



TREASURED ACRES SUBDIVISION

DRAINAGE LETTER

**PREPARED BY**

Michael A. Bartusek

RESPEC


121 S Tejon St., Suite 1110
Colorado Springs, CO 80903
719-283-7671

PREPARED FOR

Jerry Lomax
11750 Green Acres Ln.
Colorado Springs, CO 80908
719-331-3958

JULY 20, 2020

Project Number 03925.5

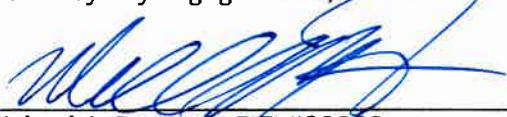


Please add "PCD File
No. MS-21-009"



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 City/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.



Michael A. Bartusek, P.E. #23329

**DEVELOPER'S STATEMENT:**

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



By: _____

Jerry Lomax

Title: Owner

Address: 11750 Green Acres Ln.
Colorado Springs, CO 80908

← Please add a header
"El Paso County:"

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

Jennifer Irvine, COUNTY ENGINEER/ECM Administrator

Date

Conditions:

TABLE OF CONTENTS

Purpose	1
General Description	1
Soil Conditions	1
Drainage Criteria	1
Existing Drainage Conditions	1
Proposed Drainage Conditions	2
Floodplain Statement	3
Drainage and Bridge Fees	3
Summary	4
References	4
Appendix A – Maps	A
Appendix B – Calculations	B
Appendix C – Design Charts	C

TREASURED ACRES SUBDIVISION

DRAINAGE LETTER

PURPOSE

This drainage letter is for the platting of an existing 15.18 acre parcel into three (3) lots.

GENERAL DESCRIPTION

This is a drainage letter for Treasured Acres Subdivision which is a 15.18 acre site located along Green Acres Ln. approximately 1300 lf from Burges Rd. in northern El Paso County. It is further described as a portion of Section 15, Township 12 South, Range 64 West of the 6th PM in El Paso County, Colorado. See *Appendix A* for a vicinity map. The project is located adjacent to the West Tributary of the Black Squirrel Creek within the Upper Black Squirrel Drainage Basin.

SOIL CONDITIONS

According to the El Paso County Area Soil Survey, the soil on the site is classified as follows:

- 41 Kettle gravelly sandy loam K=0.15 T=2 Hydrologic Soil Group A

This soil can be described as having a rapid permeability, medium-surface runoff, and moderate hazard of erosion.

DRAINAGE CRITERIA

The methodology utilized for this report is in accordance with the *El Paso County Drainage Criteria Manual* for hydrologic and hydraulic design. The Rational Method for computation of runoff was used.

$Q = c i a$

Where

- Q = maximum rate of runoff in cubic feet per second
- c = runoff coefficient representing drainage area characteristics
- i = average rainfall intensity, in inches per hour, for the duration required for the runoff to become established
- a = drainage basin size in acres

EXISTING DRAINAGE CONDITIONS

The existing parcel contains an existing ranch with a house and several outbuildings. Most of the existing parcel is undeveloped and covered with rangeland grasses. Some minor, undeveloped flows enter the site from the adjacent parcel to the west. The site drains into three (3) different drainage basins:

- Basin A drains to the southeast into the Falcon Drainage Basin and contains 1.69 acres.
- Basin B drains to the southwest into the Sand Creek Drainage Basin and contains 3.29 acres.
- Basin C drains to the east and north into the Black Squirrel Creek and contains 10.20 acres.

Sub-basin Aex contains 1.69 acres and drains a large portion of the existing Treasured Acres ranch including the gravel driveway, a 1,650 sf garage and a 1,200 sf shed. It produces flows of

1.0 cfs for the 5-year storm and 4.6 cfs for the 100-year storm. These flows travel in a southeastern direction onto the adjacent parcel to the south within the Falcon Drainage Basin.

Sub-basin Bex contains 3.29 acres and drains the remainder of the existing developed farm and includes a portion of the gravel driveway, the 1,150 sf house and two (2) outbuildings totaling 1,800 sf. It produces flows of 1.3 cfs for the 5-year storm and 8.0 cfs for the 100-year storm. These flows will combine with the flows from Sub-basin OS1 at DP1 to produce flows of 1.7 cfs for the 5-year storm and 12.7 cfs for the 100-year storm. It flows to the west and southwest and into the Sand Creek Drainage Basin.

Sub-basin Cex is divided into two (2) Sub-basins. Sub-basin C1ex contains 6.50 acres and drains the northeast part of the undeveloped site. It produces flows of 1.6 cfs for the 5-year storm and 8.0 cfs for the 100-year storm. It flows to the east onto the adjacent property and into the Black Squirrel Drainage Basin.

Sub-basin C2ex contains 3.70 acres and drains the northwestern part of the undeveloped site. It produces flows of 1.1 cfs for the 5-year storm and 8.2 cfs for the 100-year storm. These flows will combine with the flows from Sub-basin C1ex at DP1 to produce flows of 2.5 cfs for the 5-year storm and 19.0 cfs for the 100-year storm. These flows make their way into the into the Black Squirrel Creek within the Upper Black Squirrel Drainage Basin.

PROPOSED DRAINAGE CONDITIONS

The proposed lot 15.18 acre subdivision will contain three (3) lots, each containing 5.06 acres. No change to the drainage pattern will occur. The existing ranch development will be contained within Lot 1. Lots 2 and 3 will encompass the northeast portion of the site. Although no development is proposed for these lots at this time it was assumed that these lots will contain a 2,500 sf house and a 500 lf gravel driveway.

The Sub-basin A1 will remain the same as existing except for the removal of one of the buildings and contains 1.69 acres and drains a large portion of the existing Treasured Acres ranch including the gravel driveway and a 1,650 sf garage. It produces flows of 0.9 cfs for the 5-year storm and 4.5 cfs for the 100-year storm. These flows travel in a southeastern direction onto the adjacent parcel to the south within the Falcon Drainage Basin. The imperviousness of this area will remain at 10.14%.

Sub-basin B1 will also remain the same and contains 3.29 acres and drains the remainder of the existing developed ranch and includes a portion of the gravel driveway, the 1,150 sf house and two (2) outbuildings totaling 1,800 sf. It produces flows of 1.3 cfs for the 5-year storm and 8.0 cfs for the 100-year storm. These flows will combine with the flows from Sub-basin OS1 at DP1 to produce flows of 1.7 cfs for the 5-year storm and 12.7 cfs for the 100-year storm. It flows to the west and southwest and into the Sand Creek Drainage Basin. The imperviousness of this area will remain at 2.67%.

Sub-basin C1 is located in the northeastern portion of the contains 6.50 acres and contains a portion of Lots 2 and 3. It drains the northeast part of the subdivision and produces flows of 2.0 cfs for the 5-year storm and 12.6 cfs for the 100-year storm. It flows to the east onto the adjacent property and into the Upper Black Squirrel Drainage Basin. The imperviousness of this area will be at 2.49%.

Sub-basin C2 will contain the northeastern portion of lots 2 and 3 and contains 3.70 acres and drains the northwestern part of the undeveloped site. It produces flows of 1.5 cfs for the 5-year

storm and 8.7 cfs for the 100-year storm. These flows will combine with the flows from Sub-basin C1ex at DP1 to produce flows of 3.3 cfs for the 5-year storm and 19.9 cfs for the 100-year storm. These flows make their way into the into the Black Squirrel Creek within the Upper Black Squirrel Drainage Basin. The imperviousness of this area will be at 4.37% with the total imperviousness of Sub-basin C of 3.12%. The imperviousness of the total project will increase from 1.71% to 3.68%.

FLOODPLAIN STATEMENT

No portion of the site is within a designated FEMA 100-year floodplain as designated on Map No. 08041C0320G, dated December 7, 2018.

DRAINAGE AND BRIDGE FEES

The project is located within the

- Falcon Drainage Basin
- Sand Creek Drainage Basin
- Upper Black Squirrel Drainage Basin

Please use proposed impervious amounts for drainage fee calculations. Per the proposed narrative, it is going to be 10.14%.

Please update drainage and bridge fees per acre with the latest 2021 fees.

The estimated Basin Fees are as follows:

Falcon Drainage Basin

Impervious Coverage	=	8.70%
Area Subject to Fee	=	0.087 x 1.69 acres = 0.147 acre
Falcon Basin Fee	=	\$29,622/acre
Drainage Basin Fee	=	\$29,622 x 0.171 = \$4,355

Falcon Bridge Fee

Impervious Coverage	=	8.70%
Area Subject to Fee	=	0.087 x 1.69 acres = 0.147 acre
Falcon Basin Fee	=	\$4,069/acre
Bridge Fee	=	\$4,069 x 0.171 = \$598

Sand Creek Drainage Basin

Impervious Coverage	=	2.67%
Area Subject to Fee	=	0.0267 x 3.29 acres = 0.088 acre
Falcon Basin Fee	=	\$18,940/acre
Drainage Basin Fee	=	\$29,622 x 0.088 = \$1,667

Sand Creek Bridge Fee

Impervious Coverage	=	2.67%
Area Subject to Fee	=	0.0267 x 3.29 acres = 0.088 acre
Falcon Basin Fee	=	\$5,559/acre
Bridge Fee	=	\$5,559 x 0.088 = \$489

The Upper Black Squirrel drainage basin has no El Paso County Drainage Basin fees associated with it; therefore, no fees are required at this time.

Please update report contents to include a summation of drainage basin and bridge fees.

SUMMARY

Site runoff associated with the development of the Treasured Acres Subdivision will not adversely affect the downstream and surrounding developments. The overall drainage pattern and quantity will not be significantly changed from the existing conditions. No additional drainage improvements will be required due to this project. All areas disturbed by construction will be reseeded, and erosion control measures will be installed during construction of the proposed site. This drainage report is in general conformance with the previously approved drainage reports/studies which include this site.

Please identify the previously approved drainage reports that are associated with this site and list it under references.

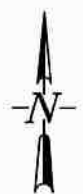
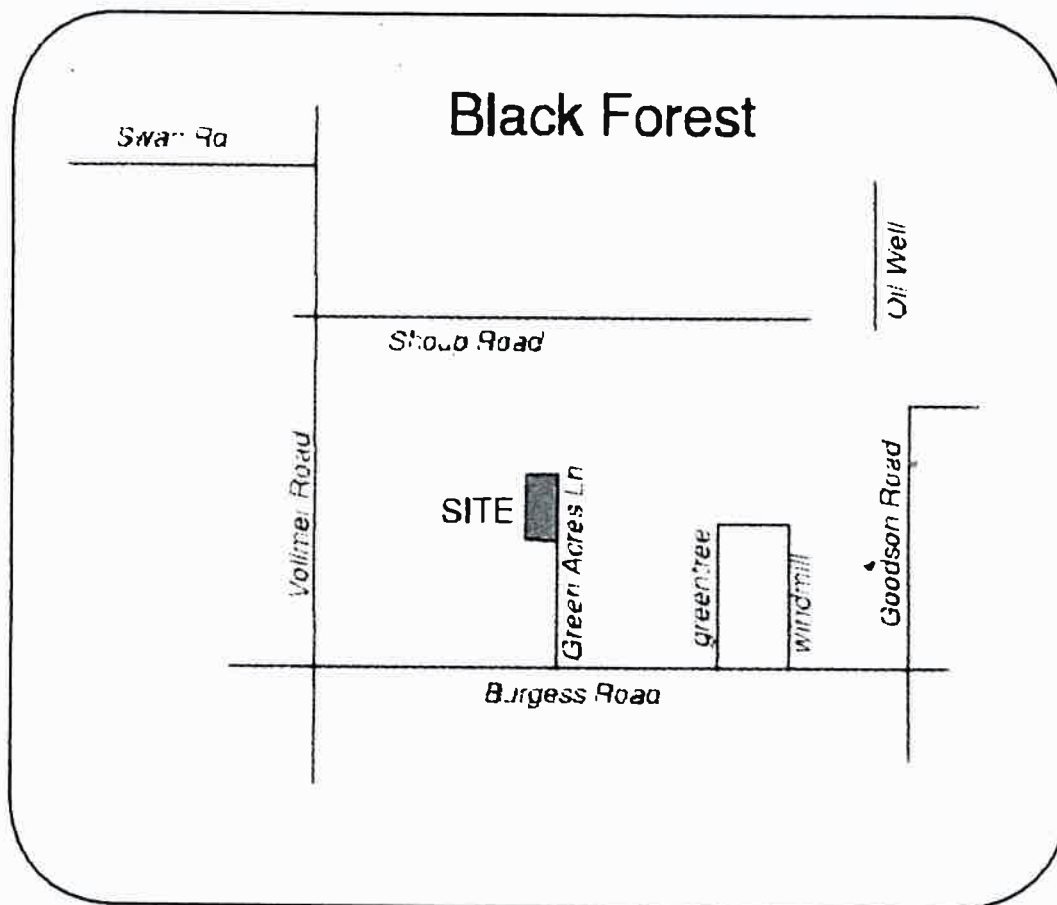
REFERENCES

1. City of Colorado Springs and El Paso County (1994). ***Drainage Criteria Manual Volume 1*** (DCM)
2. City of Colorado Springs and El Paso County (1994). ***Drainage Criteria Manual Volume II*** (DCM)
3. Soil Survey of El Paso County Area, Colorado by USDA, NRCS.
4. ***El Paso County (January 2006) Engineering Criteria Manual.***

Please add FEMA and City of Colorado Springs Vol. 1 chapter 6 to the list of references.

APPENDIX A

MAPS

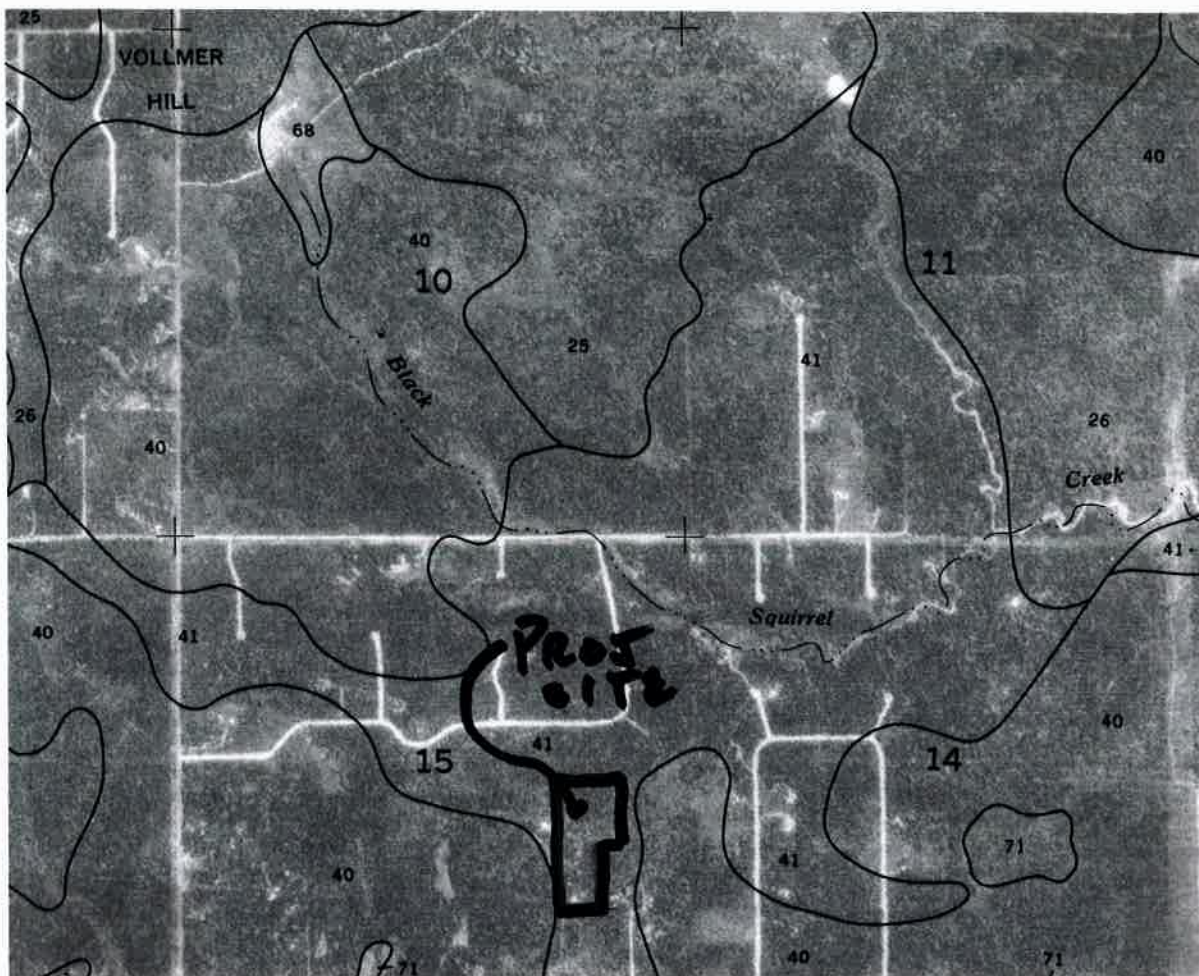


VICINITY MAP

N.T.S.



121 S Tejon St., Suite 1110 Colorado Springs, CO 80903
Phone: (719) 283-7671



SOILS MAP

N.T.S.



121 S Tejon St., Suite 1110 Colorado Springs, CO 80903
Phone: (719) 283-7671

National Flood Hazard Layer FIRMette



39°0'24.28"N

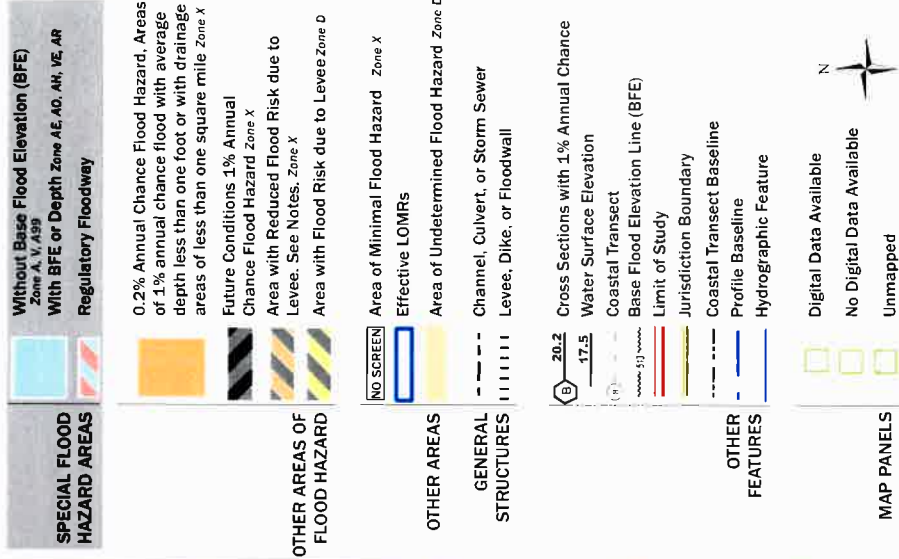


104°38'36.40"W

USGS The National Map: Orthimagery. Date refreshed April 2019.

Legend

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



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 6/2/2020 at 1:35:29 PM 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.

APPENDIX B

DRAINAGE CALCULATIONS

IMPERVIOUS AREA CALC - TYPE B SOILS									
Description		5YR	100YR	Imperv %					
UNDEV		0.08	0.35	0					
GRAVEL DRIVE		0.59	0.70	80					
PAVING(ASPH/CONC)		0.90	0.96	100					
BUILDINGS		0.73	0.81	90					
EXISTING CONDITIONS									
					Imperious Area Description				
							CALCULATED C		Total
Subbasin	Area	Landscape	Building	Paving	Gravel	5YR	100YR	Imperv	%
Aex	1.69	1.484	0.065	0.000	0.141	0.15	0.40	10.14	
Bex	3.29	3.189	0.050	0.010	0.041	0.10	0.36	2.67	
C1ex	6.50	6.500	0.000	0.000	0.000	0.08	0.35	0.00	
C2ex	3.70	3.700	0.000	0.000	0.000	0.08	0.35	0.00	
	15.18	14.873	0.115	0.010	0.182			1.71	
DEVELOPED CONDITIONS									
					Imperious Area Description				
							CALCULATED C		Total
Subbasin	Area	Landscape	Building	Paving	Gravel	5YR	100YR	Imperv	%
A	1.69	1.511	0.038	0.000	0.141	0.14	0.39	8.70	
B	3.29	3.189	0.050	0.010	0.041	0.10	0.36	2.67	
C1	6.50	6.305	0.057	0.000	0.138	0.10	0.36	2.49	
C2	3.70	3.505	0.057	0.000	0.138	0.11	0.37	4.37	
	15.18	14.510	0.202	0.010	0.458			3.68	
		ASSUMED PROPOSED BUILDING AREA = 2500 SF							
		ASSUMED GRAVEL DRIVEWAY = 12'X500'							

Narrative states that impervious is going to remain 10.14% impervious. Please clarify in the narrative whether this will still apply, and update subbasin impervious values if it will remain 10.14%.

TREASURED ACRES RANCH SUBDIVISION																		
PROJ. #03925.6																		
DRAINAGE CALCULATION SHEET																		
file: Treasured Acres dr																		
05/22/20																		
AREA	AREA	C5	C100	C5 X A	C100 X A	Initial Tci		Travel Time				I5	I100	Q5	Q100	AREA		
DESIG.	(acre)	(5 yr)	(100 yr)			L (ft)	Slope (%)	ti (min)	L (ft)	Slope (%)	V (fps)	Tt (min)	(in/hr)	(in/hr)	(cfs)	(cfs)	DESIG.	
EXISTING CONDITIONS																		
Aex	1.69	0.15	0.40	0.25	0.68	60	5.00	8.09	450	6.50	2.50	3.00	3.88	6.77	0.98	4.58	Aex	
Bex	3.29	0.10	0.36	0.33	1.18	100	7.00	9.84	240	8.00	2.80	1.43	3.85	6.72	1.27	7.96	Bex	
C1ex	6.50	0.08	0.35	0.52	2.28	100	4.00	12.07	750	4.00	2.00	6.25	3.05	5.33	1.59	12.12	C1ex	
C2ex	3.70	0.08	0.35	0.30	1.30	100	7.00	10.04	400	5.20	2.20	3.03	3.60	6.29	1.07	8.15	C2ex	
DP1	10.20			0.82	3.57								18.32	3.05	5.33	2.49	19.03	DP1
DEVELOPED CONDITIONS																		
A	1.69	0.14	0.39	0.24	0.66	60	5.00	8.18	450	6.50	2.50	3.00	3.86	6.75	0.91	4.45	A	
B	3.29	0.10	0.36	0.33	1.18	100	7.00	9.84	240	8.00	2.80	1.43	3.85	6.72	1.27	7.96	B	
C1	6.50	0.10	0.36	0.65	2.34	100	4.00	11.83	750	4.00	2.00	6.25	3.07	5.37	2.00	12.55	C1	
C2	3.70	0.11	0.37	0.41	1.37	100	7.00	9.74	400	5.20	2.20	3.03	3.64	6.36	1.48	8.70	C2	
DP1	10.20			1.06	3.71								18.08	3.07	5.37	3.25	19.90	DP1

APPENDIX C

DESIGN CHARTS

Table 6-6. Runoff Coefficients for Rational Method
(Source: UDFCD 2001)

Land Use or Surface Characteristics	Percent Impervious	Runoff Coefficients											
		2-year		5-year		10-year		25-year		50-year		100-year	
		HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D
Business													
Commercial Areas	95	0.79	0.80	0.81	0.82	0.83	0.84	0.85	0.87	0.87	0.88	0.88	0.89
Neighborhood Areas	70	0.45	0.49	0.49	0.53	0.53	0.57	0.58	0.62	0.60	0.65	0.62	0.68
Residential													
1/8 Acre or less	65	0.41	0.45	0.45	0.49	0.49	0.54	0.54	0.59	0.57	0.62	0.59	0.65
1/4 Acre	40	0.23	0.28	0.30	0.35	0.36	0.42	0.42	0.50	0.46	0.54	0.50	0.58
1/3 Acre	30	0.18	0.22	0.25	0.30	0.32	0.38	0.39	0.47	0.43	0.52	0.47	0.57
1/2 Acre	25	0.15	0.20	0.22	0.28	0.30	0.36	0.37	0.46	0.41	0.51	0.46	0.56
1 Acre	20	0.12	0.17	0.20	0.26	0.27	0.34	0.35	0.44	0.40	0.50	0.44	0.55
Industrial													
Light Areas	80	0.57	0.60	0.59	0.63	0.63	0.66	0.66	0.70	0.68	0.72	0.70	0.74
Heavy Areas	90	0.71	0.73	0.73	0.75	0.75	0.77	0.78	0.80	0.80	0.82	0.81	0.83
Parks and Cemeteries													
Playgrounds	7	0.05	0.09	0.12	0.19	0.20	0.29	0.30	0.40	0.34	0.46	0.39	0.52
Railroad Yard Areas	13	0.07	0.13	0.16	0.23	0.24	0.31	0.32	0.42	0.37	0.48	0.41	0.54
Undeveloped Areas													
Historic Flow Analysis-- Greenbelts, Agriculture	2	0.03	0.05	0.09	0.16	0.17	0.26	0.26	0.38	0.31	0.45	0.36	0.51
Pasture/Meadow	0	0.02	0.04	0.08	0.15	0.15	0.25	0.25	0.37	0.30	0.44	0.35	0.50
Forest	0	0.02	0.04	0.08	0.15	0.15	0.25	0.25	0.37	0.30	0.44	0.35	0.50
Exposed Rock	100	0.89	0.89	0.90	0.90	0.92	0.92	0.94	0.94	0.95	0.95	0.96	0.96
Offsite Flow Analysis (when landuse is undefined)	45	0.26	0.31	0.32	0.37	0.38	0.44	0.44	0.51	0.48	0.55	0.51	0.59
Streets													
Paved	100	0.89	0.89	0.90	0.90	0.92	0.92	0.94	0.94	0.95	0.95	0.96	0.96
Gravel	80	0.57	0.60	0.59	0.63	0.63	0.66	0.66	0.70	0.68	0.72	0.70	0.74
Drive and Walks													
Roofs	100	0.89	0.89	0.90	0.90	0.92	0.92	0.94	0.94	0.95	0.95	0.96	0.96
Lawns	90	0.71	0.73	0.73	0.75	0.75	0.77	0.78	0.80	0.80	0.82	0.81	0.83
	0	0.02	0.04	0.08	0.15	0.15	0.25	0.25	0.37	0.30	0.44	0.35	0.50

Figure 6-25. Estimate of Average Concentrated Shallow Flow

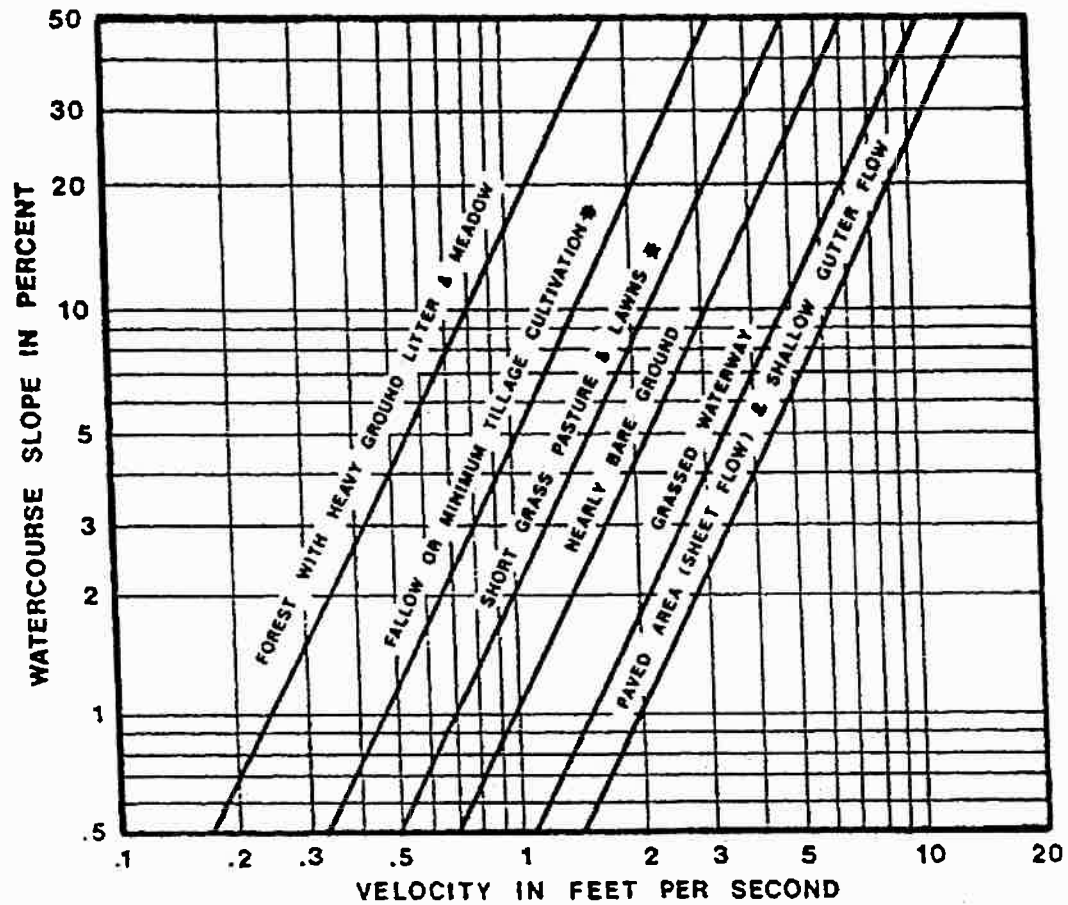
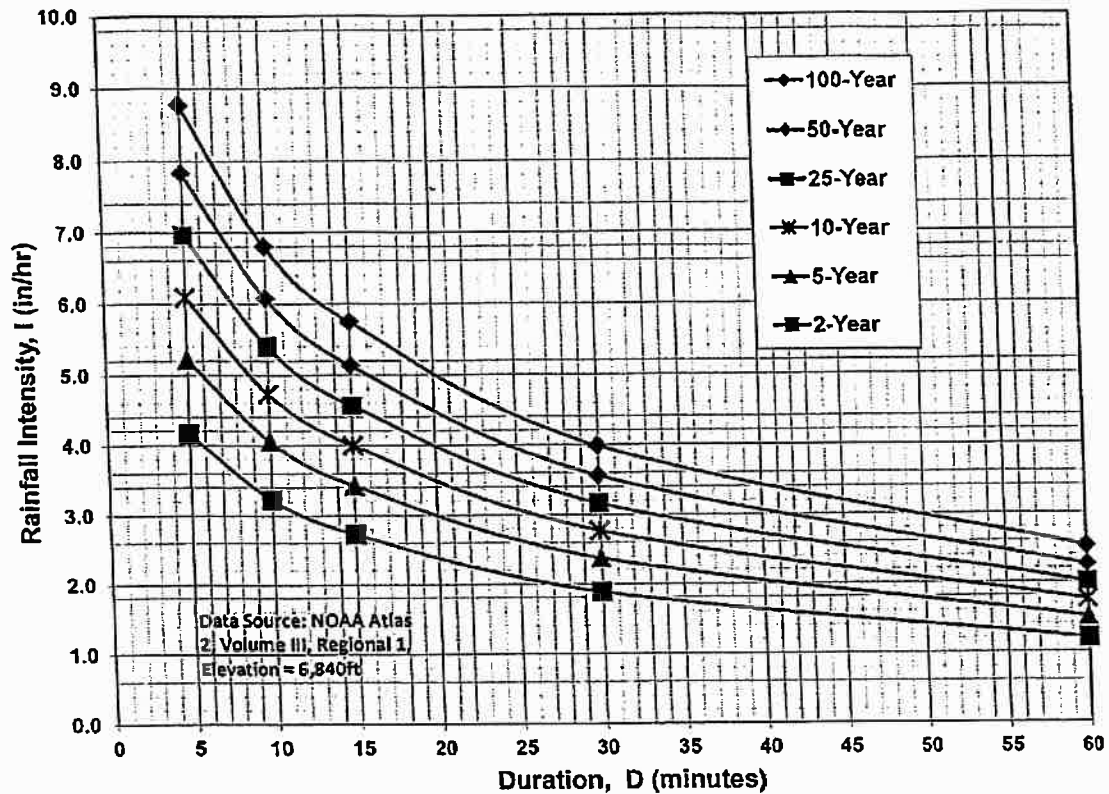


Figure 6-5. Colorado Springs Rainfall Intensity Duration Frequency



IDF Equations

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

$$I_{50} = -2.25 \ln(D) + 11.375$$

$$I_{25} = -2.00 \ln(D) + 10.111$$

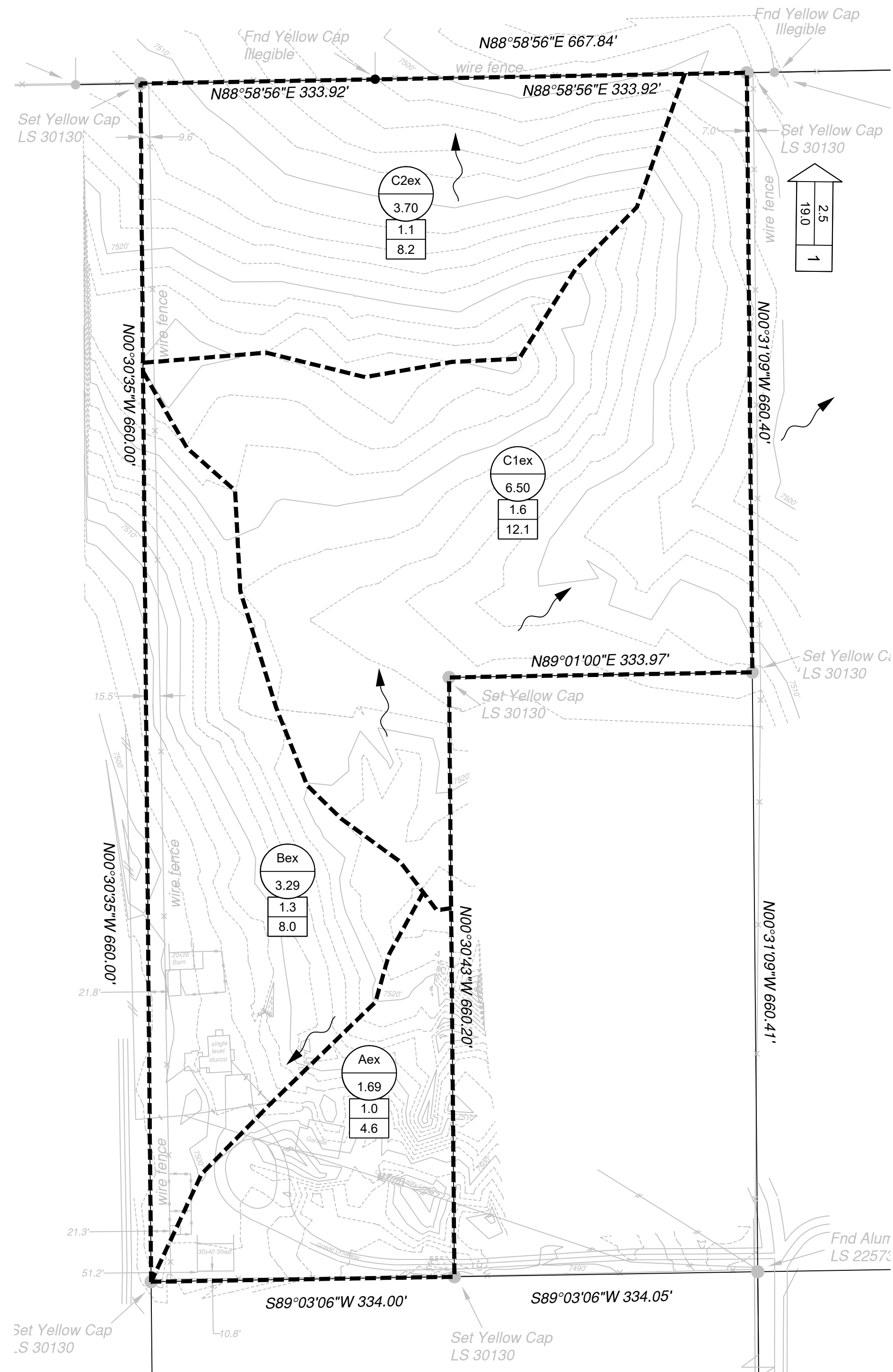
$$I_{10} = -1.75 \ln(D) + 8.847$$

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

$$I_2 = -1.19 \ln(D) + 6.035$$

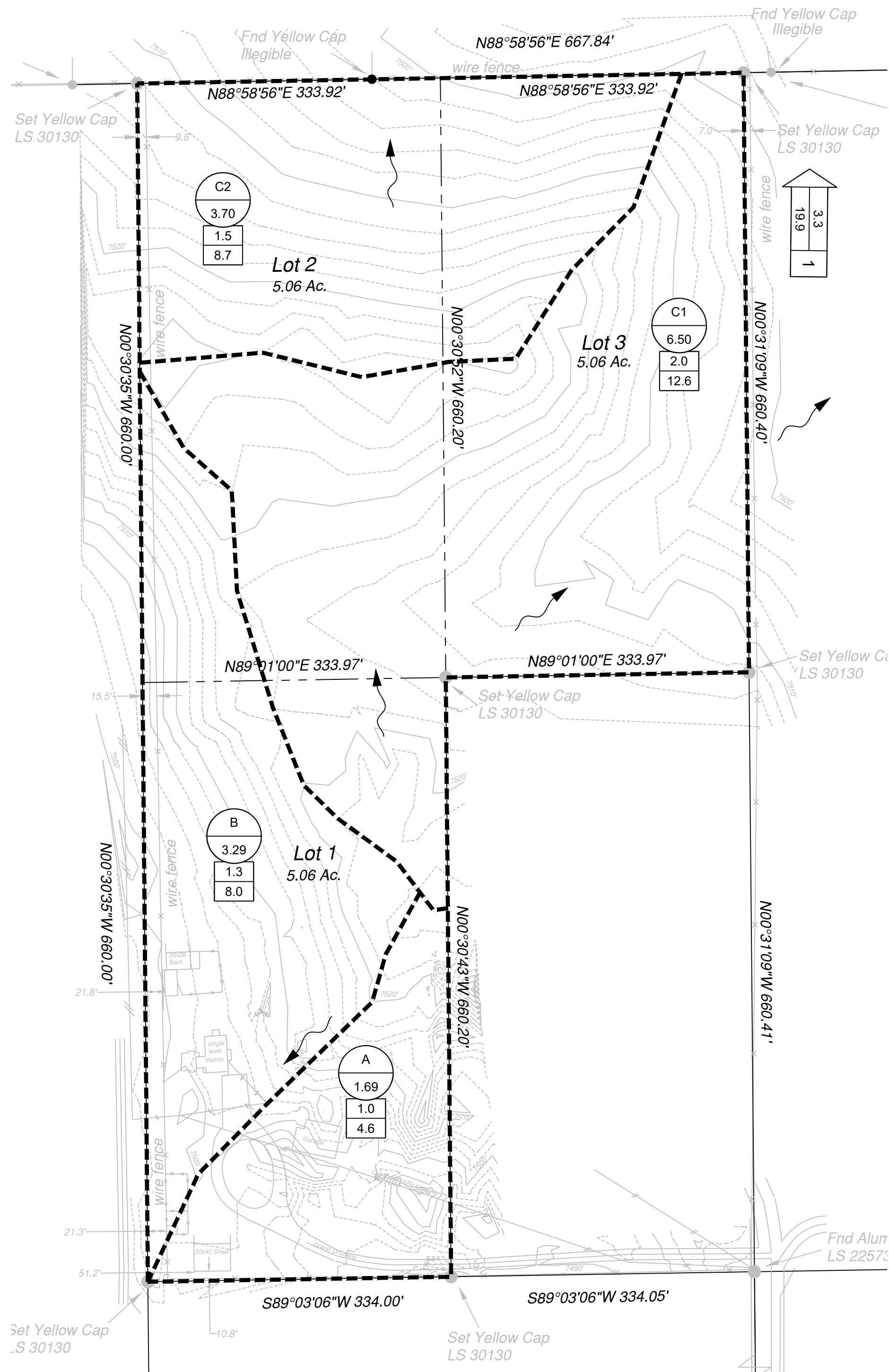
Note: Values calculated by equations may not precisely duplicate values read from figure.

NAME: K:\AUTOCADLAND PROJECTS\2020\03925.5 - TREASURED ACRES\3. DWG\3 SHEETS\03925.5-DRAINAGE PLAN.DWG
PLOT DATE: May 26, 2020 8:27 AM, BY: MARK FERRARESE



EXISTING DRAINAGE PLAN

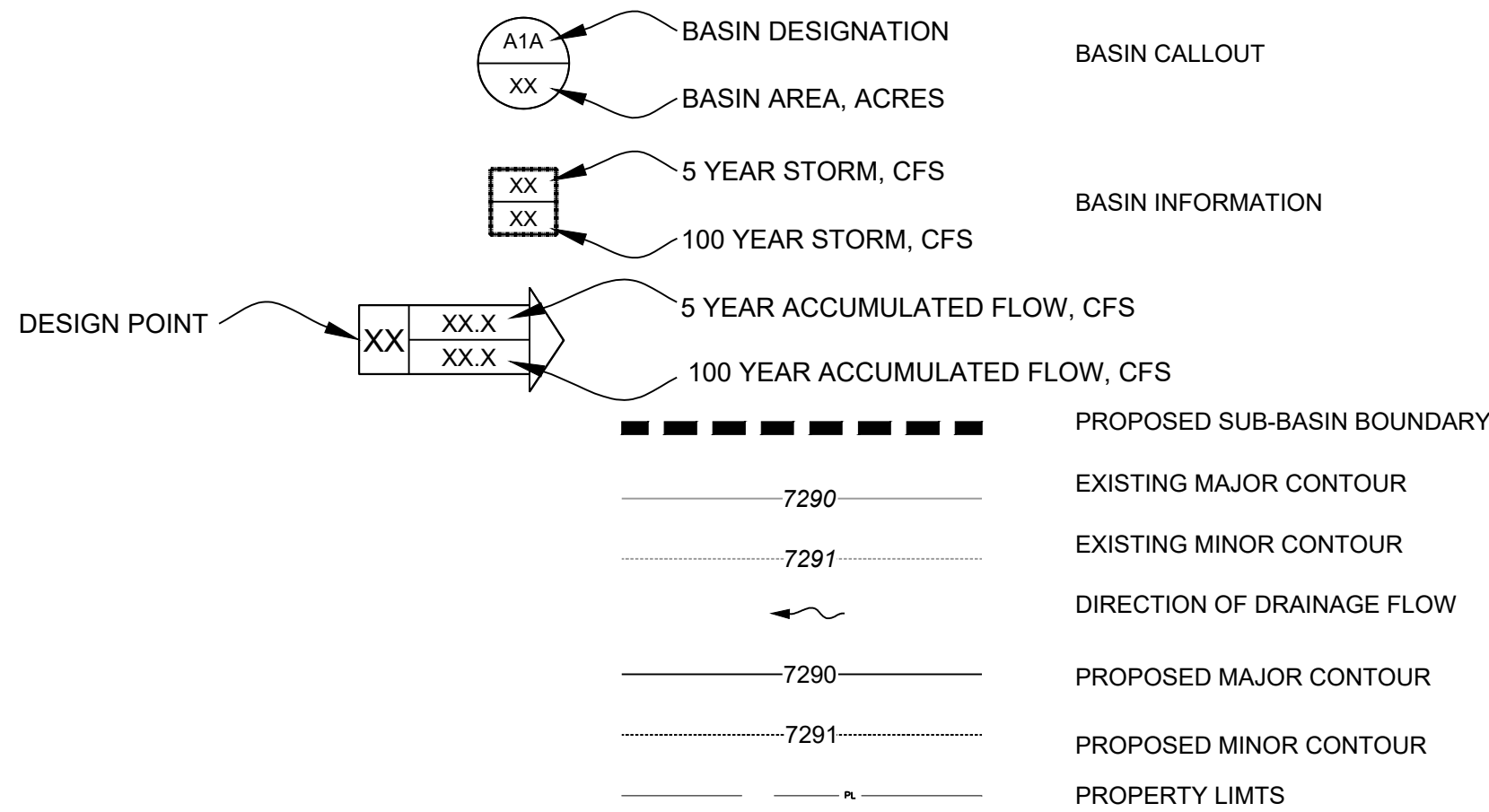
EXISTING CONDITIONS			
AREA DESIGNATION	Q5 (CFS)	Q100 (CFS)	ACRES
Aex	1.0	4.6	1.69
Bex	1.3	8.0	3.29
C1ex	1.6	12.1	6.50
C2ex	1.1	8.2	3.70
DP1	2.5	19.0	10.20



PROPOSED DRAINAGE PLAN

PROPOSED CONDITIONS			
AREA DESIGNATION	Q5 (CFS)	Q100 (CFS)	ACRES
A	1.0	4.6	1.69
B	1.3	8.0	3.29
C1	2.0	12.6	6.50
C2	1.5	8.7	3.70
DP1	3.3	19.9	10.20

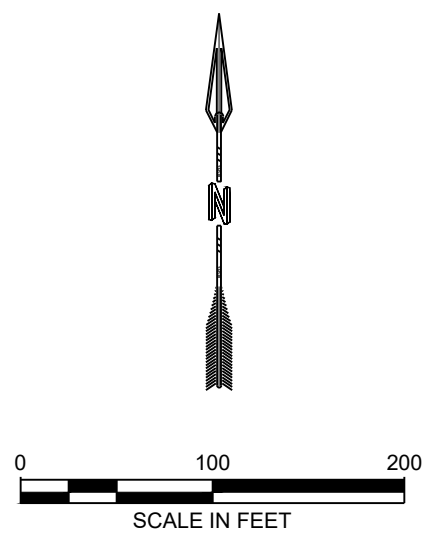
SYMBOL LEGEND



Please update drainage maps to show 2ft contours and provide contours for the adjacent areas that surround the site.

Please show time of concentration path on drainage maps.

Please delineate the four drainage basins that the site is on for both drainage maps.



DESIGNED
DRAWN
CHECKED
DATE

MAB
MDF
MAB
05/21/2020

REVISION

RESPEC
121 S TEIJON ST
SUITE 1110
COLORADO SPRINGS, CO 80903
PHONE (719) 283-7671

STAMP

811
Know what's below.
Call before you dig.

ADDRESS

TREASURED ACRES

EXISTING AND PROPOSED
DRAINAGE PLAN

DRAWING NUMBER:
C
SHEET 1