PRELIMINARY/FINAL DRAINAGE REPORT

FOR

JACKSON OFFICE WAREHOUSE & STORAGE BUILDINGS DEVELOPMENT

ROCKY MOUNTAIN INDUSTRIAL PARK
FILING NO. 1A, LOT 2

Prepared For:
Jackson Developmental Solutions, LLC
55963 Maroon Mesa Drive
Colorado Springs, CO 80918

Prepared By:
Associated Design Professionals, Inc.
3520 Austin Bluffs Parkway Suite 102
Colorado Springs, CO 80918
719.266-5212

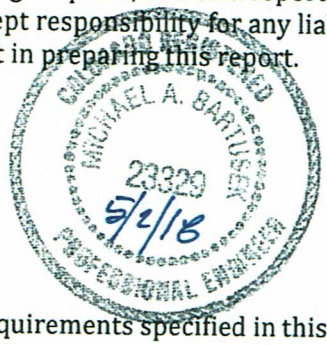
ADP Project No.170602
May 2, 2018
PCD File No. PPR-17-057

ADP CIVIL
ENGINEERING FOR THE FUTURE

ADPCIVIL
ENGINEERING FOR THE FUTURE

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.

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: _____

Title: President

Address: Jackson Developmental Solutions, LLC
5963 Maroon Mesa Drive
Colorado Springs, CO 80918

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

Approved
by Elizabeth Nijkamp
El Paso County Planning and Community Development
on behalf of Jennifer Irvine, County Engineer, ECM Administrator
06/28/2018 10:11:31 AM

Jennifer Irvine, County Engineer/ECM Administrator Date

Conditions:

PRELIMINARY/FINAL DRAINAGE REPORT
JACKSON OFFICE WAREHOUSE & STORAGE BUILDINGS DEVELOPMENT
ROCKY MOUNTAIN INDUSTRIAL PARK FILING NO. 1A, LOT 2

PROJECT DESCRIPTION

This drainage report is for the development of the Rocky Mountain Industrial Park Filing No. 1A, Lot 2. The currently vacant 2.09 acre site is located north of Constitution Avenue and east of Capital Drive on the north side of Sandy Court at the end of the cul-de-sac. It is further described as a portion of Section 33, Township 13 South, Range 65 West of the 6th Principal Meridian in El Paso County, Colorado.

All of this lot is located in Sand Creek drainage basin. An existing storm sewer is located within Sandy Court which empties into an existing riprap lined channel located along the east edge of the property.

SOILS

The soil on the site can be described as having a rapid permeability, medium-surface runoff, and moderate to high hazard of erosion. The soils within the site are Blendon sandy loams. These soils are classified as Hydrologic Group 'B'.

FLOODPLAIN STATEMENT

A small portion of the developed site is located within a designated FEMA 100-year floodplain according to the information published in the Federal Emergency Management Agency Flood Plain Map N. 08041C0756F, dated March 17, 1997, LOMR 04-08-0062P dated November 18, 2004. This area falls within the existing riprap channel.

METHOD OF COMPUTATION

The methodology utilized for this report is in accordance with the *City Drainage Criteria Manual, Volumes 1*, dated May 2014. The Rational Method for computation of runoff was used for determining Sub-Basin flows.

$Q = cia$

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

EXISTING DRAINAGE CONDITIONS

The existing site has been overlot grades and is covered with rangeland. The site slopes in a southeasterly direction with most flows directed onto Sandy Court where they are intercepted by an existing 10' sump window inlet. The inlet flows into a 30" RCP storm sewer which empties into the east tributary of Sand Creek. The remainder of the site drains directly into the riprap-lined collector channel which will be privately maintained by the property owner. This channel then flows into the east fork of Sand Creek.

No flows enter the site from the east; however, flows from the north do enter the site as delineated in the Final Drainage Report for the Rocky Mountain Industrial Park Filing No. 1 by

Kiowa Engineering Corporation. These flows enter the site within a 10' wide channel with estimated flows of 51.0 cfs for the 5-year storm and 116.7 cfs for the 100-year storm at DP1. The off-site sub-basin OS1 only drains the existing landscape area and produces flows of 0.2 cfs for the 5-year storm and 1.1 cfs for the 100-year storm. Sub-basin AEX drains to the western portion of the undeveloped site. It produces flows of 0.8 cfs and 5.7 cfs respectively. These flows combine with the flows from OS1 at DP2 to produce flows to Sandy Court of 0.8 cfs for the 5-year storm and 6.3 cfs for the 100-year storm. These flows combine with the flows from DP1 at DP2 to produce total flows of 51.0 cfs for the 5-year storm and 116.7 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_5CFS**	**Q_{100} CFS**
OS1	0.2	1.1
AEX	0.8	5.7
DP1	50.2	116.8
DP2 (OS1 + AEX)	0.8	6.3
DP3(DP1+DP2)	49.5	118.4

DEVELOPED DRAINAGE CONDITIONS

The development of this site includes the addition of two (2) 5,067 sf office/warehouse buildings in the center of the site and a 3,000 sf vehicle storage building in the northwest corner of the site.

The lower portion of the lot will be paved with asphalt while the upper portion will be covered with gravel. The site will be regraded to direct the flows around the proposed office/warehouse buildings.

Flows from the northern area will be directed to curbs and cross pans in the southern area and directed into a sand filter water quality basin.

As stated in the previous section, a small amount of off-site flow enters the site from a grass-covered berm on the north side of the site. Sub-basin OS1 drains the western part of this berm and produces flows of 0.1 cfs for the 5-year storm and 0.7 cfs for the 100-year storm. These flows drain onto Sub-basin A1.

The western portion of the developed site is designated as Sub-basin A1. This sub-basin will produce flows of 2.5 cfs and 5.2 cfs respectively. These flows combine with the flows from OS1 at DP2 to produce flows of 2.6 cfs for the 5-year storm and 5.7 cfs for the 100-year storm. Flows from DP1 continue to the east and into Sub-basin A2.

Sub-basin OS2 drains the eastern part of this berm and produces flows of 0.1 cfs for the 5-year storm and 0.4 cfs for the 100-year storm. These flows drain onto Sub-basin A2.

The eastern portion of the developed site is designated as Sub-basin A2. This sub-basin will produce flows of 2.1 cfs and 4.2 cfs respectively. These flows combine with the flows from OS2 at DP3 to produce flows of 2.1 cfs for the 5-year storm and 4.6 cfs for the 100-year storm.

Flows from DP3 combine with the flows from DP2 at DP4 to produce total flows into the sand filter basin of 4.7 cfs for the 5-year storm and 10.2 cfs for the 100-year storm.

No flows enter the site from the east; however, flows from the north do enter the site as delineated in the Final Drainage Report for the Rocky Mountain Industrial Park by Kiowa Engineering Corporation. These flows enter the site within a 10' wide channel with estimated flows of 51.0 cfs for the 5-year storm and 116.7 cfs for the 100-year storm at DP1.

Sub-basin B drains the eastern swale and the landscape area south of the developed site. This area produces flows of 0.3 cfs and 1.1 cfs respectively. These flows combine with the flows from DP4 at DP5 to produce total site flows of 4.9 cfs for the 5-year storm and 11.2 cfs for the 100-year storm. These flows combine with the off-site flows from DP1 at DP6 to produce total site flows of 52.4 cfs for the 5-year storm and 122.0 cfs for the 100-year storm.
Table 2 shows the estimated runoff which will be produced for the project under developed conditions.

TABLE 2 – PHASE I DEVELOPED CONDITIONS		
Sub-Basin	**Q_5 CFS**	**Q_{100} CFS**
OS1	0.1	0.7
Os2	0.1	0.4
A1	2.5	5.2
A2	2.1	4.2
B	0.3	1.1
DP1	50.2	116.8
DP2 (OS1 + A1)	2.6	5.7
DP3 (OS2 + A2)	2.1	4.6
DP4 (DP2 + DP3)	4.7	10.2
DP5 (DP4 + B)	4.9	11.2
DP6(DP1+DP5)	52.4	122.0

WATER QUALITY

Water quality for the site will be achieved through a 1,400 cf sand filter basin (SFB) with a four-inch slotted underdrain tied into a "Type C" inlet with an 18" HDPE pipe outlet. This SFB will be privately owned and maintained by the property owner.

DETENTION

A Regional Detention Facility is proposed to be built upstream of the Rocky Mountain Industrial Park. This facility will be designed to account for the proposed flows within the proposed development within the industrial development according to the Hydrology Analysis section of the Final Drainage Report for the Rocky Mountain Industrial Park Filing No. 1 by Kiowa Engineering Corporation. No detention was proposed or exists within the existing subdivision, only Water Quality basins.

PRIVATE DRAINAGE FACILITIES

Item	Unit	Quantity	Unit Cost	Total Cost
18" HDPE FES	EA	1	$400	$ 400
18" HDPE	LF	15	$40	$ 600
Outlet Structure	EA	1	$5,000	$5,000

Emergency Spillway	EA	1	$1,500	$1,500
			Sub-Total	$7,500
			15% Contingency & Engineering	$1,125
			TOTAL	$8,625

DRAINAGE BASIN FEES

The entire project was previously platted and lies within the Sand Creek Drainage Basin; therefore, no fees are due.

CONCLUSION

The proposed development and subsequent lot developments follow the "Four Step Process" as mandated by the EPA as follows:

Step 1: Runoff has been reduced by disconnecting impervious areas where possible, eliminating "unnecessary" impervious areas and encouraging infiltration into suitable soils.

Step 2: All drainageways, ditches and channels have been stabilized by the following methods:

- Tributaries have been left in their relatively natural state where possible.
- New drainageways and swales have been stabilized with either riprap or erosion control fabric depending on the erosion potential.
- No new roadside ditches are proposed for the development.

Step 3: The proposed development will disturb approximately 2.0 acres.

Step 4: The development of this project will not affect sensitive waters.

The development of this site will have little impact on downstream properties once the water quality is constructed.

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.***

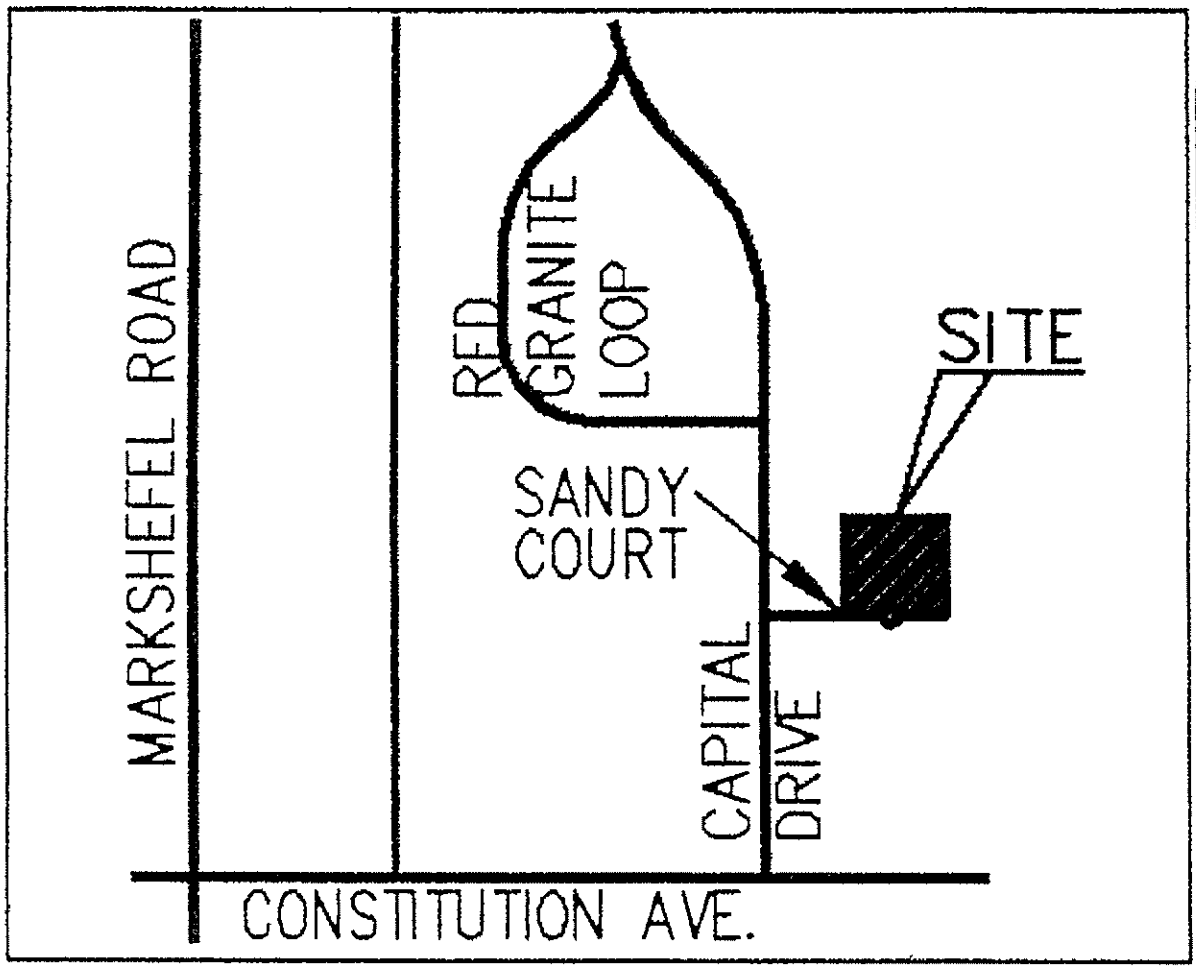
5. Urban Drainage and Flood Control District (June 2011). ***Urban Storm Drainage Criteria Manual, Volume 1-3.***

6. Rocky Mountain Industrial Park Filing No. 1 Final Drainage Plan by Kiowa Engineering Corporation, dated February 2002.

7. Rocky Mountain Industrial Park Filing No. 1A by Land Development Consultants, Inc., dated March, 2009.

APPENDIX A

MAPS

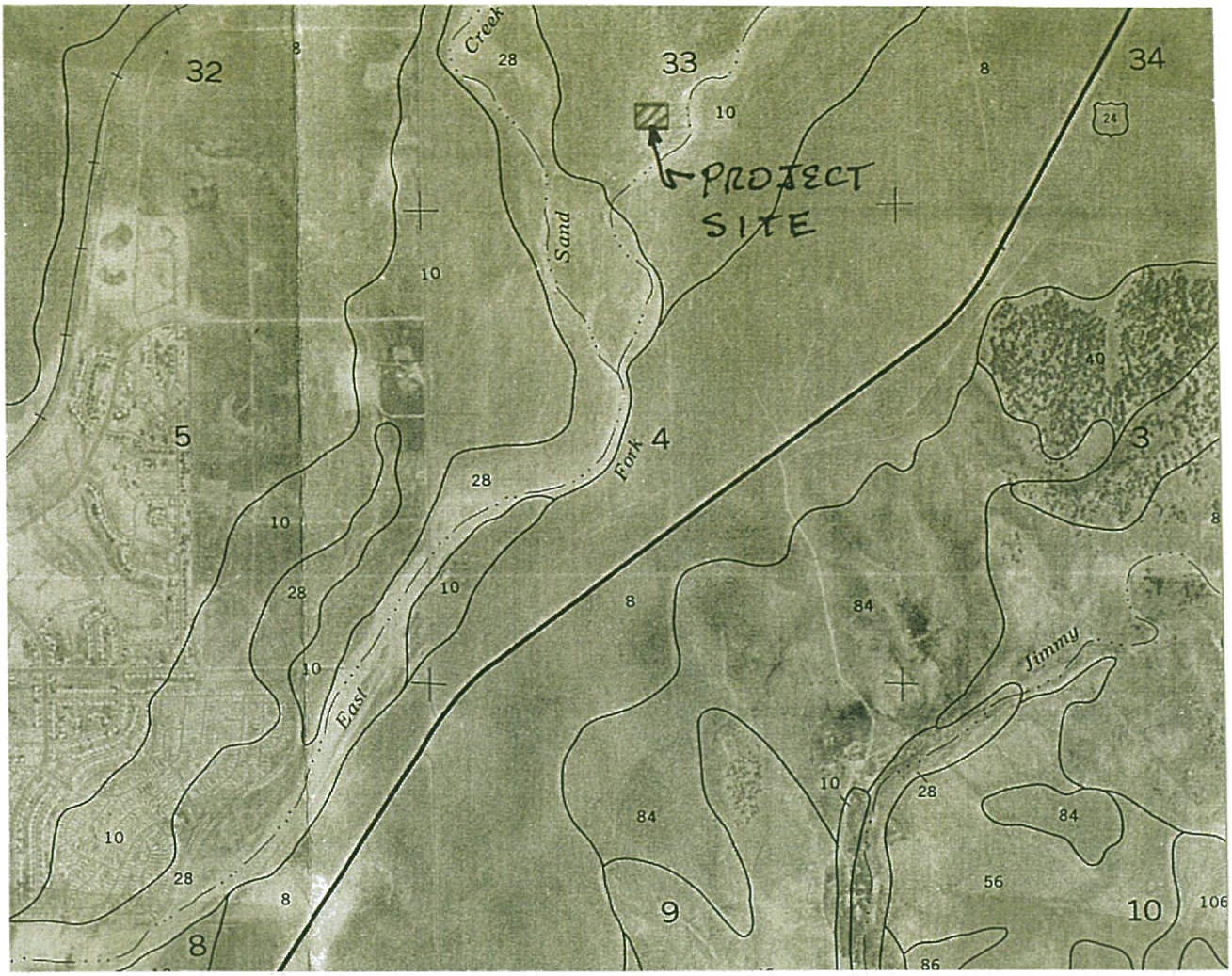


VICINITY MAP

N.T.S.

ADP CIVIL
ENGINEERING FOR THE FUTURE

3520 Austin Bluffs Pkwy, Suite 102
Colorado Springs, CO 80918
(719) 266-5212
fax: (719) 266-5341



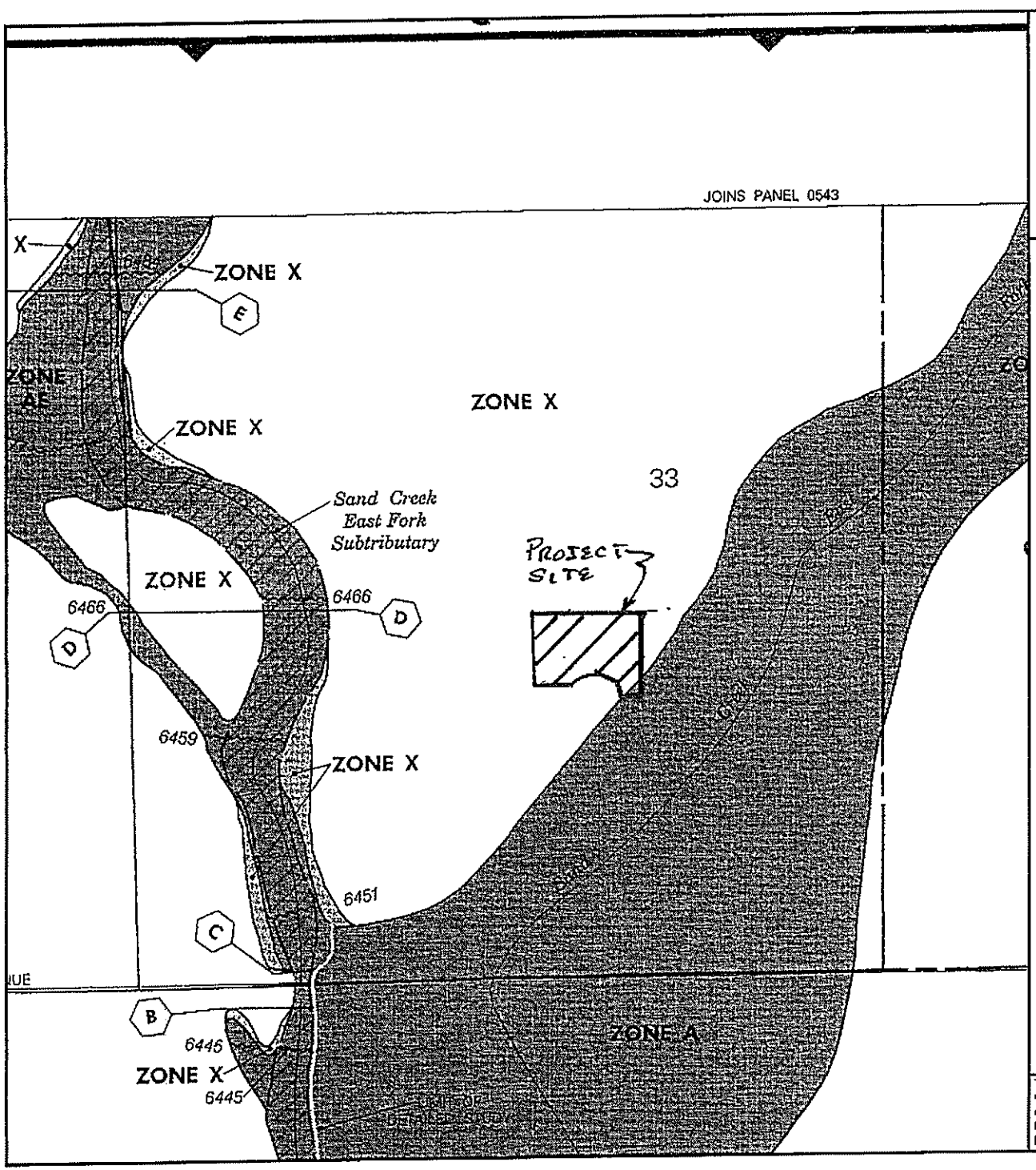
N

SOILS MAP

N.T.S.

ADPCIVIL
ENGINEERING FOR THE FUTURE

3520 Austin Bluffs Pkwy, Suite 102
Colorado Springs, CO 80918
(719) 266-5212
fax: (719) 266-5341



APPROXIMATE SCALE IN FEET

500 0 500

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

EL PASO COUNTY, COLORADO AND INCORPORATED AREAS

PANEL 756 OF 1300

(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS: COMMUNITY	NUMBER	PANEL	SUFFIX
COLORADO SPRINGS, CITY OF	080060	0756	F
EL PASO COUNTY, UNINCORPORATED AREAS	080059	0756	F

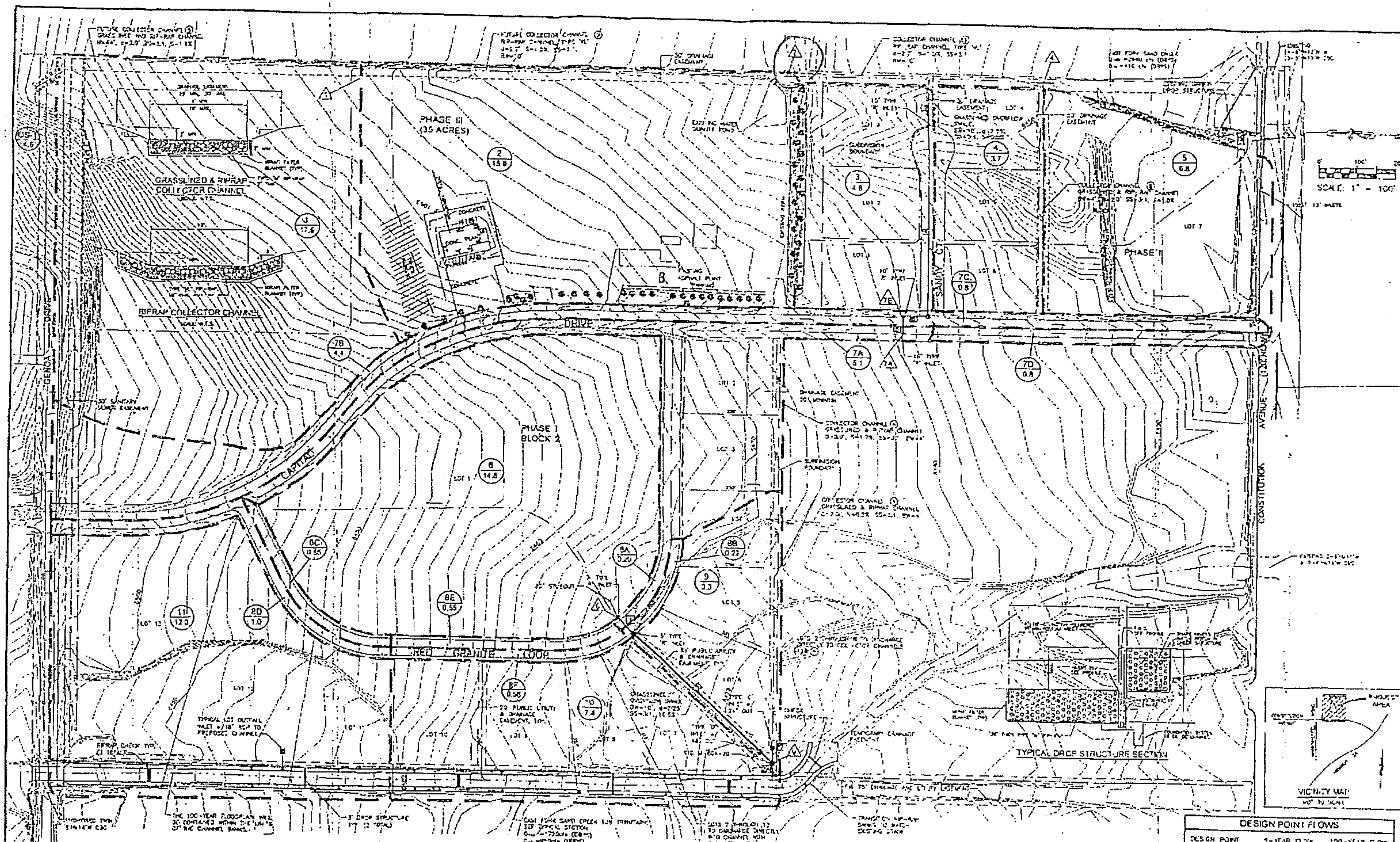
MAP NUMBER
08041C0756 F

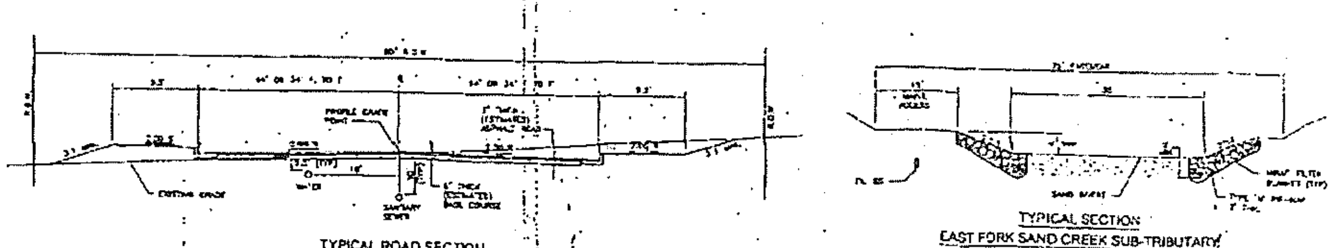
EFFECTIVE DATE:
MARCH 17, 1997

Federal Emergency Management Agency

APPENDIX B

DESIGN CALCULATIONS





LEGEND

DESIGN POINT FLOWS		
DESIGN POINT	5-YEAR FLOW	100-YEAR FLOW
△1	56.0	107.7
△2	61.0	116.7
△[illegible]	101.4	186.0
△[illegible]	29.4	49.5
△[illegible]	45.6	85.2
△[illegible]	13.4	29.5
△[illegible]	17.6	34.3
△[illegible]	65.5	123.2

HYDRAULIC STRUCTURES

[1]	30" RCP @ 2.2%	①	GRASSLINED & RIP-RAP CHANNEL
[2]	36" RCP @ 0.8%	②	RIP-RAP CHANNEL
[2A]	48" RCP @ 0.8%	③	RIP-RAP CHANNEL
[3]	30" RCP @ 0.8% w/GRASSLINED OVERFLOW SWALE		
[4]	24" RCP @ 0.8%	④	GRASSLINED & RIP-RAP CHANNEL
[5]	18" RCP @ 2.0%	⑤	GRASSLINED & RIP-RAP CHANNEL
[6]	24" RCP @ 2.0%	⑥	GRASSLINED & RIP-RAP CHANNEL
[7]	24" RCP @ 2.0%		

Kiowa Engineering Corporation
2814 International Circle
Colorado Springs, Colorado
80910-3127
(719) 630-7342

ROCKY MOUNTAIN INDUSTRIAL PARK
Final Drainage Report Proposed Drainage Plan
COLORADO SPRINGS, COLORADO

Project No.: C1017
Scale: 1" = 100'
Date: 06/05/01
Design: RNW
Drawn: JLM
Check: RNW
Revisions:

Fig. 2

8140 SANDY CT

PROJ. #170703

DRAINAGE CALCULATION SHEET

file:sandy ct dr

05/02/18

AREA DESIG.	AREA (acre)	C5 (5 yr)	C100 (100 yr)	C5 X A	C100 X A	Initial Tci L (ft)	Initial Tci Slope (%)	Initial Tci ti (min)	Travel Time L (ft)	Travel Time Slope (%)	Travel Time V (fps)	Travel Time Tt (min)	TC (min)	I5 (in/hr)	I100 (in/hr)	Q5 (cfs)	Q100 (cfs)	length L (feet)	vel. V (fps)	^t (min)	AREA DESIG.
EXISTING CONDITIONS																					
DP1	33.40	0.51	0.68	17.03	22.71								19.60	2.95	5.14	50.17	116.84	270	5.00	0.90	DP1
OS1	0.35	0.08	0.35	0.03	0.12	50	25.00	4.66	0	2.50	1.70	0.00	5.00	5.19	9.06	0.15	1.11	350	1.50	3.89	OS1
Aex	2.09	0.08	0.35	0.17	0.73	20	25.00	2.95	350	1.70	1.20	4.86	7.81	4.47	7.80	0.75	5.71				Aex
DP2	2.44			0.20	0.85								8.89	4.25	7.42	0.83	6.34				DP2
DP3	35.84			17.23	23.57								20.50	2.88	5.02	49.54	118.36				DP3
DEVELOPED CONDITIONS																					
DP1	33.40	0.51	0.68	17.03	22.71								19.60	2.95	5.14	50.17	116.84	270	5.00	0.90	DP1
OS1	0.22	0.08	0.35	0.02	0.08	50	25.00	4.66	0	2.50	1.70	0.00	5.00	5.19	9.06	0.09	0.70	260	1.00	4.33	OS1
A1	0.97	0.62	0.74	0.60	0.71	60	2.50	5.12	260	1.00	1.00	4.33	9.45	4.15	7.24	2.50	5.16				A1
DP2	1.19			0.62	0.79								9.45	4.15	7.24	2.57	5.72				DP2
OS2	0.13	0.08	0.35	0.01	0.05	50	25.00	4.66	0	2.50	1.70	0.00	5.00	5.19	9.06	0.05	0.41	300	1.00	5.00	OS2
A2	0.78	0.65	0.76	0.51	0.59	60	2.50	4.79	300	1.00	1.00	5.00	9.79	4.09	7.14	2.08	4.23				A2
DP3	0.91			0.52	0.64								9.79	4.09	7.14	2.12	4.56	125	1.50	1.39	DP3
DP4	2.10			1.14	1.43								9.79	4.09	7.14	4.66	10.20				DP4
B	0.34	0.16	0.41	0.06	0.14	15	2.50	5.02	280	2.50	1.70	2.75	7.77	4.48	7.82	0.25	1.09				B
DP5	2.44			1.20	1.57								9.79	4.09	7.14	4.89	11.19				DP5
DP6	35.84			18.23	24.28								20.50	2.88	5.02	52.42	121.95				DP6

IMPERVIOUS AREA CALC

Description	Imperv %
UNDEV	0
LOOSE GRAVEL	80
PAVED PARKING	100
BUILDINGS	100

Subasin	Area	Landscape	Building	Imperious Area Description: Paved Parking	Loose Gravel	Total Imperv
OS1	0.22	0.22	0	0	0	0
OS2	0.13	0.13	0	0	0	0
A1	0.97	0.18	0.19	0.20	0.41	73.1
A2	0.78	0.10	0.12	0.23	0.33	78.6
Total	2.10					63.0

SPILLWAY CALCULATIONS

b = 10'

d = 0.5'

C = 3.2

Q = d^1.5xbxC

Q = 11.3 cfs

PIPE CAPACITY

D = 18"

S = 1.0%

n = 0.012

Q max = 11.4 cfs

INLET CAPACITY

Ponding Elev = 6453.45 - 6452.85

Max Ponding Depth = 0.65' = 7.8"

Q = 11.2 cfs

Ponding Depth = 6.75" (Per Figure 8-10)

Design Procedure Form: Sand Filter (SF)

UD-BMP (Version 3.06, November 2016)

Designer:	Michael A Bartusek
Company:	Associated Design Professionals
Date:	March 27, 2018
Project:	Jackson Office/Warehouse Storage Buildings Development
Location:	Rocky Mountain Industrial Park Fil 1A Lot 2

1. Basin Storage Volume

A) Effective Imperviousness of Tributary Area, I_a (100% if all paved and roofed areas upstream of sand filter): I_a = 63.0 %

B) Tributary Area's Imperviousness Ratio ($i = I_a/100$): i = 0.630

C) Water Quality Capture Volume (WQCV) Based on 12-hour Drain Time
$WQCV = 0.8 * (0.91 * i^3 - 1.19 * i^2 + 0.78 * i)$: WQCV = 0.20 watershed inches

D) Contributing Watershed Area (including sand filter area): Area = 91,475 sq ft

E) Water Quality Capture Volume (WQCV) Design Volume
$V_{WQCV} = WQCV / 12 * Area$: V_{WQCV} = 1,504 cu ft

F) For Watersheds Outside of the Denver Region, Depth of Average Runoff Producing Storm: d_6 = 0.40 in

G) For Watersheds Outside of the Denver Region, Water Quality Capture Volume (WQCV) Design Volume: $V_{WQCV\ OTHER}$ = 1,399 cu ft

H) User Input of Water Quality Capture Volume (WQCV) Design Volume (Only if a different WQCV Design Volume is desired): $V_{WQCV\ USER}$ = 1,400 cu ft

2. Basin Geometry

A) WQCV Depth: D_{WQCV} = 1.4 ft

B) Sand Filter Side Slopes (Horizontal distance per unit vertical, 4:1 or flatter preferred). Use "0" if sand filter has vertical walls.: Z = 4.00 ft / ft

C) Minimum Filter Area (Flat Surface Area): A_{Min} = 720 sq ft

D) Actual Filter Area: A_{Actual} = 792 sq ft

E) Volume Provided: V_T = 1400 cu ft

3. Filter Material

Choose One
- (●) 18" CDOT Class B or C Filter Material
- ( ) Other (Explain):

4. Underdrain System

A) Are underdrains provided?

Choose One
- (●) YES
- ( ) NO

B) Underdrain system orifice diameter for 12 hour drain time

i) Distance From Lowest Elevation of the Storage Volume to the Center of the Orifice: y = 1.8 ft

ii) Volume to Drain in 12 Hours: Vol_{12} = 1,400 cu ft

iii) Orifice Diameter, 3/8" Minimum: D_O = 7 / 8 in

Design Procedure Form: Sand Filter (SF)

Designer: Michael A Bartusek
Company: Associated Design Professionals
Date: March 27, 2018
Project: Jackson Office/Warehouse Storage Buildings Development
Location: Rocky Mountain Industrial Park Fil 1A Lot 2

5. Impermeable Geomembrane Liner and Geotextile Separator Fabric A) Is an impermeable liner provided due to proximity of structures or groundwater contamination?	Choose One O YES ● NO
6-7. Inlet / Outlet Works A) Describe the type of energy dissipation at inlet points and means of conveying flows in excess of the WQCV through the outlet	Riprap rundowns into basin with riprap emergency spillway. Type C inlet w/18" HDPE pie outlet structure.

Notes:

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	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

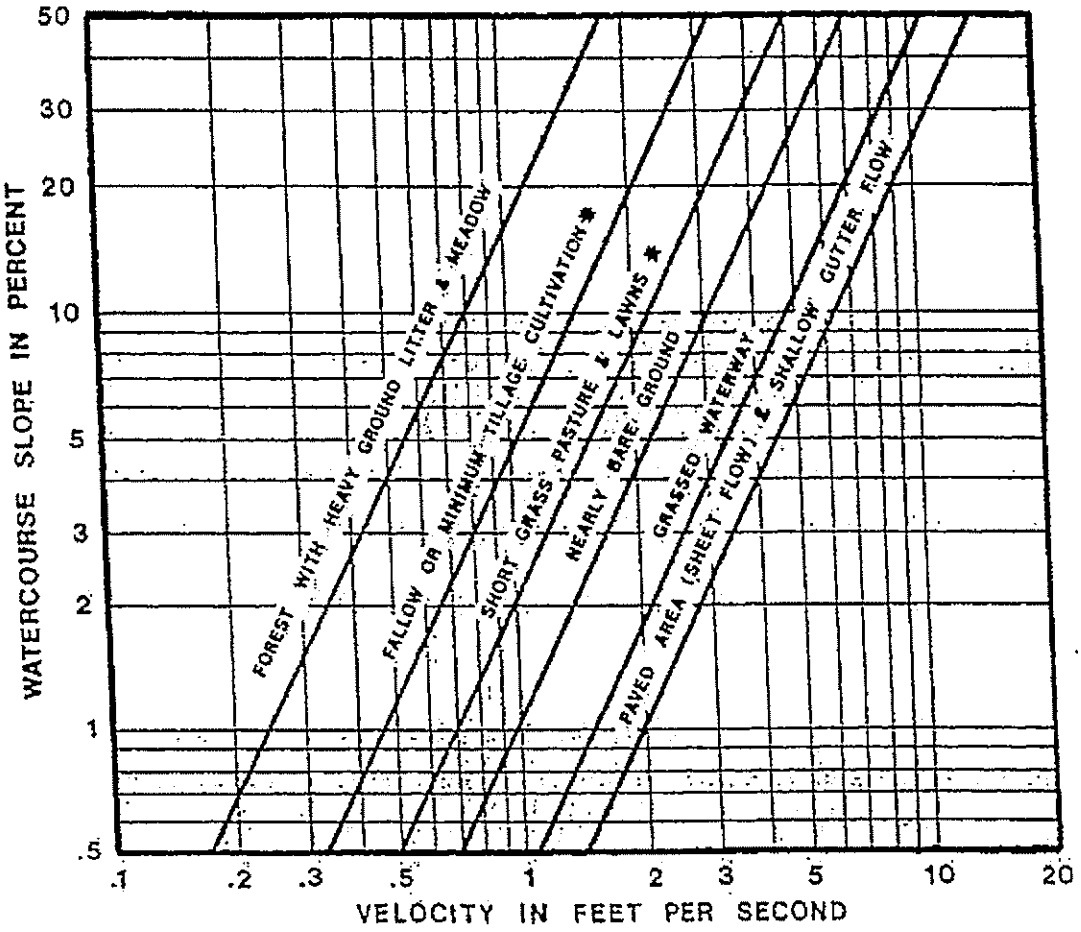
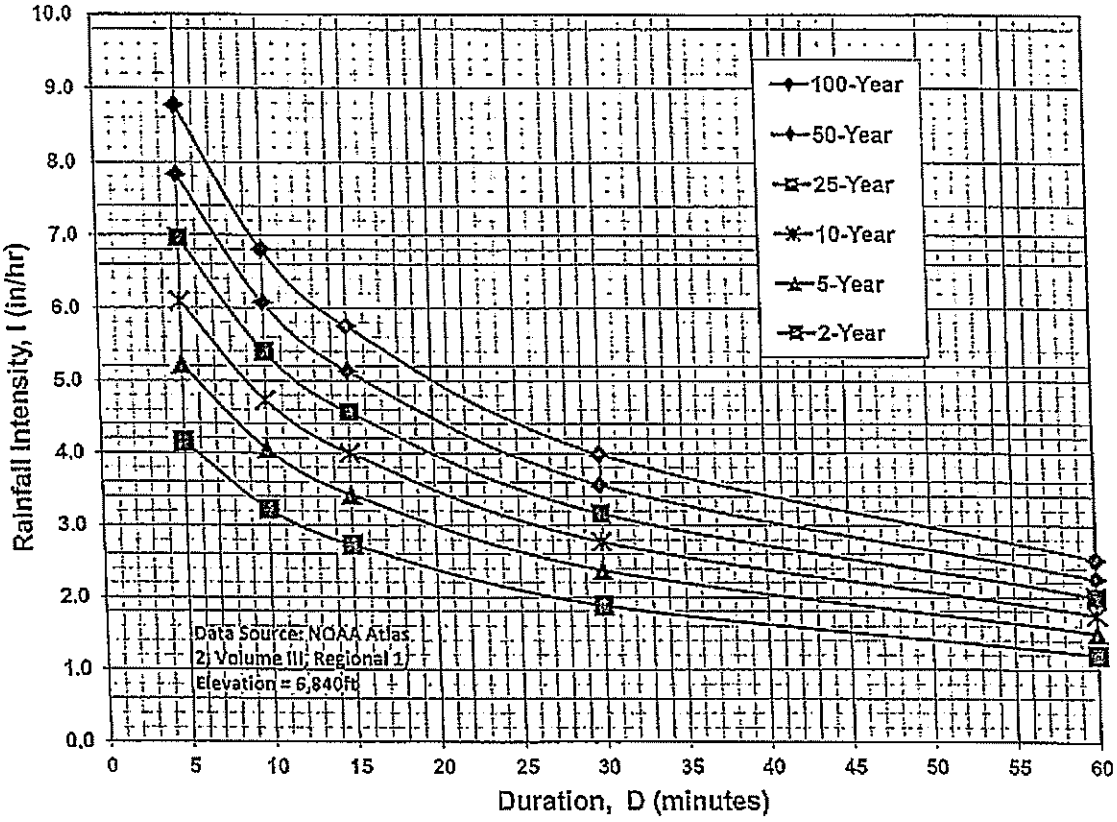


Figure 6-5. Colorado Springs Rainfall Intensity Duration Frequency



IDF Equations

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

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

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

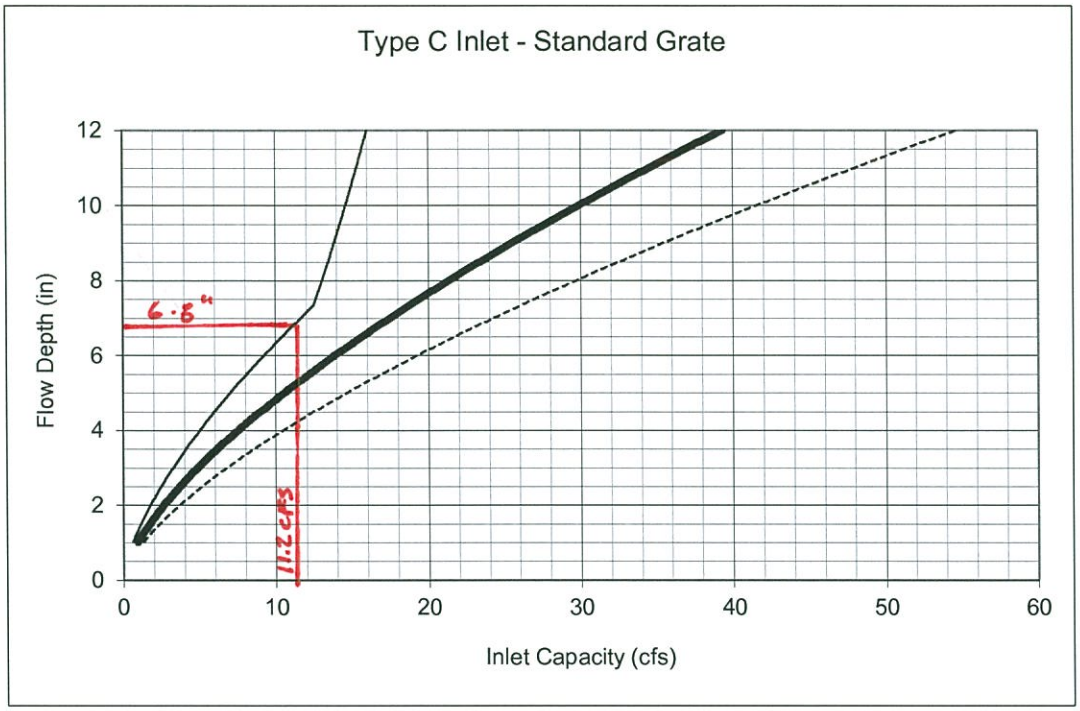
$I_{10} = -1.75 \ln(D) + 8.847$

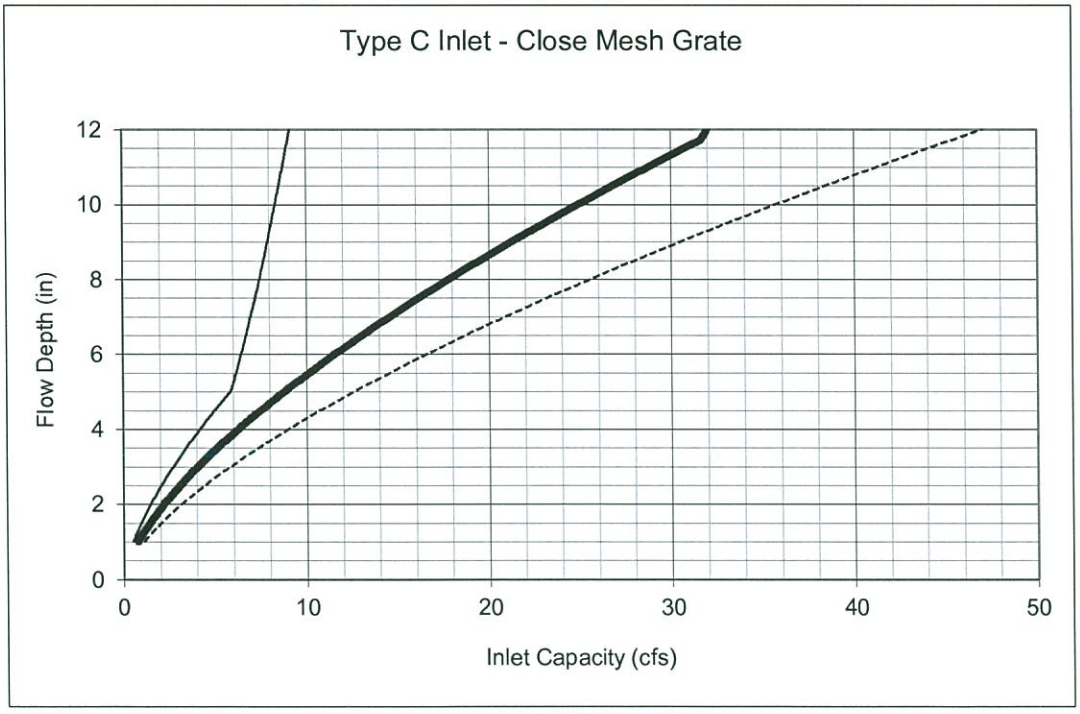
$I_5 = -1.50 \ln(D) + 7.583$

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

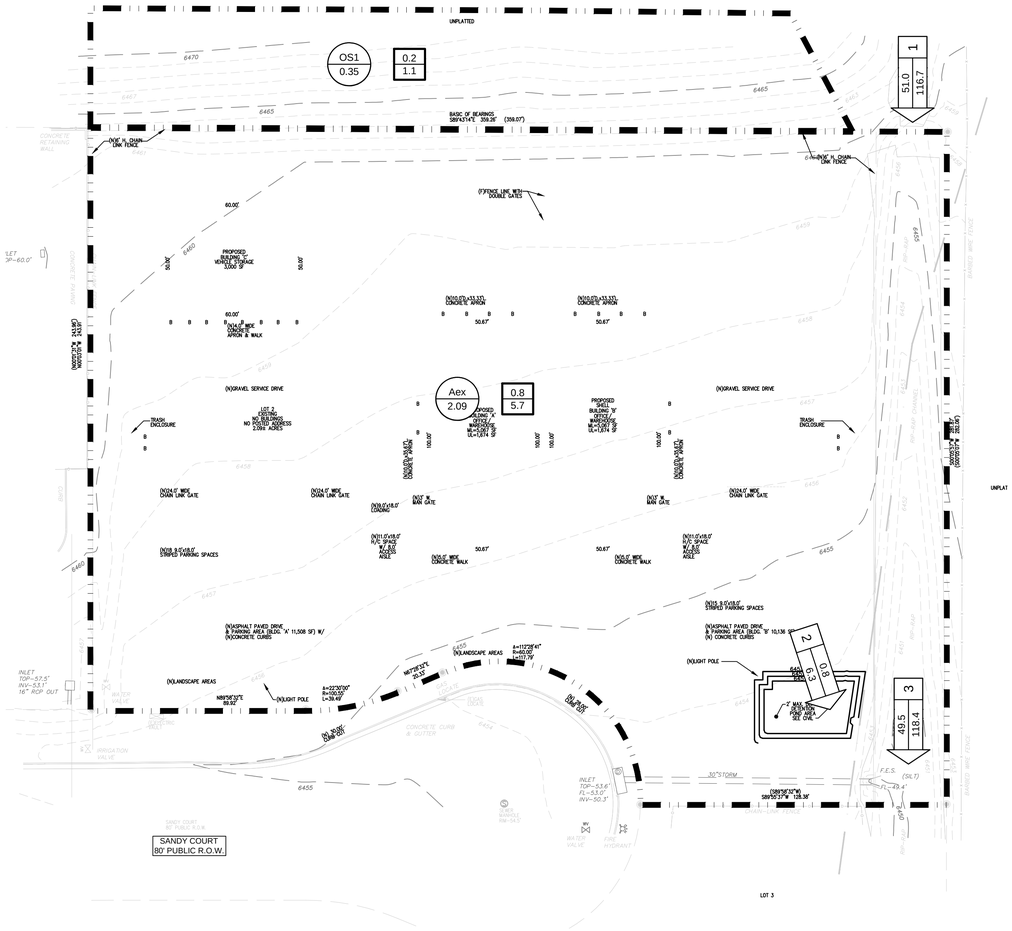
Note: Values calculated by equations may not precisely duplicate values read from figure.

Figure 8-10. Inlet Capacity Chart Sump Conditions, Area (Type C) Inlet

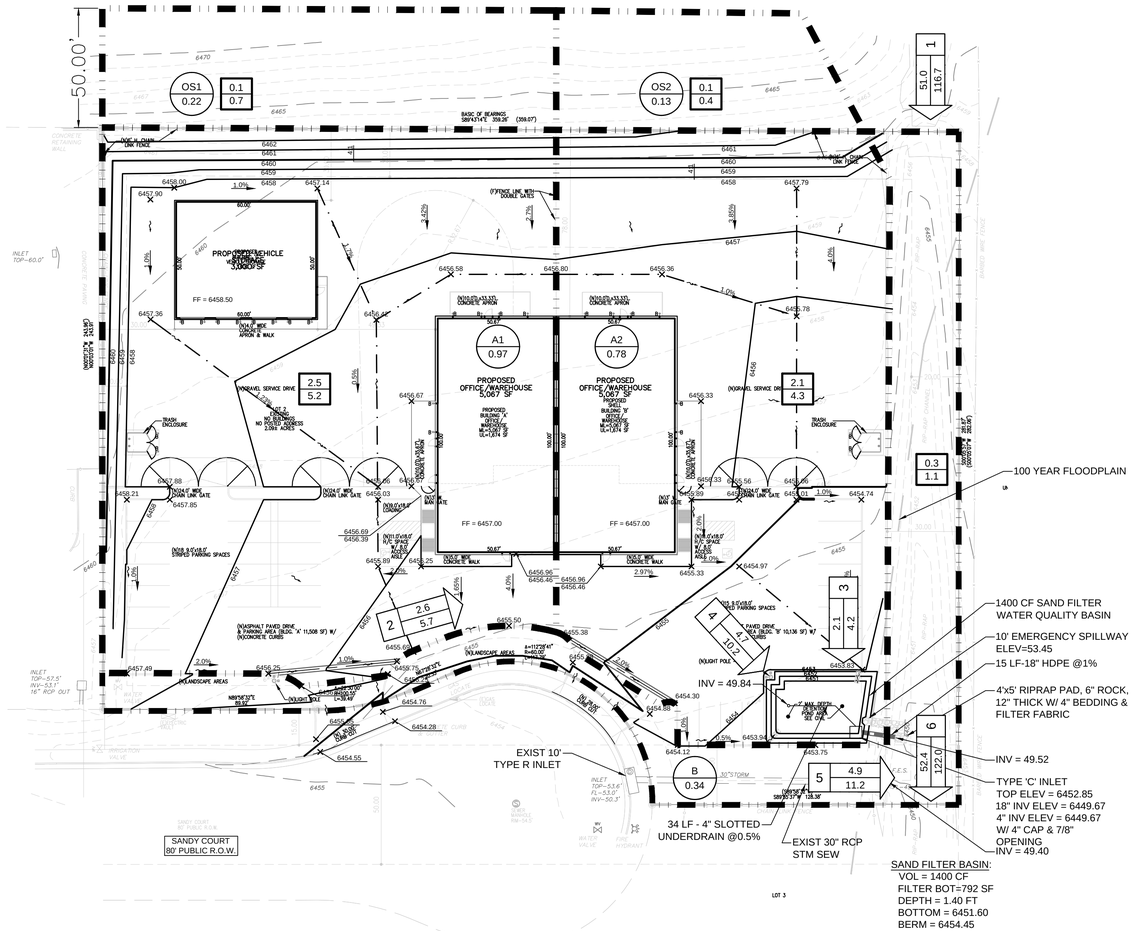




Notes:
1. The standard inlet parameters must apply to use these charts.



EXISTING CONDITIONS



PROPOSED CONDITIONS

LEGEND:

- A1A / XX — BASIN DESIGNATION; BASIN AREA, ACRES
- XX / XX — 5 YEAR STORM, CFS; 100 YEAR STORM, CFS
- DESIGN POINT — XX / XX.X / XX.X — 5 YEAR ACCUMULATED FLOW, CFS; 100 YEAR ACCUMULATED FLOW, CFS
- SUB-BASIN BOUNDARY
- DIRECTION OF DRAINAGE FLOW

LEGEND:

- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- EXISTING WATER VALVES
- EXISTING FIRE HYDRANT
- EXISTING SANITARY MANHOLE

BENCHMARK:
CP#____
N ____
E ____
ELEV ____

GRAPHIC SCALE
30 0 15 30 60 120
(IN FEET)
1 inch = 30 ft.

DESIGNED BY MAB
PROJECT ENGINEER MAB
PROJECT MANAGER MAB
DATE: 10/09/17
JOB NO. 170602
CAD FILE NO. 170602-Drainage
DRAWN BY HJG
SCALE: HORZ. 1" = 30' VERT. .05" = 5'

PREPARED BY:

ADPCIVIL ENGINEERING FOR THE FUTURE
3520 Austin Bluffs Parkway
Suite 102
Colorado Springs, CO 80918
(719) 266-5212
fax: (719) 266-5341

NO.	DATE	REVISION	BY

JACKSON OFFICE WAREHOUSE & STORAGE BLDGS

8140 SANDY COURT

EL PASO COUNTY, COLORADO

EXIST & DEVELOPED DRAINAGE PLAN

SHEET 1 of 1