	C <sub>5</sub>	C <sub>10</sub>	C <sub>25</sub>	C <sub>50</sub>	C <sub>100</sub>	Impervious Percentage					C <sub>2</sub>	C <sub>5</sub>	C <sub>10</sub>	C <sub>25</sub>	C <sub>50</sub>	C <sub>100</sub>
							I- Light Areas	80%	0%	0%	0%						
Drive and Walks	100%	0.89	0.90	0.92	0.94	0.95	0.96					0.57	0.59	0.63	0.66	0.68	0.70
Roofs	90%	0.71	0.73	0.75	0.78	0.80	0.81					0.00	0.00	0.00	0.00	0.00	0.00
S- Gravel	80%	0.57	0.59	0.63	0.66	0.68	0.70					0.00	0.00	0.00	0.00	0.00	0.00
Lawns	0%	0.02	0.08	0.15	0.25	0.30	0.35					0.00	0.00	0.00	0.00	0.00	0.00

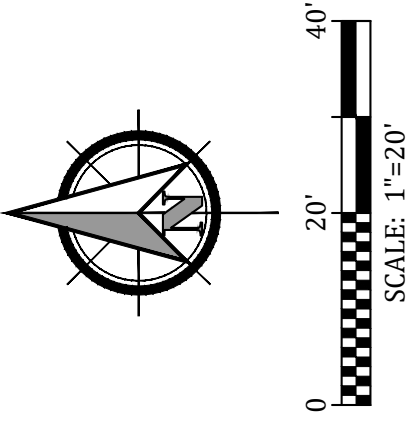
Hydrologic Soil Group

A or B

## PROPOSED COMPOSITE IMPERVIOUSNESS

Basin	Area (ac)	Weighted Impervious and C Values							Areas (ac)						
		Imp.	C <sub>2</sub>	C <sub>5</sub>	C <sub>10</sub>	C <sub>25</sub>	C <sub>50</sub>	C <sub>100</sub>	Drive and Walks	Roofs	S-Gravel	Lawns	I- Light Areas	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			





DRAINAGE LEGEND

**E(n)** Calc. Area 'n' see report for discussion of UH/AFR Exchanges (WQTC).

Calc. Area Boundary

Runoff Reduction Design Point

Time of Concentration Flowpath

Emergency Overflow Path

Ex. or Proposed Flow Direction

Spot Elev. High Point

Spot Elev. Low Point

Lot or Property Boundary

Existing Intermediate Contour

Existing Index Contour

Existing Intermediate Contour

Existing Index Contour

Existing 6" Vertical Curb & Gutter

Ex. or Proposed Paving

Ex. or Proposed Roof

Ex. or Proposed Concrete

Color Legend for Runoff Reduction Calculation

0	1,353 s.f.	Not Captured due to grade.
1	30,494 s.f.	Directly Connected Impervious Area
2	40,286 s.f.	Separate Pervious Area
3	12,733 s.f.	Upstream Impervious Area w/ Interface Location
4	12,733 s.f.	Receiving Pervious Area
Total Pervious Area		73,019 s.f.
Total Impervious Area		43,227 s.f.
Total Treated Volume		580 Cu. Ft.
Total Untreated Volume		957 Cu. Ft.
Percent Reduction of downstream facility.		38%



Landscape Endeavors  
Proposed Site Layout  
Green Infrastructure Plan  
El Paso County, Colorado

**Kiowa**  
Engineering Corporation  
1604 South 21st Street  
Colorado Springs, Colorado 80904  
(719) 630-7342

Project No:	24060
Date:	March 31, 2025
Design:	AWMc
Drawn:	MIK
Check:	AWMc
Revisions:	
Sheet	

GI

of 1 Sheets



# Design Procedure Form: Runoff Reduction

UD-BMP (Version 3.07, March 2018)

Sheet 1 of 1

**Designer:** AWMc  
**Company:** Kiowa Engineering Corporation  
**Date:** March 30, 2025  
**Project:** WQ Treatment Analysis for Improvements  
**Location:** Lot 1 Seder Subdivision (El Paso County), CO

## SITE INFORMATION (User Input in Blue Cells)

WQCV Rainfall Depth 0.60 inches  
 Depth of Average Runoff Producing Storm,  $d_6$  = 0.43 inches (for Watersheds Outside of the Denver Region, Figure 3-1 in USDCM Vol. 3)

Area Type	UIA:RPA	UIA:RPA	SPA	SPA	SPA	DCIA	DCIA	DCIA				
Area ID	U-1	U-2	S-1	S-2	S-3	D-1	D-2	D-3				
Downstream Design Point ID	1	1	1	1	1	1	1	0				
Downstream BMP Type	SF	SF	SF	SF	SF	SF	SF	None				
DCIA (ft <sup>2</sup> )	--	--	--	--	--	26,402	4,092	1,353				
UIA (ft <sup>2</sup> )	3,274	10,644	--	--	--	--	--	--				
RPA (ft <sup>2</sup> )	2,830	9,903	--	--	--	--	--	--				
SPA (ft <sup>2</sup> )	--	--	9,191	12,725	38,370	--	--	--				
HSG A (%)	100%	100%	100%	100%	100%	--	--	--				
HSG B (%)	0%	0%	0%	0%	0%	--	--	--				
HSG C/D (%)	0%	0%	0%	0%	0%	--	--	--				
Average Slope of RPA (ft/ft)	0.020	0.010	--	--	--	--	--	--				
UIA:RPA Interface Width (ft)	20.00	36.00	--	--	--	--	--	--				

## CALCULATED RUNOFF RESULTS

Area ID	U-1	U-2	S-1	S-2	S-3	D-1	D-2	D-3				
UIA:RPA Area (ft <sup>2</sup> )	6,104	20,547	--	--	--	--	--	--				
L / W Ratio	15.26	15.85	--	--	--	--	--	--				
UIA / Area	0.5364	0.5180	--	--	--	--	--	--				
Runoff (in)	0.00	0.00	0.00	0.00	0.00	0.50	0.50	0.50				
Runoff (ft <sup>3</sup> )	0	0	0	0	0	1100	171	56				
Runoff Reduction (ft <sup>3</sup> )	136	444	460	636	1919	0	0	0				

## CALCULATED WQCV RESULTS

Area ID	U-1	U-2	S-1	S-2	S-3	D-1	D-2	D-3				
WQCV (ft <sup>3</sup> )	109	355	0	0	0	880	136	56				
WQCV Reduction (ft <sup>3</sup> )	136	444	0	0	0	0	0	0				
WQCV Reduction (%)	125%	125%	0%	0%	0%	0%	0%	0%				
Untreated WQCV (ft <sup>3</sup> )	-27	-89	0	0	0	880	136	56				

## CALCULATED DESIGN POINT RESULTS (sums results from all columns with the same Downstream Design Point ID)

Downstream Design Point ID	1	1	1	1	1	1	1	0				
DCIA (ft <sup>2</sup> )	30,494	30,494	30,494	30,494	30,494	30,494	30,494	1,353				
UIA (ft <sup>2</sup> )	13,918	13,918	13,918	13,918	13,918	13,918	13,918	0				
RPA (ft <sup>2</sup> )	12,733	12,733	12,733	12,733	12,733	12,733	12,733	0				
SPA (ft <sup>2</sup> )	60,286	60,286	60,286	60,286	60,286	60,286	60,286	0				
Total Area (ft <sup>2</sup> )	117,431	117,431	117,431	117,431	117,431	117,431	117,431	1,353				
Total Impervious Area (ft <sup>2</sup> )	44,412	44,412	44,412	44,412	44,412	44,412	44,412	1,353				
WQCV (ft <sup>3</sup> )	1,480	1,480	1,480	1,480	1,480	1,480	1,480	56				
WQCV Reduction (ft <sup>3</sup> )	580	580	580	580	580	580	580	0				
WQCV Reduction (%)	39%	39%	39%	39%	39%	39%	39%	0%				
Untreated WQCV (ft <sup>3</sup> )	900	900	900	900	900	900	900	56				

## CALCULATED SITE RESULTS (sums results from all columns in worksheet)

Total Area (ft <sup>2</sup> )	823,370
Total Impervious Area (ft <sup>2</sup> )	312,237
WQCV (ft <sup>3</sup> )	1,537
WQCV Reduction (ft <sup>3</sup> )	580
WQCV Reduction (%)	38%
Untreated WQCV (ft <sup>3</sup> )	957



# Obering, Wurth & Associates

Consulting Civil Engineers  
Professional Land Surveyors

1015 Elkton Drive  
Colorado Springs, Colorado 80907  
(719) 531-6200 FAX (719) 531-6266

JOB 12027 Akers Acres

SHEET NO. \_\_\_\_\_

OF \_\_\_\_\_

CALCULATED BY \_\_\_\_\_

DATE \_\_\_\_\_

CHECKED BY \_\_\_\_\_

DATE \_\_\_\_\_

SCALE \_\_\_\_\_

## Pond As-Built Info

Pond Bottom 54' x 152' @ Elev 65.48  
Design (50' x 150' @ Elev 65.65)

Pond Top 84' x 176' @ Elev 70.80  
Design (80' x 180' @ Elev 70.65)

Inlet Top within 0.02' of design  
Pond Volume

At Full Depth 1.39 ac.ft (Design 1.24 ac.ft) ✓

At WQCV (Elev 66.80) 0.27 ac.ft (0.22 ac.ft) x

At 5 year Storm 0.54 ac.ft (0.5 ac.ft) ✓

At 100 yr Storm 1.0 ac.ft (0.95 ac.ft) ✓

## Peak Outflow

Q<sub>5</sub> out 5.3 cfs (design 5.7 cfs) ✓

Q<sub>100</sub> out 13.7 cfs (design 14.3 cfs) ✓

## Summary

As-built average bottom/top dimensions and elevations are close to design and actually result in a slightly larger pond. Pond was modeled to check as-built conditions and all design requirements were met or improved. The as-built pond is acceptable as constructed.



Imagery ©2025 Airbus, Map data ©2025 Google 20 ft



LOT 15  
AKERS ACRES SUB. NO. 1

OWNER: FEATHERGRASS INVESTMENTS, LLC  
AP #53320-00-002  
COLORADO SPRINGS, CO 80907

LOT 14  
AKERS ACRES SUB. NO. 1

OWNER: FEATHERGRASS INVESTMENTS, LLC  
AP #53320-00-001  
4745 N CHESTNUT ST.  
COLORADO SPRINGS, CO 80907

N 1/2 LOT 13  
AKERS ACRES SUB. NO. 1

OWNER: FEATHERGRASS INVESTMENTS, LLC  
AP #53320-00-010  
4745 N CHESTNUT ST.  
COLORADO SPRINGS, CO 80907

LEGEND

---	6486--	EXISTING CONTOUR
---	8490--	FINISHED GRADE CONTOUR
(-4+83.45)		EXISTING GRADE
23.45		PROPOSED GRADE (8400-6500 INDEX)
==		EXISTING STORM SEWER
==		PROPOSED STORM SEWER
==		EXISTING STORM INLET
==		EXISTING CURB/GUTTER
==		PROPOSED CURB/GUTTER
==		PROPOSED CMU WALL
==		FLOW LINE
==		TOP CURB
==		TOC
==		TW
==		TOP OF CONCRETE
==		TOP WALL
==		INLET PROTECTION
==		VEHICLE TRACKING CONTROL
==		SILT FENCE
==		TEMPORARY SEDIMENT BASIN
==		SEDIMENT CONTROL LOG
==		RAS PAVEMENT
==		(RECYCLED ASPHALT SHINGLES)
==		RAS PAVEMENT
==		RAS PAVEMENT
==		CONCRETE

BENCHMARK

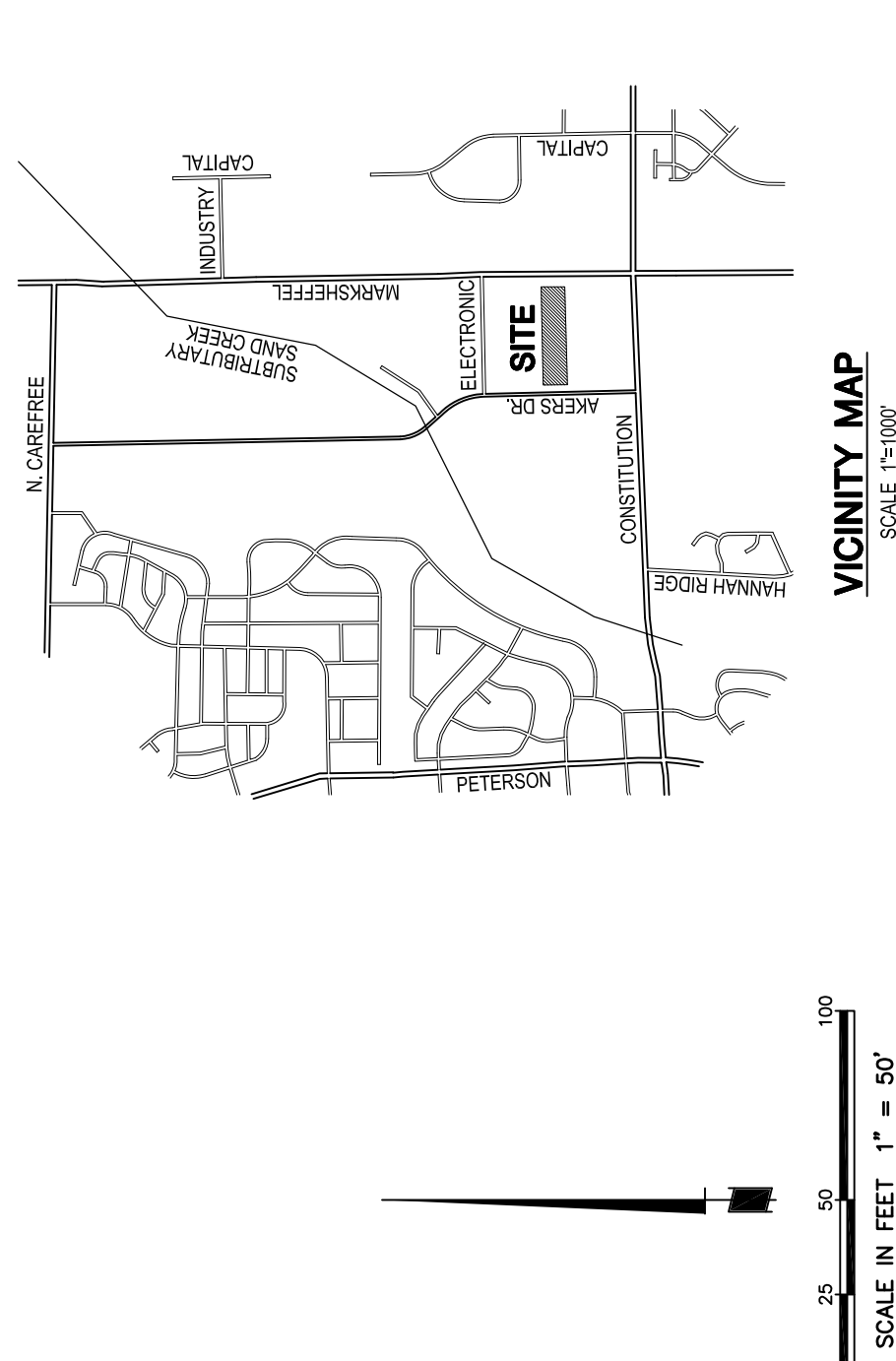
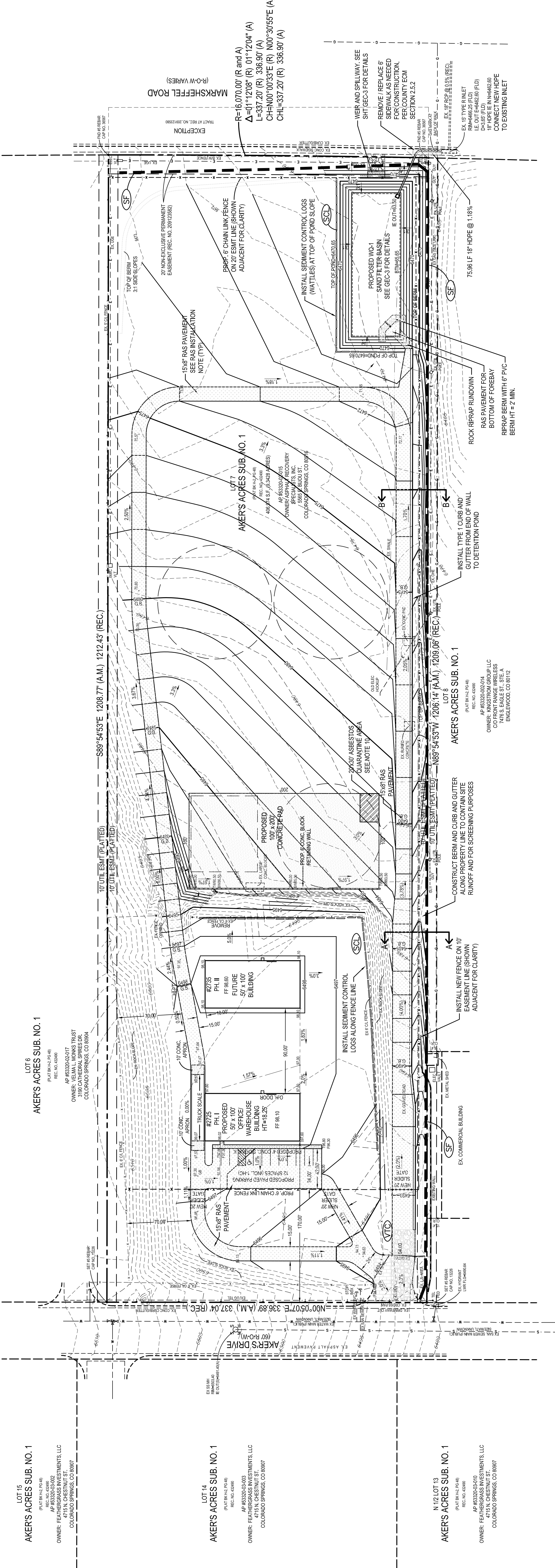
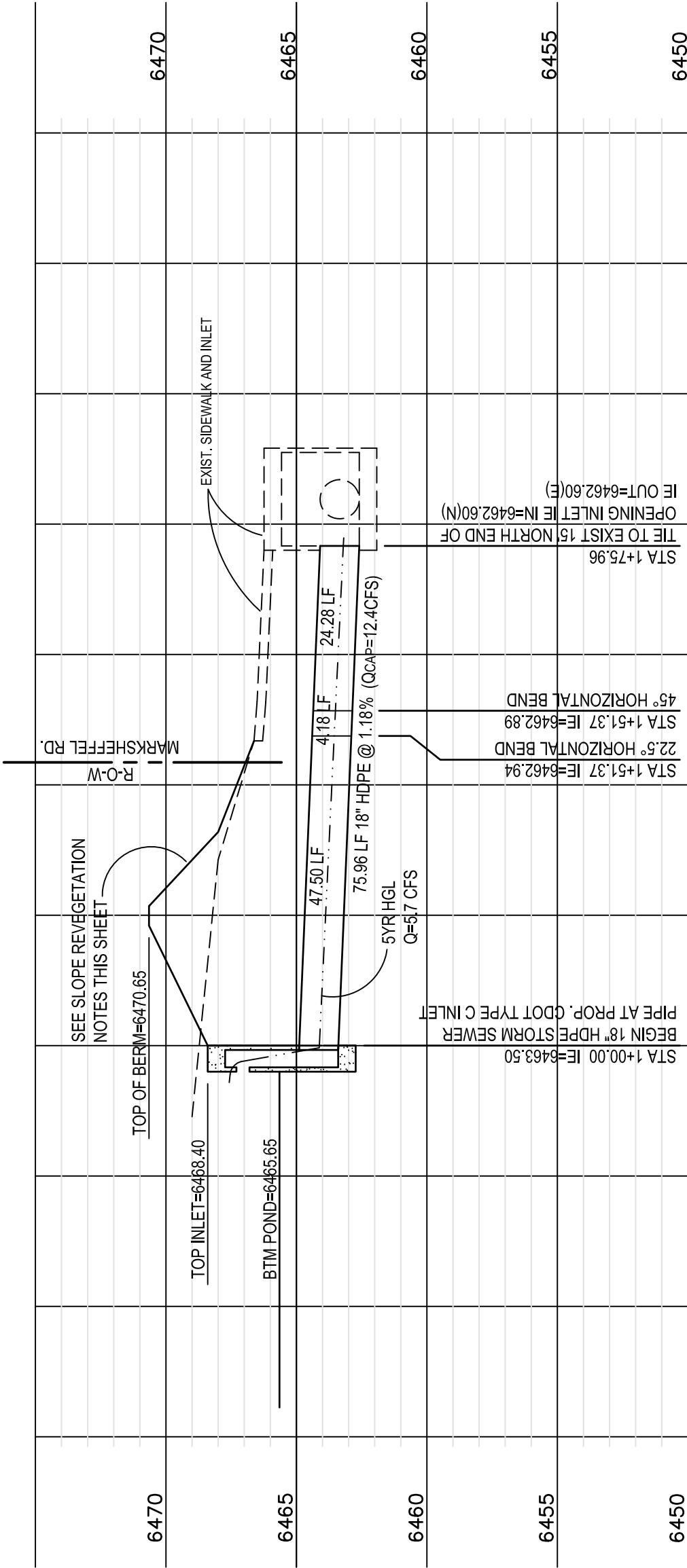
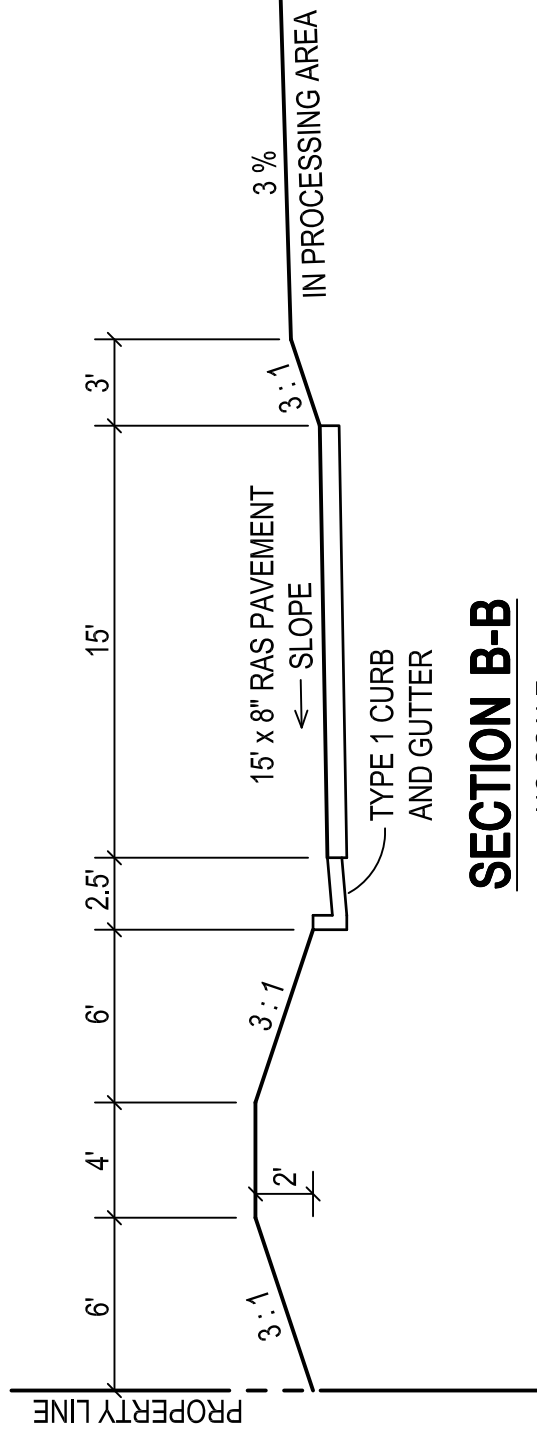
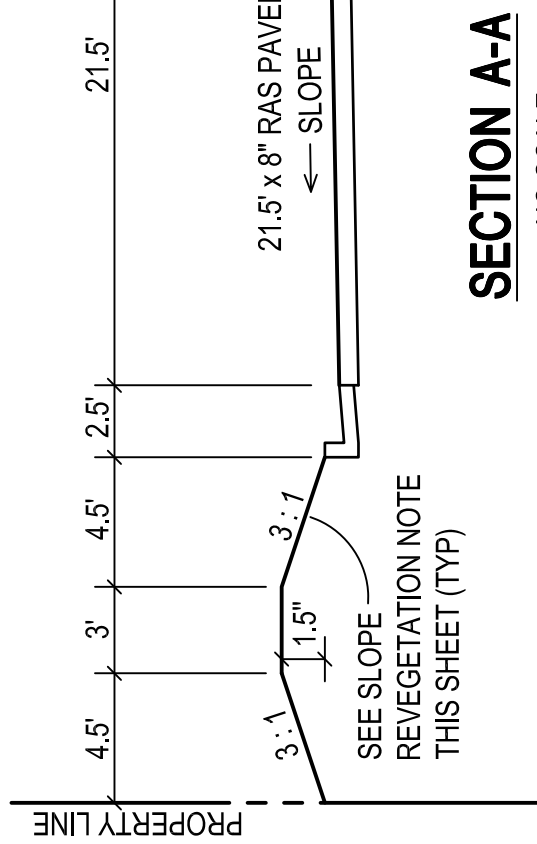
FINIS MONUMENT "BLT 104" A 2" ALUMINUM CAP IN THE NORTHEAST TOP OF HEADWALL OF A BOX CULVERT AT THE FIRST CREEK CROSSING UNDER CONSTITUTION AVENUE EAST OF MARKSHEFFEL ROAD.  
FINIS ELEVATION=6424.3

SLOPE REVEGETATION NOTES

- UPON COMPLETION OF BERM AND POND SLOPE CONSTRUCTION REVEGETATE THE DISTURBED AREAS. REVEGETATION SHALL CONSIST OF HYDROSEEDING, HYDROMULCHING, AND HYDROEROSION CONTROL MATS. HYDROSEEDING/MULCHING/REVEGETATION MAY ALSO BE ACCOMPLISHED BY HYDROSEEDING/MULCHING METHODS. REVEGETATION SHALL BE IN ACCORDANCE WITH GENERALLY ACCEPTED PRACTICES OF THE U.S. DEPARTMENT OF NATURAL RESOURCES.
- SPREAD AVAILABLE TOPSOIL ON BERMS AND SLOPES A MINIMUM OF 4" THICK. PREPARE THE SEED BED BY DISC OR SPRING-TOOTH HARROW TO LOOSEN THE SURFACE AND MIX THE TOPSOIL.
- APPLY PELLETTED FERTILIZERS AT A PER ACRE RATE OF 100 LB N/2 (AVAILABLE), 40 LB P/265 AND NO K, WORKED INTO THE SOIL TO A DEPTH OF 3-4".
- SEED MIX AND RATE SHALL BE FOR DRILLING METHOD WITH A GRASS DRILL SPACING OF 8"-12" APART AND A DRILL DEPTH OF 1/2"-1". SEED MIX SHALL BE ROCKY MOUNTAIN NATIVE MIX AS SUPPLIED BY ARKANSAS VALLEY SEED COMPANY, LONGMONT, COLORADO, OR APPROVED ALTERNATE STATE CERTIFIED SEED MIX APPLIED AT A RATE OF 20# P/5 PER ACRE.
- UPON COMPLETION OF SEEDING, ALL RESEEDED AREAS SHALL BE STRAW MULCHED. THE MULCH SHALL BE CLEAN AND FREE OF SEEDS. MULCH SHALL BE APPLIED EVENLY OVER THE SEEDED AREAS AT A MINIMUM RATE OF 4000 LB/ACRE. UPON COMPLETION OF DISTRIBUTION THE MULCH SHALL BE THOROUGHLY CRIMPED INTO THE SOIL.
- SEEDED AREAS SHALL BE WATERED BY HAND WITH A TANK TRAILER UNTIL SUCH TIME AS 70% OF THE PRE-CONSTRUCTION VEGETATION HAS BEEN ESTABLISHED.

RAS INSTALLATION NOTES

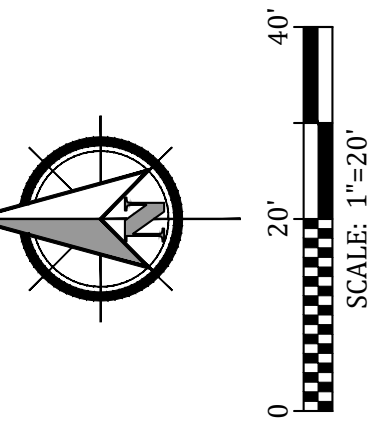
- INSTALL RAS IN TWO (2) LIFTS OF COMPACTED FOUR (4) INCHES EACH. DISTRIBUTE EVENLY WITH A MOTOR GRADER.
- COMPACT EACH LIFT WITH AN EIGHT (8) TON WHEEL COMPACTOR AT 70" PLUS AMBIENT AIR TEMPERATURE.











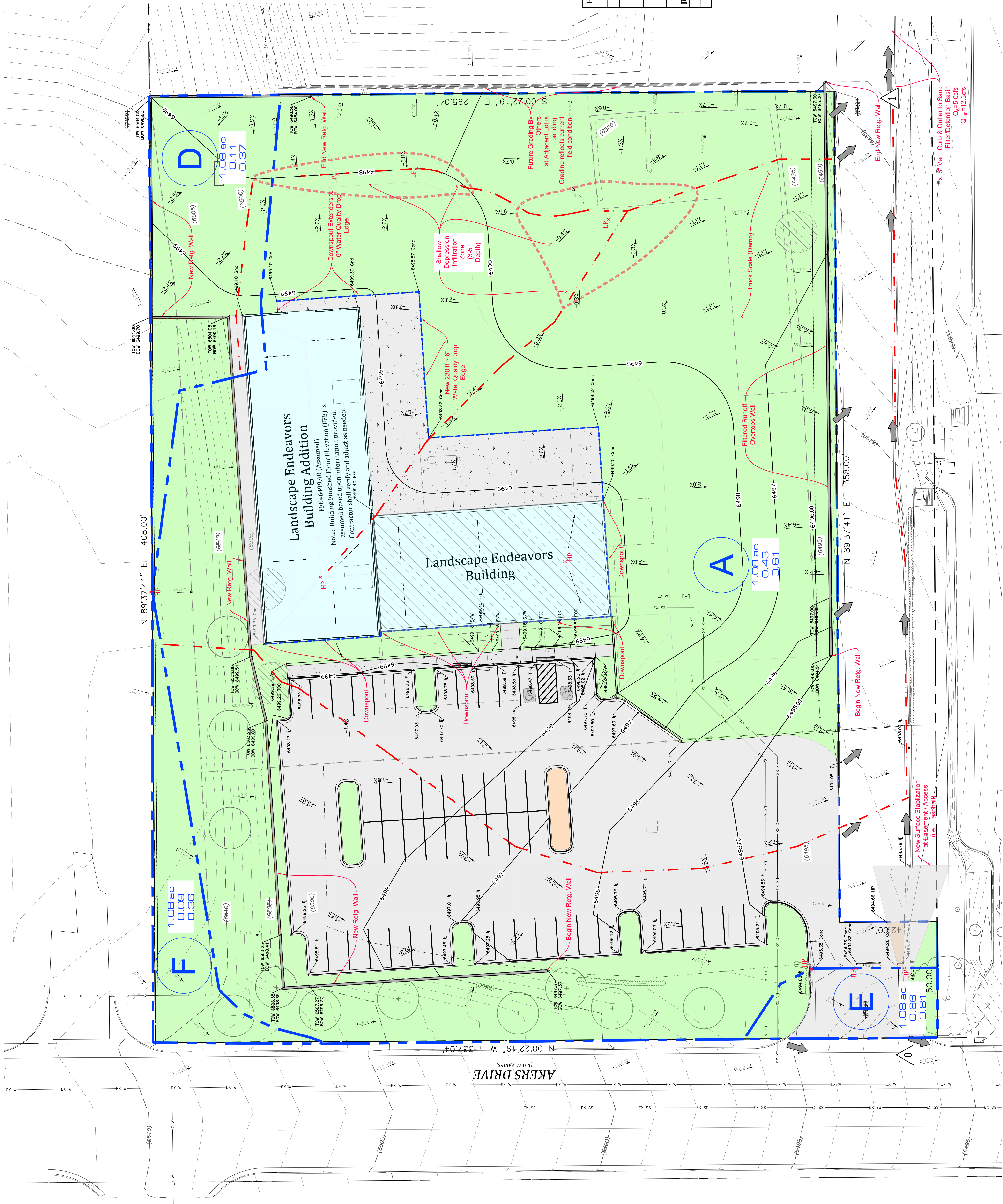
DRAINAGE LEGEND

- Developed
- Basin Designation
  - Basin Area
  - 5-Year Runoff Coeff.
  - 100-Year Runoff Coeff.
  - Subbasin Boundary
  - Project Design Point
  - Time of Concentration
  - Flowpath
  - Emergency Over-Flow Path
  - Ex. or Proposed Flow Direction
  - Spot Elev. High Point
  - Spot Elev. Low Point
  - Lot or Property Boundary
  - Existing Intermediate Contour
  - Existing Index Contour
  - Existing Intermediate Contour
  - Existing Index Contour
  - Existing 6" Vertical Curb & Gutter
  - Ex. or Proposed Paving
  - Ex. or Proposed Roof
  - Ex. or Proposed Concrete
  - Ex. & Proposed Landscape

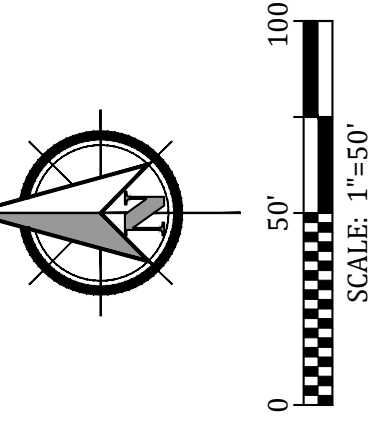
Basin / Design Point	Acres	Developed	
		Q <sub>5</sub>	Q <sub>100</sub>
A	2.53 ac	4.9 cfs	11.7 cfs
D	0.16 ac	0.1 cfs	0.4 cfs
E	0.05 ac	0.2 cfs	0.4 cfs
F	0.08 ac	0.0 cfs	0.2 cfs
Raw Summary	2.81 ac	5.2 cfs	12.7 cfs
Approved Rpt	3.13 ac	6.4 cfs	15.2 cfs
Lot 7 Replat	3.45 ac	7.5 cfs	16.6 cfs

SAND FILTER BASIN DETENTION DATA

Description	5-Year Storm	100-Year Storm
Developed Runoff In	20.6 cfs	44.4 cfs
Existing Runoff	6.6 cfs	16.4 cfs
Flow Out	5.7 cfs	14.3 cfs
Water Depth	2.4 ft	4.1 ft
Freeboard	2.6 ft	0.9 ft
Peak Storage	0.495 ac-ft	0.947 ac-ft

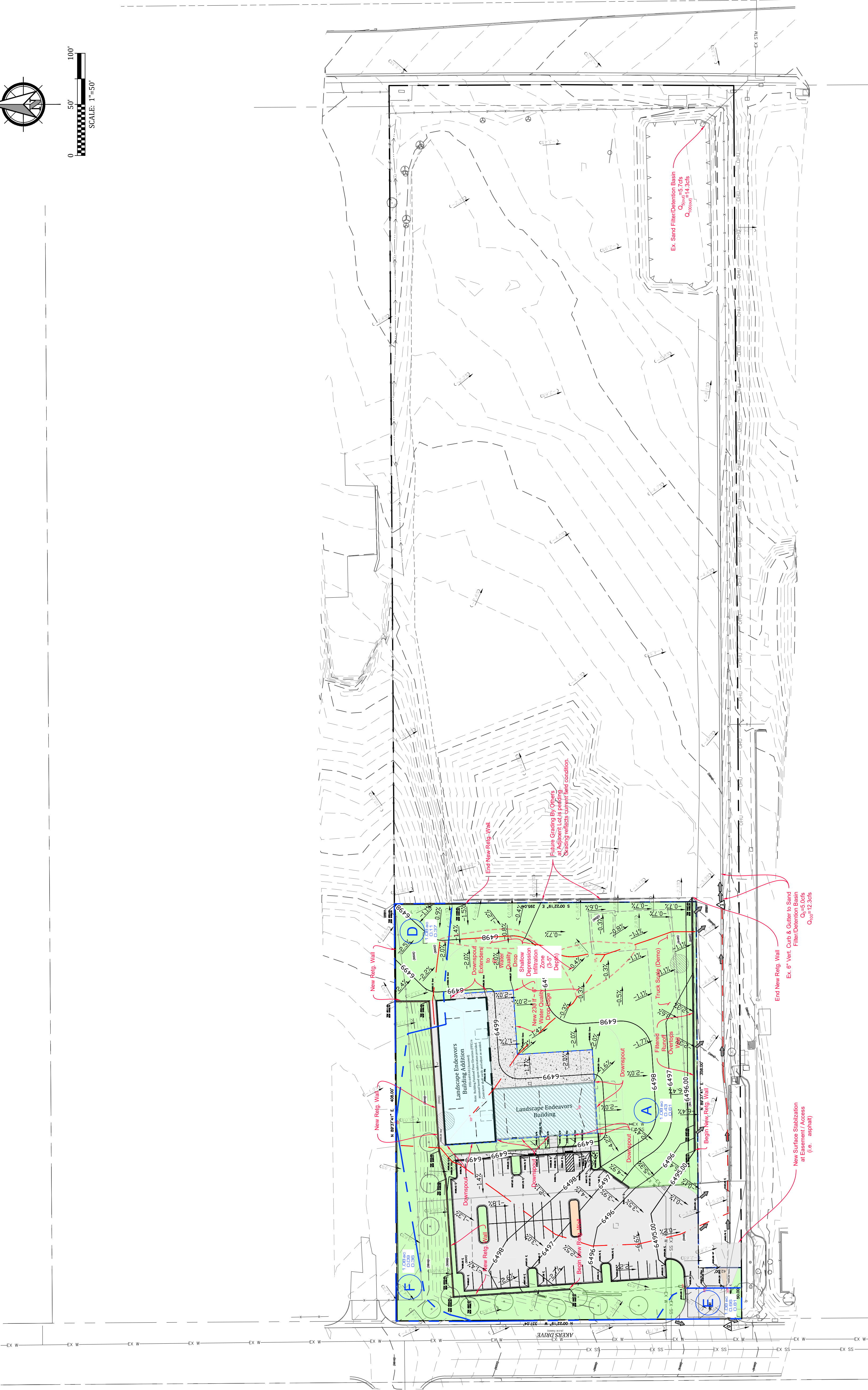






Landscape Endeavors  
Proposed Site Layout  
DEVELOPED CONDITION IN RELATION TO OFFSITE PBMP  
El Paso County, Colorado

Project No:	24060
Date:	May 1, 2025
Design:	AWMc
Drawn:	MIK
Check:	AWMc
Revisions:	



SAND FILTER BASIN DETENTION DATA

Description	5-Year Storm	100-Year Storm
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