FINAL DRAINAGE REPORT FOR ZINDORF – MCDANIEL'S SUBDIVISION

PCD FILE NO. MS-22-006

PREPARED BY

Richard Gallegos, P.E.
RESPEC
121 S. Tejon St., Suite 1110
Colorado Springs, CO 80903

PREPARED FOR

Greg Zindorf
Z Investments LLC
PO Box 50005
Colorado Springs, CO

April 2023

RESPEC

ENGINEER'S STATEMENT

This report and plan for the drainage design of Zindorf - McDaniels Subdivision, was prepared by me (or under my direct supervision) and is correct to the best of my knowledge and belief. Said report and plan 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 understand that El Paso County does not, and will not, assume liability for drainage facilities designed by others. I accept responsibility for any liability caused by any negligent acts, errors or omissions on my part in preparing this report.

_____   1/3/2023
                                              _____
 Richard Gallegos, P.E.   Date

Registered Professional Engineer State of Colorado No. 36247

[Seal: COLORADO LICENSED — RICHARD G. GALLEGOS, JR. — 36247 — PROFESSIONAL ENGINEER]

DEVELOPER'S STATEMENT

Greg Zindorf hereby certifies that the drainage facilities for the Zindorf – McDaniels Subdivision shall be constructed according to the design presented in this report. I understand that El Paso County does not, and will not, assume liability for the drainage facilities designed and/or certified by my engineer and that are submitted to El Paso County; and cannot, on behalf of the Zindorf – McDaniels Road guarantee that final drainage design review will absolve Greg Zindorf and/or their successors and/or assigns of future liability for improper design. I further understand that approval of the final plat does not imply approval of my engineer's drainage design.

 GREG ZINDORF
_____   12-20-2022
                                     _____
Authorized Signature   Date

Greg Zindorf_____
Printed Name

Owner_____   Address: PO Box 50005
Title   Colorado Springs, CO

EL PASO COUNTY STATEMENT

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.   Date
County Engineer/ECM Administrator

TABLE OF CONTENTS

BACK POCKET

1.0 PURPOSE

This drainage report is for the design of Zindorf – McDaniels Subdivision (McDaniels Tract). The site is located at 22755 McDaniels Road, Calhan CO in eastern El Paso County. See Vicinity Map in the Appendix below for reference. It is further described as the Northeast One-Quarter of the Northeast One-Quarter of Section 11, Township 14 South, Range 63 West of the 6th P.M.

This site is located in the Ellicott Consolidation – CHBS1200 Drainage Basin. Work will include subdividing the 39.7-acre site into four residential lots. An existing home will remain, and the driveway will be reconstructed. On the other three lots, home pads and gravel driveways will be constructed.

2.0 SOIL CONDITIONS

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

SOIL #	SOIL TYPE	HYDROLOGIC CLASSIFICATION
19	Columbine Gravelly Sandy Loam	A
28	Ellicot Loamy Coarse Sand	A
95	Truckton Loamy Sand	A

The Columbine soil can be described as having a very high permeability, very low surface runoff, and slight hazard of erosion. The Ellicot soil also can be described as very low surface runoff and slight erosion hazard. The Truckton soil includes a moderate hazard of erosion and low water surface runoff. The soil classification used for this study is 'A'. See Soils Map below in the Appendix for reference.

3.0 DRAINAGE CRITERIA

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

Q = cia   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

The storm recurrence intervals used for this study were the 5-year storm and the 100-year storm. ManningSolver Version 1.019 was used in this analysis to calculate the Manning's normal depth within the proposed swale.

4.0 EXISTING DRAINAGE CONDITIONS

The overall site consists of 39.7 acres, of this area approximately 1.03 acres is developed as a single family home, yard, and gravel driveway accessing McDaniel's Road. The areas of the site not covered by gravel road or the residential home are covered with short grass pastures. These undeveloped areas include slopes that range from 0.5% to 2.4%. The overall existing site is approximately 2.1% impervious. See Existing Drainage Map in Appendix for reference.

Flows from Sub-basins EX1 through EX3 and OS1 through OS3 are tributary to the Ellicot Consolidated Drainage Basin (CHBS1200).

Sub-basin OS1 contains 8.67 acres and drains southeast into Subbasin EX2. It produces flows of 1.1 cfs for the 5-year storm and 8.2 cfs for the 100-year storm. These flows sheetflow and continue towards the FEMA 100-year floodway in the middle of the site.

Sub-basin OS2 contains 0.49 acres and drain southwest into the Haegler Ranch floodway that runs through the middle of the site. It produces flows of 0.1 cfs for the 5-year storm and 1.0 cfs for the 100-year storm. These flows sheetflow to the southwest.

Sub-basin OS3 contains 1.02 acres and drains the east along McDaniels Road. It contains half of McDaniels Road that drains south into the ditch. It produces flows of 0.5 cfs for the 5-year storm and 1.5 cfs for the 100-year storm. All flows north of the site are directed into a drainage ditch that flows into a culvert under McDaniels Road. These flows bypass the development occurring on the site in a ditch along North Log Road. Flows overtopping the intersection of McDaniels Road and North Log Road sheetflow to the east.

Sub-basin EX1 contains 1.06 acres and drains due southwest. It produces flows of 0.2 cubic feet per second (cfs) for the 5-year storm and 1.4 cfs for the 100-year storm. These flows are directed to the southerly direction.

Sub-basin EX2 contains 14.59 acres and drains southeast into the Haeglar Ranch floodway in the middle of the site. It produces flows of 1.8 cfs for the 5-year storm and 14.0 cfs for the 100-year storm. These flows sheetflow to the southeast.

Sub-basin EX3 contains 22.89 acres and sheetflows to the southwest into the Haegler Ranch floodway in the middle of the site. It produces flows of 3.5 cfs for the 5-year storm and 22.8 cfs for the 100-year storm. These flows will combine with flows from Sub-basin EX2, Sub-basin EX3, Sub-basin OS1, Sub-basin OS2, and Sub-basin OS3 to produce total flows of 7.1 cfs for the 5-year storm and 48.0 cfs for the 100-year storm at Design Point 1. FEMA Zone 'A' 100-year floodplain flows entering the site are approximately 1,900 cfs.

The total flow leaving the site at Design Point 1 (DP1) is 7.1 cfs for the 5-year storm and 48.0 cfs for the 100-year storm. The estimated runoff amounts produced for the project under Existing Conditions are shown in Table 1 below.

TABLE 1 – EXISTING CONDITIONS		
Sub-basin	Q_5 (CFS)	Q_{100} (CFS)
EX1	0.2	1.4
EX2	1.8	14.0
EX3	3.5	22.8
OS1	1.1	8.2
OS2	0.1	1.0
OS3	0.5	1.5
DP1 (EX2 + EX3 + OS1 + OS2 + OS3)	7.1	48.0

5.0 DEVELOPED DRAINAGE CONDITIONS

Although the overall site consists of 39.7 acre only approximately 1.37 acres will be disturbed. The site will be subdivided into four separate lots with three house and gravel driveway being constructed on the four lots. The existing house will remain and the gravel driveway will be reconstructed. See Proposed Conditions Map below in Appendix for reference.

The overall drainage pattern will remain the same as existing conditions with developed flows directed to the same locations as described in the Existing Conditions Section. Proposed site imperviousness is 2.8%, versus 2.1% in the existing conditions.

Sub-basin OS1 contains 8.67 acres and drains southeast into Subbasin PP2. It produces flows of 1.1 cfs for the 5-year storm and 8.2 cfs for the 100-year storm. These flows continue towards the FEMA 100-year floodway in the middle of the site.

Sub-basin OS2 contains 0.49 acres and drain southwest into the Haegler Ranch floodway that runs through the middle of the site. It produces flows of 0.1 cfs for the 5-year storm and 1.0 cfs for the 100-year storm. These flows sheetflow to the southwest and will combine with flows from Design Point 1, described above.

Sub-basin OS3 contains 1.02 acres and drains the east along McDaniels Road. It contains half of McDaniels Road that drains south into the ditch. It produces flows of 0.5 cfs for the 5-year storm and 1.5 cfs for the 100-year storm. All flows north of the site are directed into a drainage ditch that flows into a culvert under McDaniels Road. These flows bypass the development occurring on the site in a ditch along North Log Road. Flows overtopping the intersection of McDaniels Road and North Log Road sheetflow to the east.

Sub-basin PP1 contains 1.06 acres and drains due southwest. It produces flows of 0.2 cfs for the 5-year storm and 1.4 cfs for the 100-year storm. These flows sheetflow in a southerly direction.

Sub-basin PP2 contains 14.59 acres and drains southeast into the Haegler Ranch floodway in the middle of the site. It produces flows of 1.8 cfs for the 5-year storm and 14.0 cfs for the 100-year storm. These flows sheetflow to the southeast.

Sub-basin PP3 contains 22.89 acres and sheetflows to the southwest into the Haegler Ranch floodway in the middle of the site. It produces flows of 3.9 cfs for the 5-year storm and 22.9 cfs for the 100-year storm. These flows will combine with flows from Sub-basin PP2, Sub-basin PP3, Sub-basin OS1, Sub-basin OS2, and Sub-basin OS3 to produce total flows of 7.5 cfs for the 5-year storm and 48.0 cfs for the 100-year storm at Design Point 1. The majority of runoff will sheet flow and have similar time of concentrations as seen in the existing conditions. The 100-year peak rate in the proposed conditions is the same as that of the existing, and the 5-year increases 0.4 cfs in the proposed conditions, existing 5-year flow rate of 7.1 cfs versus the proposed flow rate of 7.5 cfs. Because the peak flow rate for the 100-year storm event remains unchanged, and only a slight increase in the 5-year flow rate is seen, mitigation is not required. All flows north of the site are directed into a drainage ditch that flows into a culvert under McDaniels Road. These flows bypass the development occurring on the site in a ditch along North Log Road. Flows overtopping the intersection of McDaniels Road and North Log Road sheetflow to the east.

At Design Point 1, the computed flows are either generated from this site, or sheet flow through the site from adjacent parcels, but do not include the flows within the floodplain from the upstream watershed. Peak 100-year flow rates for the overall Ellicott Consolidated floodplain watershed area through the site is 7,019 cfs per the FEMA Flood Insurance Study. Only the 100-year peak flow rate through this area is provided. FEMA has completed a detailed study of the channel, and the data provided is included in the appendix of this report, including the computed water surface profile.

The estimated runoff amounts produced for the project for Developed Conditions are shown in Table 2 below.

TABLE 2 – DEVELOPED CONDITIONS		
Sub-basin	Q_5 (CFS)	Q_{100} (CFS)
PP1	0.2	1.4
PP2	1.8	14.0
PP3	3.9	22.9
OS1	1.1	8.2
OS2	0.1	1.0
OS3	0.5	1.5
DP1 (PP2 + PP3 +OS1 + OS2 + OS3)	7.5	48.0

6.0 WATER QUALITY

The total disturbance for this development will be 1.37 acres. According to the El Paso County Engineering Criteria Manual (ECM), "The following types of sites and associated land disturbances are excluded from the requirements of this Section 1.7". Furthermore, in El Paso County ECM Appendix I.7, 1.B, a "Large Lot Singe Family Site" is excluded from the requirements defined in Section 1.7. Since this site will be divided in single-family residential lots greater than 2.5 acres in size per dwelling and having a total lot imperviousness of less than 10 percent, the site can be excluded from water quality control measure requirements.

7.0 EROSION CONTROL PLAN

The site construction consists of four single family residential lots, which includes four houses and gravel driveways that all occupy greater than 2.5 acres in size per dwelling and a total lot imperviousness of less than 10 percent. With single family residential lots greater than 2.5 acres in size and less than 10 percent imperviousness, the site is excluded from stormwater quality control measures and ESQCP requirements. Although exclusions apply, each lot is still responsible for providing appropriate temporary control measures when each site is developed, which may include items such as silt fence, vehicle tracking control surfaces, etc.

8.0 FLOODPLAIN STATEMENT

Portions of the site are within the designated FEMA 100-year floodplain and designated FEMA 100-year floodway as designated on Map No. 08041C0810G and Map No. 08041C0807G, both dated December 7th, 2018. A large portion of the site consists of a FEMA Flood Zone 'AE'. A small portion on the north end of the site is considered a FEMA Flood Zone 'A'.

All structures will be a minimum of 150' away from the FEMA delineated Zone AE floodplains and homes shall be constructed in accordance with El Paso County's Chapter 12 for to either elevate any residence 1' above the 100-year base flood elevation of 6090 (NAVD 88 Datum), or floodproof the structure for any areas below the floodplain elevation.   There is currently not an approved drainage basin planning study for the Ellicott Consolidated (CHBS1200) Drainage Basin, and no County identified improvements were identified for this segment of stream. Based upon field observations, significant vegetation consisting of rangeland grasses, shrubs and trees exist in the area meaning the floodplain area is scour stable. No baseflow exists within the channel. For these reasons, drainageway improvements and channel stabilization requirements have not been identified for the drainageway shown in the Drainage Maps below. No improvements are proposed for this drainageway as a result, an no additional hydraulic analysis beyond what FEMA has provided is needed for this Final Drainage Report.

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gravel driveways will be constructed on the other lots. The total estimated new disturbance area of the site will be 1.37 acres, which will allow for new driveways for all four lots, and home construction on three of the lots. The fourth lot currently has a single family residence, which will remain and only the gravel driveway will be reconfigured. Construction will occur within drainage sub-basin PP3. The development increases total routed flows exiting the site at Design Point 1 (DP1) from 7.1 cfs to 7.5 cfs for the 5-year storm, while the 100-year storm flow remains unchanged at 48.0 cfs. This is a 5.6% increase for the 5-year storm. These increases do not warrant the need for detention, nor water quality as each lot is also greater than five acres in size. All developed flows will continue to flow along existing drainage patterns. All areas disturbed by construction will be repaired, and erosion control measures will be installed during construction of the proposed site. The proposed project will not, with respect to stormwater runoff, negatively impact the adjacent properties and downstream properties. Because there is no increase to the 100-year peak flow rates from the site and only a minimal increase in the 5-year event, the proposed development will not adversely impact adjacent and downstream properties.

12.0 REFERENCES

Municipal Code Corporation (2018). *Engineering Criteria Manual of El Paso County, Colorado (ECM)*

Municipal Code Corporation (2018). *Drainage Criteria Manual of El Paso County, Colorado (DPM)*

USDA, NRCS. Soil Survey of El Paso County Area, Colorado.

Haegler Ranch Drainage Basin Planning Study, URS Corporation, Dated May 2009.

APPENDIX A

MAPS
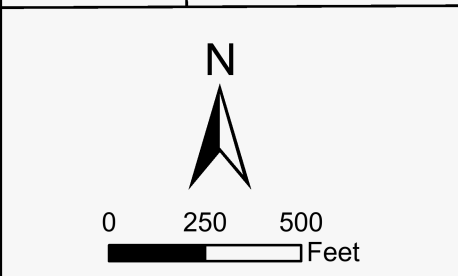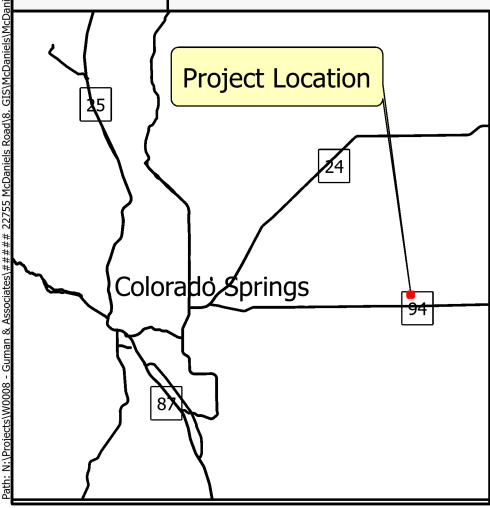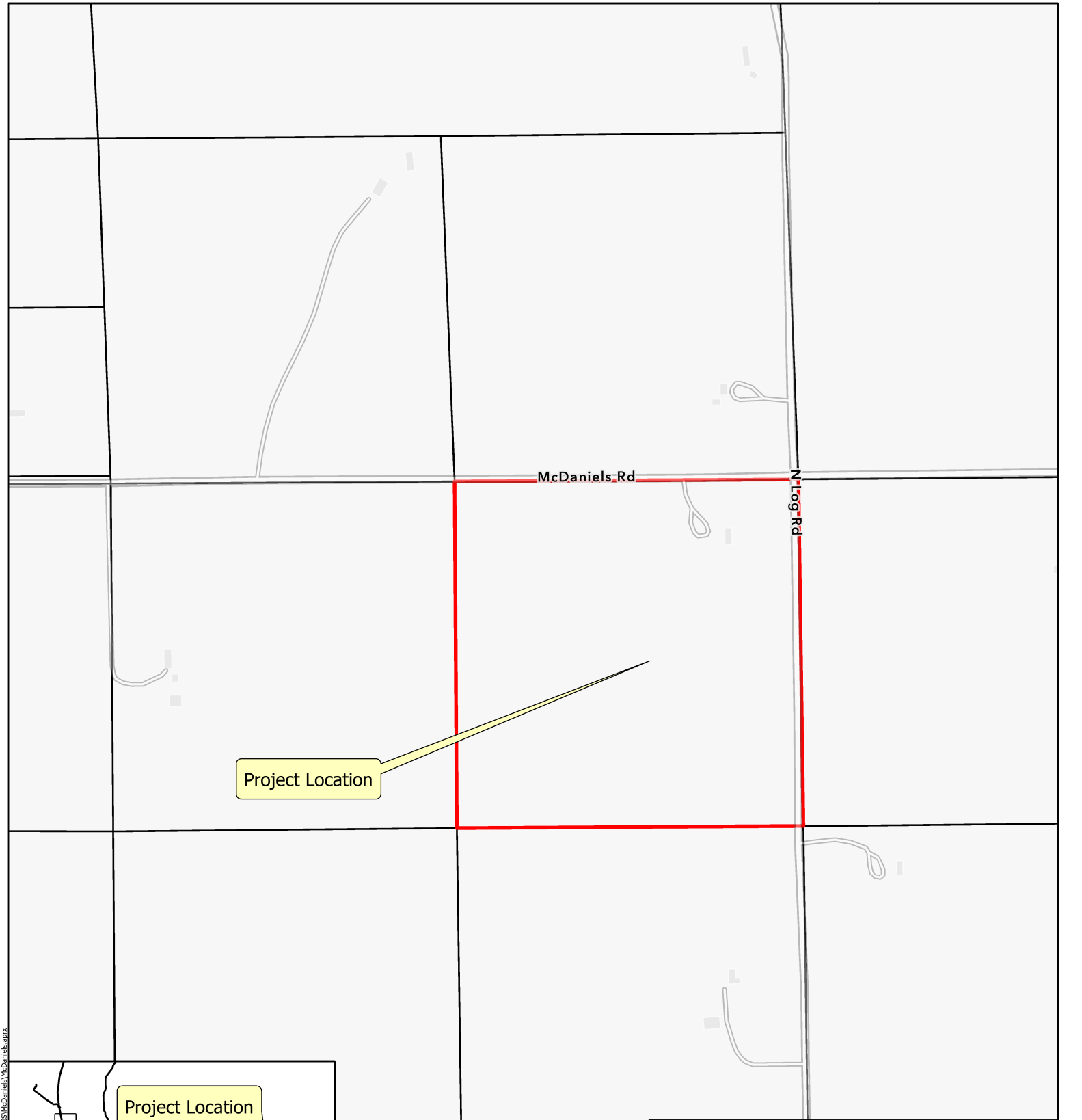
McDaniels Rd

N Log Rd

Project Location

Project Location

25

24

94

87

Colorado Springs

Prepared by:

R

RESPEC

121 S. TEJON ST., SUITE 1110
COLORADO SPRINGS, CO 80903
WWW.RESPEC.COM (719) 266-5212

22755 McDaniels Road

VICINITY MAP

N

0   250   500
Feet

Esri Community Maps Contributors, © OpenStreetMap, Microsoft, Esri, HERE, Garmin, SafeGraph,
GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA

McDaniels Rd
McDaniels Rd
Mc

19

N Log Rd

28

95

N

0	100	200

Feet

Map Unit Symbol	Map Unit Name	Rating
19	Columbine gravelly sandy loam, 0 to 3 percent slopes	A
28	Ellicot loamy coarse sand, 0 to 5 percent slopes	A
95	Truckton loamy sand, 1 to 9 percent slopes	A
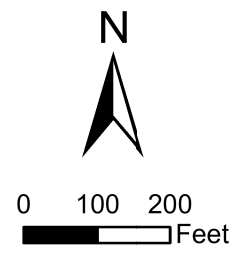
Prepared by:

R

RESPEC

121 S. TEJON ST., SUITE 1110
COLORADO SPRINGS, CO 80903
WWW.RESPEC.COM (719) 266-5212

22755 McDaniels Road

SOILS MAP

08041C0807G

6092 6090

AS

6087

6086

6084

6082

6080

6078

6076

AR

AQ

AP

AO

Ellicott Consolidated

ZONE AE

N

0 250 500
Feet

NFIP

NATIONAL FLOOD INSURANCE PROGRAM
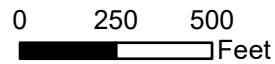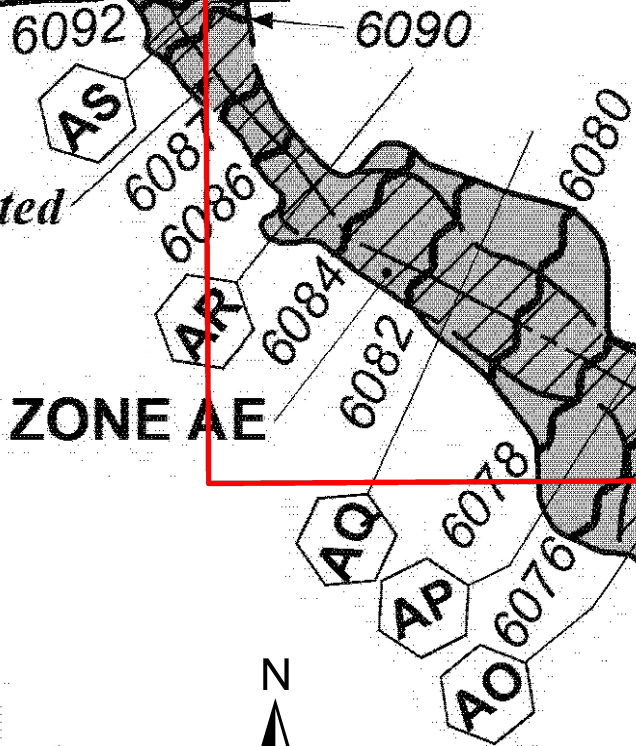
PANEL 0810G

FIRM

FLOOD INSURANCE RATE MAP

EL PASO COUNTY, COLORADO
AND INCORPORATED AREAS

PANEL 810 OF 1300

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
EL PASO COUNTY	08058	0810	G

Notice to User: The Map Number shown below should be used
when placing map orders; the Community Number shown
above should be used on insurance applications for the subject
community.

MAP NUMBER
08041C0810G

MAP REVISED
DECEMBER 7, 2018

Federal Emergency Management Agency

11

Prepared by:

R

RESPEC

121 S. TEJON ST., SUITE 1110
COLORADO SPRINGS, CO 80903
WWW.RESPEC.COM (719) 266-5212

22755 McDaniels Road

FIRM MAP
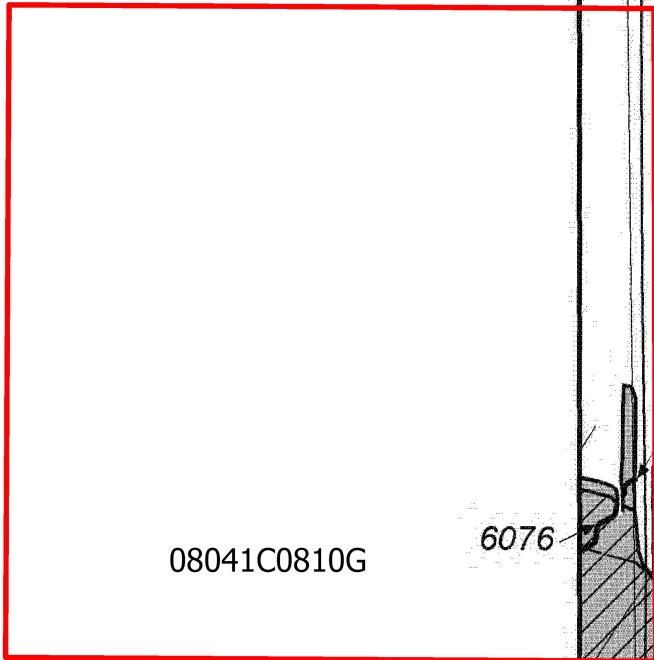
08041C0810G

6076
AO
6076

6076

Ellicott Consolidated

6072

AN

ZONE AE

6068

6064

6064

6062

6062

11

AL

6062

AM

AK

LOG RD

6056

6058

1370000 FT

38° 50' 37.50"

104° 24' 22.00"

N

Prepared by:

R

RESPEC

121 S. TEJON ST., SUITE 1110
COLORADO SPRINGS, CO 80903
WWW.RESPEC.COM (719) 266-5212

22755 McDaniels Road

FIRM MAP

0   250   500
Feet

Path: N:\Projects\W0008 - Guman & Associates\### # # # # 22755 McDaniels Road\8. GIS\McDaniels\McDaniels.aprx

APPENDIX B
CALCULATIONS

McDaniels Subdivision									
C FACTOR CALCULATION SHEET									
EXISTING CONDITIONS									
RUNOFF COEFICIENT									
TYPE A/B SOILS									
LAND USE		Imperv %	5 YR	100 YR					
UNDEV		0	0.08	0.35					
GRAVEL ROAD		80	0.59	0.7					
ASPHALT ROAD		100	0.9	0.96					
ROOFS		90	0.73	0.81					

			EXISTING CONDITIONS						
	TOTAL	SURFACE CONDITION AREAS				CALCULATED C			
AREA	AREA	UNDEV	GRAVEL	ASPHALT	ROOFS	5	100	% IMPERVIOUS	
DESIG.	(acre)		ROAD	ROAD		YR	YR		
EX1	1.06	1.06	0.00	0.00	0.00	0.08	0.35		0.00
EX2	14.59	14.59	0.00	0.00	0.00	0.08	0.35		0.00
EX3	22.86	21.83	0.98	0.00	0.05	0.10	0.37		3.63
OS1	8.67	8.67	0.00	0.00	0.00	0.08	0.35		0.00
OS2	0.49	0.49	0.00	0.00	0.00	0.08	0.35		0.00
OS3	1.02	0.60	0.42	0.00	0.00	0.29	0.49		32.94
Site Percent Impervious	2.11								

DEVELOPED CONDITIONS									
RUNOFF COEFICIENT									
TYPE A/B SOILS									
LAND USE		Imperv %	5 YR	100 YR					
UNDEV		0	0.08	0.35					
GRAVEL ROAD		80	0.59	0.7					
ASPHALT ROAD		100	0.9	0.96					
ROOFS		90	0.73	0.81					
Developed Conditions									
	TOTAL	SURFACE CONDITION AREAS				CALCULATED C			
AREA	AREA	UNDEV	GRAVEL	ASPHALT	ROOFS	5	100	% IMPERVIOUS	
DESIG.	(acre)		ROAD	ROAD		YR	YR		
PP1	1.06	1.06	0.00	0.00	0.00	**0.08**	**0.35**		**0.00**
PP2	14.59	14.59	0.00	0.00	0.00	**0.08**	**0.35**		**0.00**
PP3	22.86	21.49	1.16	0.00	0.21	**0.11**	**0.37**		**4.89**
Total	38.51	37.14	1.16	0.00	0.21	**TOTAL SITE IMPERVIOUSNESS**			**2.90**
OS1	8.67	8.67	0.00	0.00	0.00	**0.08**	**0.35**		**0.00**
OS2	0.49	0.49	0.00	0.00	0.00	**0.08**	**0.35**		**0.00**
OS3	1.02	0.60	0.42	0.00	0.00	**0.29**	**0.49**		**32.94**
Site Percent Impervious	2.83								

McDaniels Subdivision
PROJ.W008
DRAINAGE CALCULATION SHEET
file:McDaniels Rd.xlsx
06/14/22

AREA DESIG.	AREA (acre)	C5 (5 yr)	C100 (100 yr)	C5 X A	C100 X A	Initial Tci L (ft)	Initial Tci Slope (%)	ti (min)	Travel Time L (ft)	Travel Time Slope (%)	V (fps)	Tt (min)	TC (min)	I5 (in/hr)	I100 (in/hr)	Q5 (cfs)	Q100 (cfs)	AREA DESIG.
EXISTING CONDITIONS																		
EX1	1.06	0.08	0.35	0.08	0.37	300	1.70	27.73	350	1.70	0.90	6.48	34.21	2.14	3.74	0.2	1.4	EX1
EX2	14.59	0.08	0.35	1.17	5.11	300	2.00	26.28	1400	1.40	0.80	29.17	55.45	1.57	2.75	1.8	14.0	EX2
EX3	22.86	0.10	0.37	2.29	8.46	300	2.00	25.77	1500	1.40	0.80	31.25	57.02	1.54	2.69	3.5	22.8	EX3
OS1	8.67	0.08	0.35	0.69	3.03	300	1.00	33.04	1000	1.10	0.70	23.81	56.85	1.55	2.70	1.1	8.2	OS1
OS2	0.49	0.08	0.35	0.04	0.17	115	2.40	15.32	115	2.40	1.20	1.60	16.92	3.18	5.55	0.1	1.0	OS2
OS3	1.02	0.29	0.49	0.30	0.50	30	0.50	5.00	0	0.00	0.00	0.00	5.00	5.19	9.06	1.5	4.5	OS3
DP1 (EX2 + EX3 + OS1 + OS2 + OS3)	47.63	0.09	0.36	4.48	17.27	300	1.00	33.04	2600	1.10	5.00	8.67	54.47	1.59	2.78	7.1	48.0	DP1 (EX2 + EX3 + OS1 + OS2 + OS3)
DEVELOPED CONDITIONS																		
PP1	1.06	0.08	0.35	0.08	0.37	300	1.70	27.73	350	1.70	0.90	6.48	34.21	2.14	3.74	0.2	1.4	PP1
PP2	14.59	0.08	0.35	1.17	5.11	300	2.00	26.28	1400	1.40	0.80	29.17	55.45	1.57	2.75	1.8	14.0	PP2
PP3	22.86	0.11	0.37	2.51	8.46	300	2.00	25.51	1500	1.40	0.80	31.25	56.76	1.55	2.70	3.9	22.9	PP3
OS1	8.67	0.08	0.35	0.69	3.03	300	1.00	33.04	1000	1.10	0.70	23.81	56.85	1.55	2.70	1.1	8.2	OS1
OS2	0.49	0.08	0.35	0.04	0.17	115	2.40	15.32	115	2.40	1.20	1.60	16.92	3.18	5.55	0.1	1.0	OS2
OS3	1.02	0.29	0.49	0.30	0.50	30	0.50	5.00	0	0.00	0.00	0.00	5.00	5.19	9.06	1.5	4.5	OS3
DP1 (PP2 + PP3 + OS1 + OS2 + OS3)	47.63	0.10	0.36	4.71	17.27	300	1.00	33.04	2600	1.10	5.00	8.67	54.47	1.59	2.78	7.5	48.0	DP1 (PP2 + PP3 + OS1 + OS2 + OS3)

APPENDIX C

ELLICOTT CONSOLIDATED FLOODPLAIN ANALYSIS

Table 4. Summary of Discharges (cont.)

Flooding Source and Location	Drainage Area (Square Miles)	Peak Discharges (Cubic Feet Per Second)			
		10-Year	50-Year	100-Year	500-Year
East Cherry Creek					
At Walker Road	10.30	--[1]	--[1]	2,000	--[1]
East Tributary to Black Squirrel Creek					
At confluence with Black Squirrel Creek	0.97	--[1]	--[1]	569	--[1]
East Tributary to Black Squirrel Creek – West Fork Bennett Ranch Basin					
At Black Squirrel Creek – West Fork Bennett Ranch Basin	0.40	--[1]	--[1]	230	--[1]
Ellicott Consolidated					
At confluence with Black Squirrel Creek	--[1]	--[1]	--[1]	8,000	--[1]
At confluence with East Tributary	--[1]	--[1]	--[1]	7,019	--[1]
Ellicott Consolidated – East Tributary					
At confluence with Ellicott Consolidated	--[1]	--[1]	--[1]	183	--[1]
Fairfax Creek					
At Research Parkway	0.70	--[1]	--[1]	1,000	--[1]
Fisher's Canyon					
At confluence with Fountain Creek	5.30	1,420	2,590	3,090	4,800
Fisher's Canyon-Above Loomis Avenue					
At West Meadows Drive	3.59	--[1]	--[1]	1,640	--[1]
Upstream of Fisher's Canyon-South Branch	2.36	--[1]	--[1]	440	--[1]
Fisher's Canyon-South Branch					
At confluence with Fisher's Canyon	1.23	--[1]	--[1]	1,290	--[1]

(Red annotation: "Flow rate through project reach" with box around the row "At confluence with East Tributary")

---

[1]Data not available
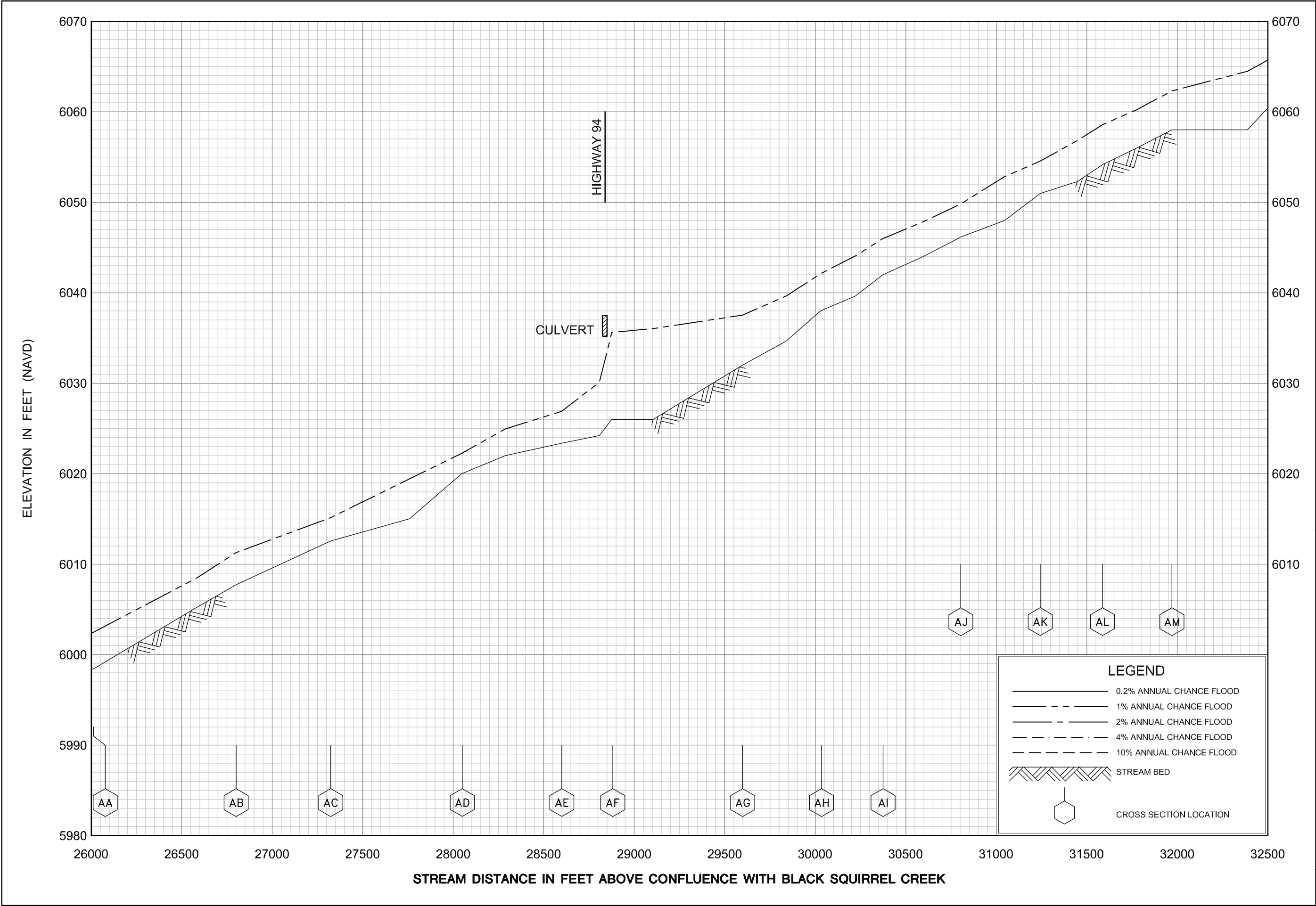
FLOOD PROFILES

ELLICOTT CONSOLIDATED

FEDERAL EMERGENCY MANAGEMENT AGENCY

EL PASO COUNTY, CO
AND INCORPORATED AREAS

134P

ELEVATION IN FEET (NAVD)

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH BLACK SQUIRREL CREEK

HIGHWAY 94

CULVERT

LEGEND

0.2% ANNUAL CHANCE FLOOD
1% ANNUAL CHANCE FLOOD
2% ANNUAL CHANCE FLOOD
4% ANNUAL CHANCE FLOOD
10% ANNUAL CHANCE FLOOD
STREAM BED

CROSS SECTION LOCATION

FLOOD PROFILES

ELLICOTT CONSOLIDATED

LIMIT OF
DETAILED STUDY

ELEVATION IN FEET (NAVD)

McDaniels Project Reach

LEGEND

0.2% ANNUAL CHANCE FLOOD
1% ANNUAL CHANCE FLOOD
2% ANNUAL CHANCE FLOOD
4% ANNUAL CHANCE FLOOD
10% ANNUAL CHANCE FLOOD

STREAM BED

CROSS SECTION LOCATION

AN   AO   AP   AQ   AR   AS

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH BLACK SQUIRREL CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

EL PASO COUNTY, CO
AND INCORPORATED AREAS

135P

APPENDIX D
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	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
Playgrounds	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
Railroad Yard Areas	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
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	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
Roofs	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
Lawns	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
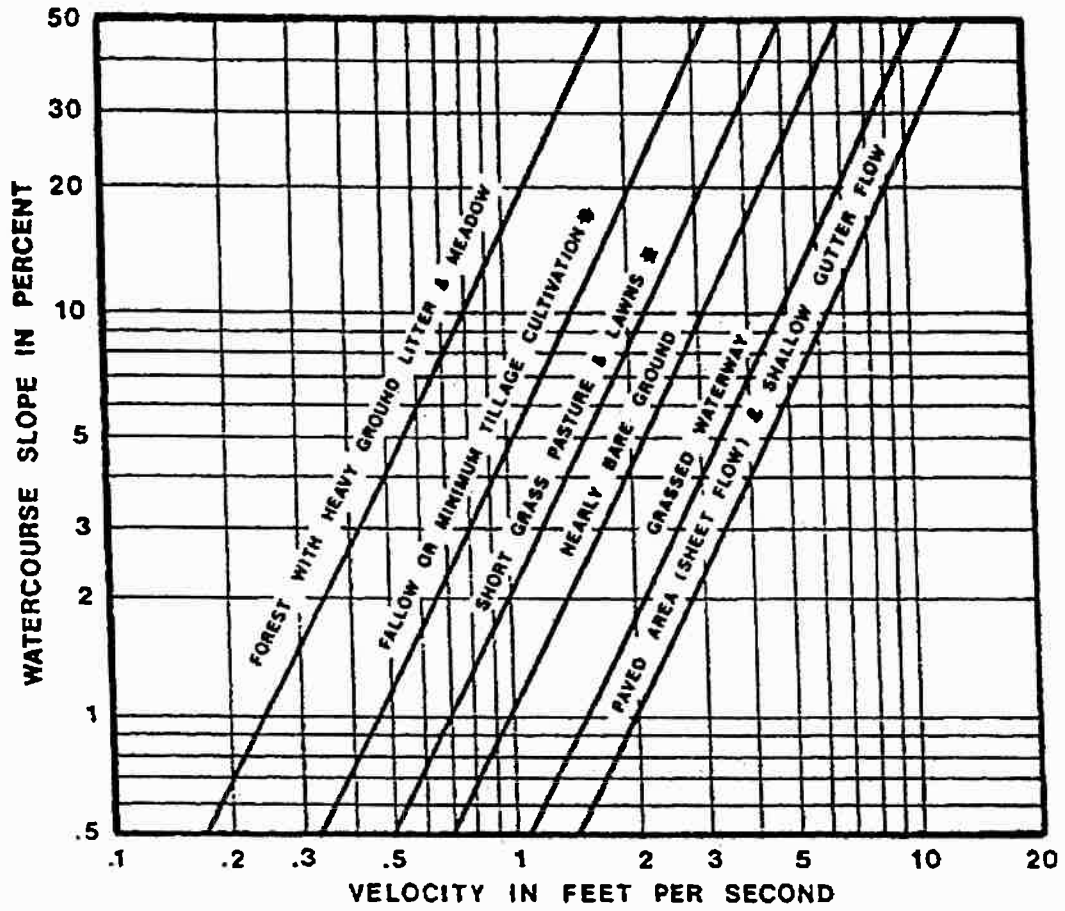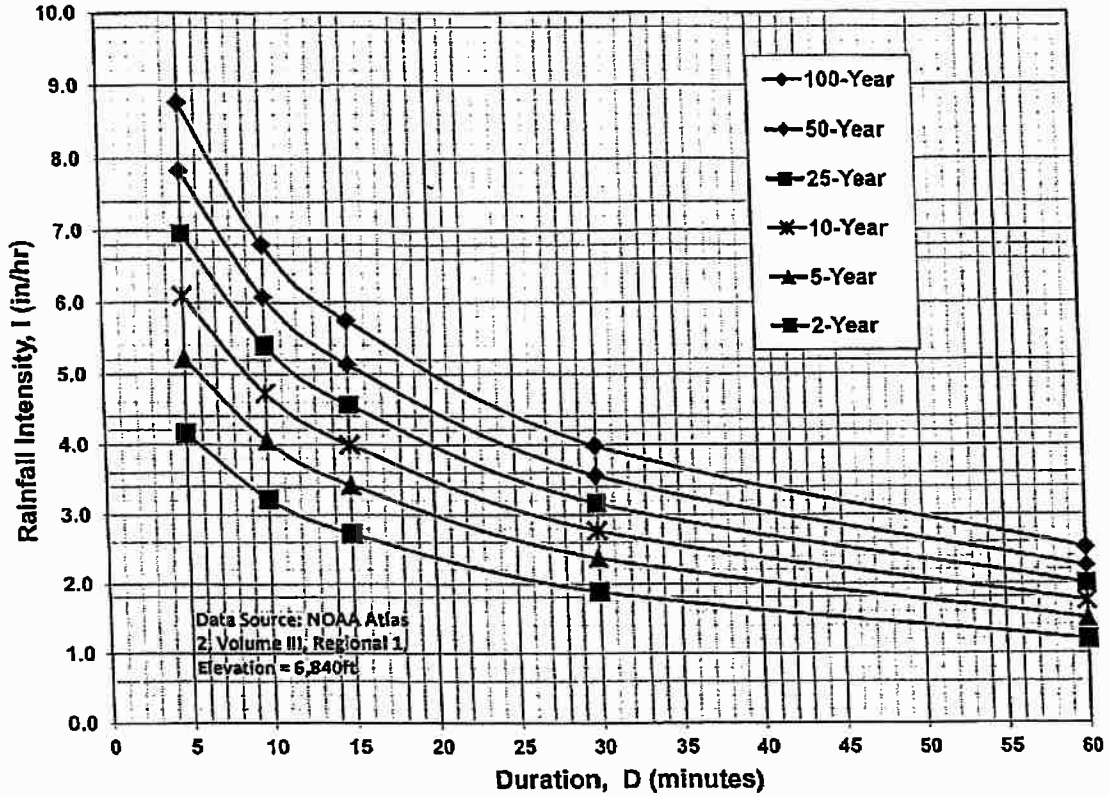
Figure 6-5. Colorado Springs Rainfall Intensity Duration Frequency

IDF Equations

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

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

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

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

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

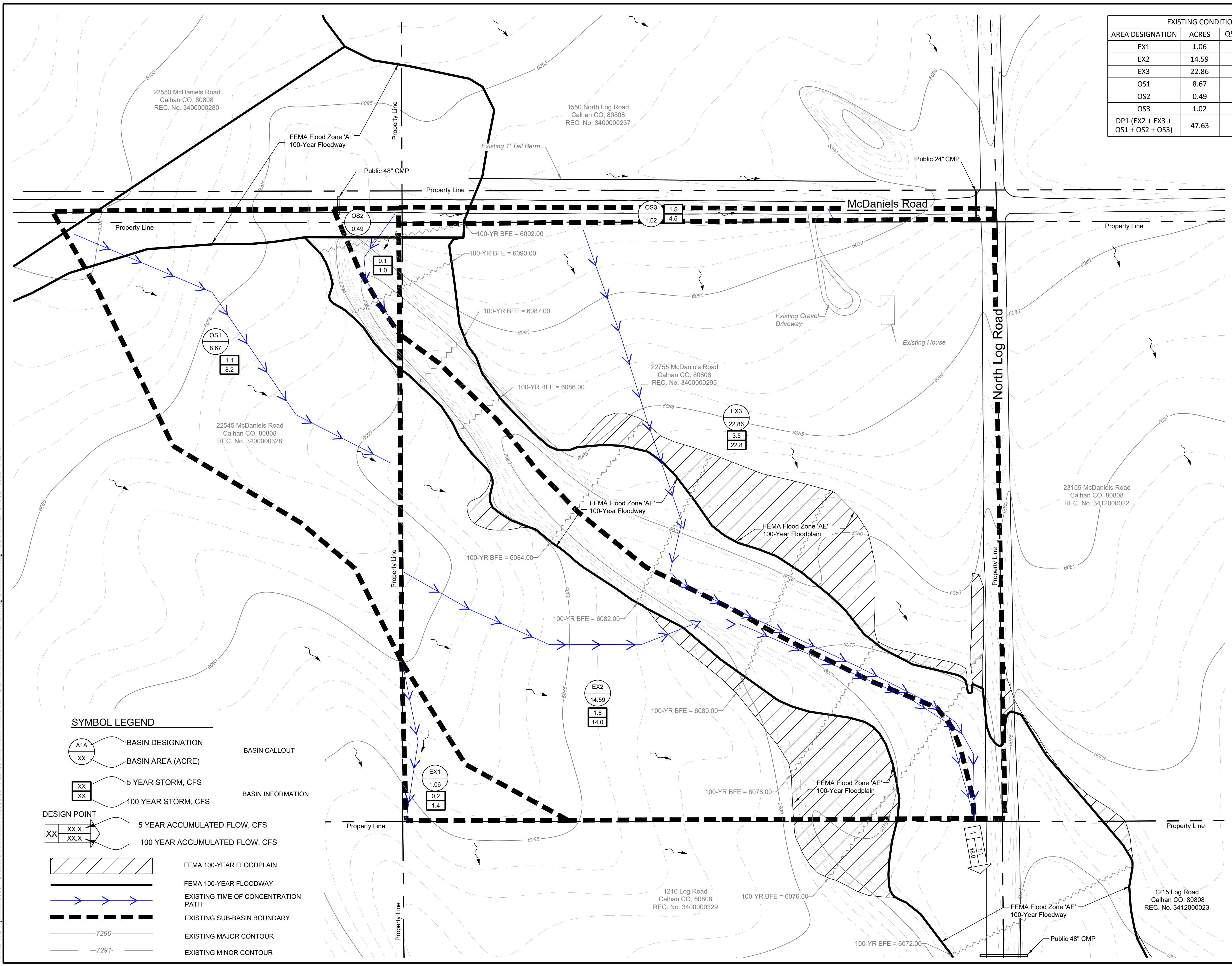$I_2 = -1.19 \ln(D) + 6.035$

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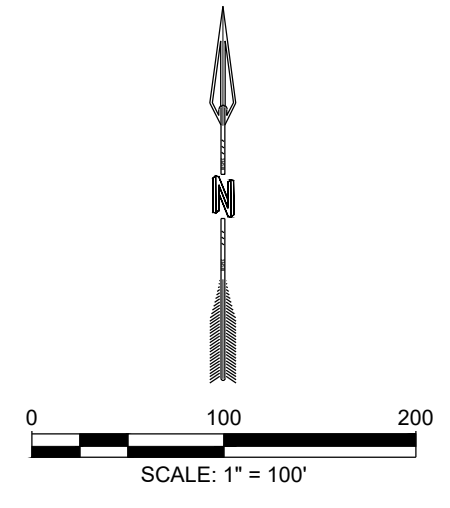duplicate values read from figure.

BACK POCKET

EXISTING CONDITIONS

AREA DESIGNATION	ACRES	Q5 (CFS)	Q100 (CFS)
EX1	1.06	0.2	1.4
EX2	14.59	1.8	14.0
EX3	22.86	3.5	22.8
OS1	8.67	1.1	8.2
OS2	0.49	0.1	1.0
OS3	1.02	1.5	4.5
DP1 (EX2 + EX3 + OS1 + OS2 + OS3)	47.63	7.1	48.0

REVISION

DESIGNED CTD
DRAWN CTD
CHECKED RGG
DATE 1.03.2023

RESPEC
COMMUNITY DESIGN SOLUTIONS
121 SOUTH TEJON STREET SUITE 1110
COLORADO SPRINGS, COLORADO 80903
WWW.RESPEC.COM PHONE (719)266-5212

RESPEC

STAMP

PRELIMINARY
NOT FOR CONSTRUCTION
1/2023
THIS DRAWING IS INCOMPLETE
AND NOT TO BE USED FOR
CONSTRUCTION UNLESS IT IS
STAMPED, SIGNED AND DATED

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

PROJECT NAME: Zindorf - McDaniels Subdivision

SHEET TITLE: Existing Conditions

SUBMITTED FOR: Greg Zindorf

SHEET NUMBER:
1 OF 2

22550 McDaniels Road
Calhan CO, 80808
REC. No. 3400000280

1550 North Log Road
Calhan CO, 80808
REC. No. 3400000237

FEMA Flood Zone 'A'
100-Year Floodway

Existing 1' Tall Berm

Public 24" CMP

Public 48" CMP

Property Line

McDaniels Road

Property Line

NOTE: ALL ELEVATIONS
IN NAVD88

OS3 1.5
1.02 4.5

OS2
0.49

0.1
1.0

100-YR BFE = 6092.00
100-YR BFE = 6090.00
100-YR BFE = 6087.00

Existing Gravel
Driveway

Existing House

OS1
8.67

1.1
8.2

100-YR BFE = 6086.00

22755 McDaniels Road
Calhan CO, 80808
REC. No. 3400000295

EX3
22.86

3.5
22.8

22545 McDaniels Road
Calhan CO, 80808
REC. No. 3400000328

23155 McDaniels Road
Calhan CO, 80808
REC. No. 3412000022

North Log Road

FEMA Flood Zone 'AE'
100-Year Floodway

FEMA Flood Zone 'AE'
100-Year Floodplain

100-YR BFE = 6084.00

100-YR BFE = 6082.00

EX2
14.59

1.8
14.0

100-YR BFE = 6080.00

EX1
1.06

0.2
1.4

FEMA Flood Zone 'AE'
100-Year Floodplain

100-YR BFE = 6078.00

1210 Log Road
Calhan CO, 80808
REC. No. 3400000329

100-YR BFE = 6076.00

1215 Log Road
Calhan CO, 80808
REC. No. 3412000023

FEMA Flood Zone 'AE'
100-Year Floodway

Public 48" CMP

100-YR BFE = 6072.00

Property Line

1
48.0

7.1
48.0

SYMBOL LEGEND

A1A
XX — BASIN DESIGNATION
— BASIN AREA (ACRE)   BASIN CALLOUT

XX
XX — 5 YEAR STORM, CFS
— 100 YEAR STORM, CFS   BASIN INFORMATION

DESIGN POINT
XX XX.X
XX.X — 5 YEAR ACCUMULATED FLOW, CFS
— 100 YEAR ACCUMULATED FLOW, CFS

FEMA 100-YEAR FLOODPLAIN

FEMA 100-YEAR FLOODWAY

EXISTING TIME OF CONCENTRATION PATH

EXISTING SUB-BASIN BOUNDARY

7290 — EXISTING MAJOR CONTOUR

7291 — EXISTING MINOR CONTOUR

0 100 200
SCALE: 1" = 100'

PCD File No. MS-22-006

PROPOSED CONDITIONS

AREA DESIGNATION	ACRES	Q5 (CFS)	Q100 (CFS)
PP1	1.06	0.2	1.4
PP2	14.59	1.8	14.0
PP3	22.86	3.9	22.9
OS1	8.67	1.1	8.2
OS2	0.49	0.1	1.0
OS3	1.02	1.5	4.5
DP1 (PP2 + PP3 + OS1 + OS2 + OS3)	47.63	7.5	48.0

REVISION

DESIGNED CTD
DRAWN CTD
CHECKED RGG
DATE 1.03.2023

RESPEC
COMMUNITY DESIGN SOLUTIONS
121 SOUTH TEJON STREET SUITE 1110
COLORADO SPRINGS, COLORADO 80903
WWW.RESPEC.COM PHONE (719)266-5212

STAMP

PRELIMINARY
NOT FOR CONSTRUCTION
1/2023
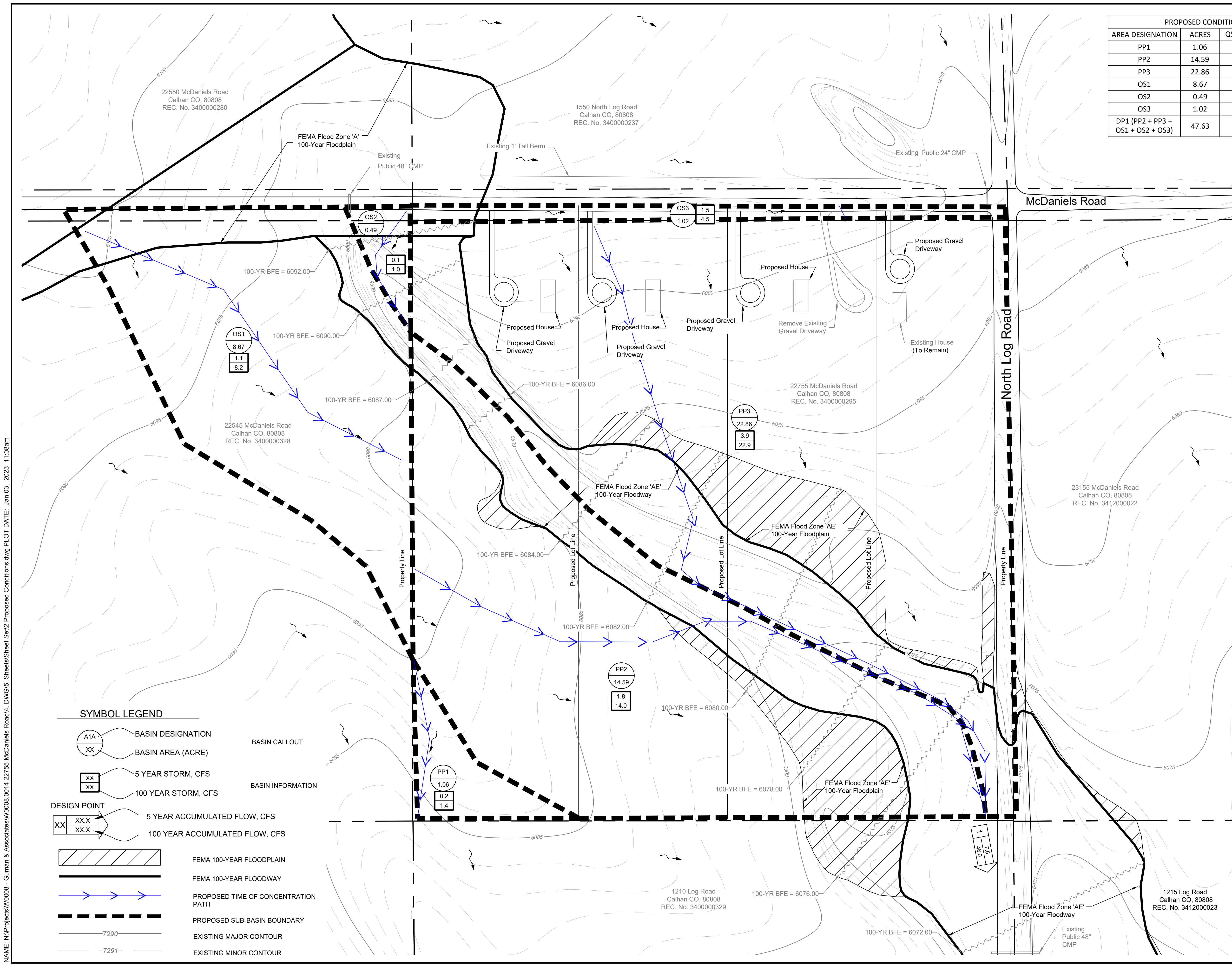THIS DRAWING IS INCOMPLETE AND NOT TO BE USED FOR CONSTRUCTION UNLESS IT IS STAMPED, SIGNED AND DATED

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

PROJECT NAME:
Zindorf - McDaniels Subdivision

SHEET TITLE:
Proposed Conditions

SUBMITTED FOR:
Greg Zindorf

SHEET NUMBER:
2 OF 2

NOTE: ALL ELEVATIONS IN NAVD88

McDaniels Road

North Log Road

22550 McDaniels Road
Calhan CO, 80808
REC. No. 3400000280

1550 North Log Road
Calhan CO, 80808
REC. No. 3400000237

FEMA Flood Zone 'A'
100-Year Floodplain

Existing Public 48" CMP

Existing 1' Tall Berm

Existing Public 24" CMP

OS3 1.5
1.02 4.5

OS2
0.49

0.1
1.0

100-YR BFE = 6092.00

OS1
8.67
1.1
8.2

100-YR BFE = 6090.00

100-YR BFE = 6087.00

22545 McDaniels Road
Calhan CO, 80808
REC. No. 3400000328

Proposed House
Proposed Gravel Driveway
Proposed House
Proposed Gravel Driveway
Proposed House
Proposed Gravel Driveway
Proposed House
Proposed Gravel Driveway
Proposed Gravel Driveway
Remove Existing Gravel Driveway
Existing House (To Remain)

100-YR BFE = 6086.00

22755 McDaniels Road
Calhan CO, 80808
REC. No. 3400000295

PP3
22.86
3.9
22.9

23155 McDaniels Road
Calhan CO, 80808
REC. No. 3412000022

FEMA Flood Zone 'AE'
100-Year Floodway

FEMA Flood Zone 'AE'
100-Year Floodplain

100-YR BFE = 6084.00

Property Line
Proposed Lot Line
Proposed Lot Line
Proposed Lot Line
Property Line

100-YR BFE = 6082.00

PP2
14.59
1.8
14.0

100-YR BFE = 6080.00

PP1
1.06
0.2
1.4

100-YR BFE = 6078.00

FEMA Flood Zone 'AE'
100-Year Floodplain

100-YR BFE = 6076.00

1210 Log Road
Calhan CO, 80808
REC. No. 3400000329

1215 Log Road
Calhan CO, 80808
REC. No. 3412000023

FEMA Flood Zone 'AE'
100-Year Floodway

Existing Public 48" CMP

100-YR BFE = 6072.00

SYMBOL LEGEND

A1A / XX — BASIN DESIGNATION / BASIN AREA (ACRE) — BASIN CALLOUT
XX / XX — 5 YEAR STORM, CFS / 100 YEAR STORM, CFS — BASIN INFORMATION

DESIGN POINT
XX XX.X / XX.X — 5 YEAR ACCUMULATED FLOW, CFS / 100 YEAR ACCUMULATED FLOW, CFS

FEMA 100-YEAR FLOODPLAIN

FEMA 100-YEAR FLOODWAY

PROPOSED TIME OF CONCENTRATION PATH

PROPOSED SUB-BASIN BOUNDARY

7290 — EXISTING MAJOR CONTOUR

7291 — EXISTING MINOR CONTOUR

SCALE: 1" = 100'
0 100 200
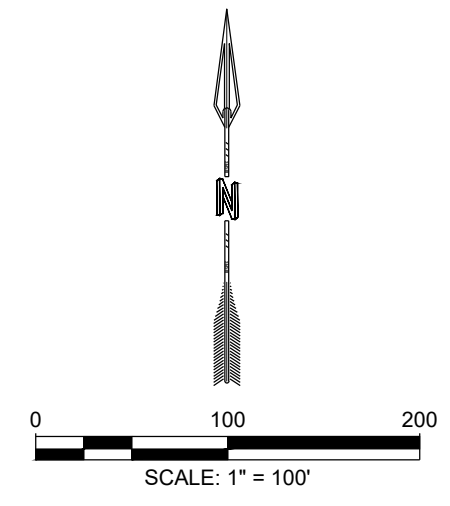
NAME: N:\Projects\W0008 - Guman & Associates\W0008.0014 22755 McDaniels Road\4. DWG\5. Sheets\Sheet Set\2 Proposed Conditions.dwg PLOT DATE: Jan 03, 2023 11:08am

PCD File No. MS-22-006