

PRELIMINARY DRAINAGE REPORT

For

ASPEN MEADOWS FILING NO. 2 AND NO. 4

Prepared for:

City of Colorado Springs
Engineering Development Review Division Team
30 North Nevada Avenue, Suite 401
Colorado Springs, CO 80903

On Behalf of:

COLA, LLC.
555 Middle Creek Parkway, Suite 380
Colorado Springs, CO 80921

Prepared by:



Matrix

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January 2021

Project No. 21.886.037

Engineer's Statement:

This report and plan for the drainage design of Aspen Meadows Filing No. 2 and No. 4 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 in accordance with the City of Colorado Springs Drainage Criteria Manual and is in conformity with the master plan of the drainage basin. I understand that the City of Colorado Springs 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.

Brady A. Shyrock
Registered Professional Engineer
State of Colorado
No. 38164

Developer's Statement:

COLA, LLC. hereby certifies that the drainage facilities for Aspen Meadows Filing No. 2 and No. 4 shall be constructed according to the design presented in this report. I understand that the City of Colorado Springs does not and will not assume liability for the drainage facilities designed and/or certified by my engineer and that are submitted to the City of Colorado Springs pursuant to section 7.7.906 of the City Code; and cannot, on behalf of Aspen Meadows Filing No. 2 and No. 4, guarantee that final drainage design review will absolve COLA, LLC. 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.

COLA, LLC.
Business Name

By: _____
Tim Buschar

Title: Director of Land Acquisition and Development

Address: 555 Middle Creek Parkway, Suite 380
Colorado Springs, CO 80921

City of Colorado Springs:

Filed in accordance with section 7-7-906 of the Code of the City of Colorado Springs, 2001, as amended.

For the City Engineer

Date

Conditions:

TABLE OF CONTENTS

I. INTRODUCTION..... 1

II. GENERAL LOCATION AND DESCRIPTION 1

III. DRAINAGE BASINS AND SUBBASINS 3

IV. SUMMARY 12

V. REFERENCES 12

APPENDIX

**Hydrologic Rational Calculations
Standard Design Charts and Tables
Maps**

- 1. Vicinity Map
- 2. Soils Map
- 3. FEMA FIRM Floodplain Map
- 4. Proposed Conditions Drainage Basin Map

I. Introduction

Aspen Meadows Filing No. 2 and No. 4 are within a 42.04-acre vacant land parcel which is master planned for mixed-use development consisting of residential, utilities, open space, and public right-of-way uses. More specifically, the proposed subdivision will be comprised of a future 22.65-acres of small lot P.U.D. (140 units), 8.61-acres of town homes (18 lots, 73 units), 8.38 acres of existing gas easement, 1.04-acres of open space, and 1.35 acres of proposed public right of way (R.O.W.). The purpose of this Preliminary Drainage Report is to identify offsite and onsite drainage patterns associated with the proposed developments and to provide hydrologic and hydraulic analysis of tributary basins and conveyance systems to the temporary sediment basins (SDB-1, SDB-2, and SDB-3).

II. General Location and Description

This site is located at the northwestern intersection of Marksheffel Road and Cowpoke Road; more specifically: Northwest 1/4 of Section 4, Township 13 South, Range 65 West of the 6th P.M. in the City of Colorado Springs, County of El Paso, State of Colorado. The surrounding development of the property are as follows:

North: Sterling Ranch, single family development. This area is located in El Paso County.

East: Aspen Meadows Filing No. 1.

West: Forest Meadows Filing Nos. 1-4 are currently in the construction phase at this time.

South: Regional Detention Basin No. 3 and Sand Creek Channel.

The site lies within the Sand Creek Drainage Basin.

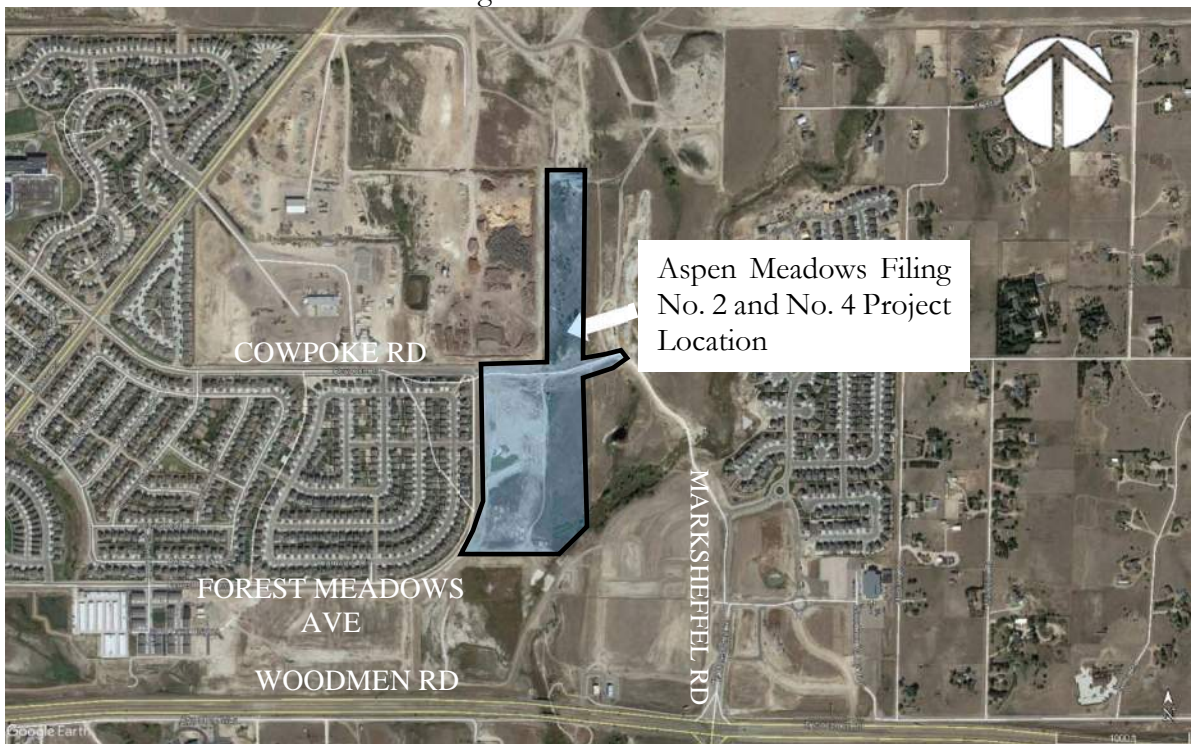


FIGURE 1. PROJECT LOCATION (NOT TO SCALE)

The combined area totals 42.04 acres and is currently undeveloped and covered in sparse vegetation including natural grasses and some shrubs. The rough graded proposed Marksheffel Road extension borders the gas easement to the east. This site slopes in a general northeast to southwest pattern until discharging into the San Creek Channel.

The Web Soil Survey, created by the Natural Resources Conservation Service, was utilized to investigate the existing general soil types within the tributary to the area impacting the site. The following soil types are present in the development area. See the Soils Map located in the appendix.

Table 1.1 - NRCS Soil Survey for El Paso County

Soil ID No.	Soil	Hydrologic Classification	Permeability
8	Blakeland loamy sand (1%-9% slopes)	A	Rapid
9	Blakeland-Fluvaquentic Haplaquolls	A	Rapid
19	Columbine gravelly sandy loam (0%-3% slopes)	A	Rapid

Soils can be classified in four different hydrologic groups, A, B, C, or D to help predict stormwater runoff rates. Hydrologic group “A” is characterized by deep, well-drained coarse-grained soils with a rapid infiltration rate when thoroughly wet and having a low runoff potential. Group “D” typically has a clay layer at or near to the surface, or a very shallow depth to impervious bedrock and has a very slow infiltration rate and a high runoff potential.

Blakeland-Fluvaquentic and Columbine gravelly sandy loams primarily dominate the soil types within the study reach. The area covered by this Preliminary Drainage Report are composed of Hydrologic Group A soils.

The entirety of the site is located in the Sand Creek Drainage Basin. Directly to the south, the development is bordered by Sand Creek Channel. This drainageway conveys flow within the Sand Creek Drainage Basin to the proposed Regional Sand Creek Detention Basin No. 3.

No existing irrigation facilities can be found on or around the site. Existing gas lines run north to south just east of the site, while existing water mains extend along Cowpoke Road and Forest Meadows Ave. There are also utilities currently servicing the existing housing development, Forest Meadows Filing No. 3.

III. Drainage Basins and Sub-basins

Historical patterns of the 42.04-acre Aspen Meadows Filing No. 2 and No. 4 site convey flow from northeast to southwest by sheet flow and existing drainageways and is directly discharged into the Sand Creek Channel. The site lies entirely within the Sand Creek Drainage Basin and is in compliance with the following reports:

Master Development Drainage Plan for Woodmen Heights Master Plan, by Classic Consulting Engineers and Surveyors, LLC, June 2004. (WHMP-MDDP)

Master Development Drainage Plan Update for Woodmen Heights and Final Drainage Report for Forest Meadows Filing No. 1 and No. 4, by Engineering and Surveying, Inc., February 2006 (MDDP Update)

Final Drainage Report for Sterling Ranch Filing No. 2, El Paso County, by M & S Civil Consultants, Inc., December 2017. (SR-FDR)

Design Memorandum, Sand Creek Detention Facility No. 3, West Full Spectrum Detention Basin Design, by Kiowa Engineering Corporation, Inc., Revised March 2, 2016 (DM-SC-3)

According to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) Panel No. 08041CO533 G, effective date December 7, 2018, the site is split into SFHA Zones “A” and “X”. The 100-year and 500-year floodplains are defined within the LOMR and when the channel improvements take place, a tract containing the stream will be transferred to the city. An annotated FIRM Panel is included in the appendix

Historically, onsite drainage currently flows from the northeastern corner of the site to the southwestern corner (Sub-basin EX1, EX2, & EX3-NW), both overland and through natural drainage swales and channels, and eventually discharges directly into the Sand Creek Channel. The adjacent Sterling Ranch property to the north (Sub-basin EX4) contributes offsite drainage at the north end of the proposed town home site. These minimal flows will be routed around the site via the existing gas easement. It is anticipated that, as the Sterling Ranch develops, these flows will be routed to the development’s detention facility located north of Aspen Meadows Filing No. 1 to the east. Further discussion of the offsite basins will be included in the Final Drainage Report.

In the interim condition, overlot grading activities for the master planned area will take place. Historic drainage patterns will not be altered. A proposed temporary sediment basin from the future townhomes area will collect runoff and outfall via a proposed overflow spillway from the temporary sediment basin into a swale directing treated runoff to a 2.5-foot deep triangular swale conveying runoff from the existing 145-foot gas easement north of Cowpoke Road, southward to Sand Creek. Another proposed temporary sediment basin will collect runoff from the future small lot P.U.D. site located approximately 1/3 of the way up the small lot PUD portion just east of Forest Meadows Drive. This will discharge either via a swale or an HDPE pipe to the south eventually reaching Pond 3 via the 24" RCP drain-pipe located at the south end of the proposed small lot PUD. Finally, a third sediment pond will be located just south of the overlot graded low point approximately 365 feet east of Forest Meadows Ave. just beyond the future small lot P.U.D. area and will outfall towards the south into Sand Creek Channel.

In the planned fully developed condition, a separate FDR will document design considerations complete with onsite water quality and detention.

IV. Drainage Design Criteria

A. Development Criteria Reference

This report has been prepared in accordance to the criteria set forth in the ***City of Colorado Springs and El Paso County Drainage Criteria Manual Volume 1*** (Drainage Criteria Manual), dated May 2014 and ***Volume 2 Stormwater Quality Policies, Procedures, and BMP's***, dated May 2014.

In addition to the City Criteria Manual, the ***Urban Storm Drainage Criteria Manuals, Volumes 1-3*** (UDFCD), published by the Urban Drainage and Flood Control District, latest update, have been used to supplement the Drainage Criteria Manual for water quality capture volume (WQCV).

A. Design Frequency

The design frequency is based on the Drainage Criteria Manual. The 100-year storm event was used as the major storm for the project, and the 5-year storm event was used as the minor storm.

B. Design Discharge

a. Method of Analysis

The hydrology for this project uses the Rational Method as recommended by the Drainage Criteria Manual for the minor and major storms. The Rational Method is used for drainage basins less than 100-acres in size. The Rational Method uses the following equation:

$$Q=C*i*A$$

Where:

- Q = Maximum runoff rate in cubic feet per second (cfs)
- C = Runoff coefficient
- i = Average rainfall intensity (inches per hour)
- A = Area of drainage sub-basin (acres)

b. Runoff Coefficient

Rational Method coefficients from 6-6 of the Drainage Criteria Manual for developed land were utilized in the Rational Method calculations. See Appendix B for more information.

c. Time of Concentration

The time of concentration consists of the initial time of overland flow and the travel time in a channel to the inlet or point of interest. A minimum time of concentrations of 5 minutes was utilized for urban areas.

d. Rainfall Intensity

The hypothetical rainfall depths for the 24-hour storm duration were taken from the DCM. Table 2.1 lists the rainfall depth for each of the 24-hour storm events.

Table 2.1 – Project Area 1-Hour Rainfall Depth

Storm Recurrence Interval	Rainfall Depth (inches)
5-year	1.50
100-year	2.52

The rainfall intensity equation for the Rational Method was taken from Drainage Criteria Manual Volume 1 Figure 6-5.

V. Drainage Facility Design

A. General Concept

The adjacent Sterling Ranch property to the north contributes to the offsite drainage just west of the Marksheffel Road extension and are accounted for in the rational calculations (see Sub-basin EX4 in the existing condition and offsite basin OS-1 in the interim condition). There are two proposed discharge points into the Sand Creek Channel. The existing Regional Detention Basin No. 3 is located immediately south of the site. It has been indicated by the City that modification of this pond will require updating the pond to meet current DCM criteria. As such, at the time of development, each filing covered in this report will provide onsite full spectrum detention. Runoff generated within the Cowpoke Road extension will be captured in the pair of sump inlets at MDDP-Update design points 16 and 16A. Detailed analysis of the runoff quantities can be found in the Appendix.

B. Detention Storage

Runoff from Filing No. 2 Town Home site and the eastern portion of R.O.W. from Cowpoke Road (9.68-acres of tributary area) will be treated in a temporary sediment basin (SDB-1), prior to being released to Regional Detention Basin No. 3 via a proposed triangular swale. In the fully developed condition, a full spectrum water quality and detention facility will be installed at the southwestern corner of the Town Home area (in the same location as SDB-1) and will discharge to existing storm sewer in Forest Meadows Drive. Further discussion of the detention facility will be included in the Final Drainage Report. Future full spectrum detention for Filing No. 4 small lot PUD area (26.56-acres of tributary area) will be provided near the location of SDB-3 at the south end of the small lot PUD site. Further discussion of the detention facility will be included in the Final Drainage Report.

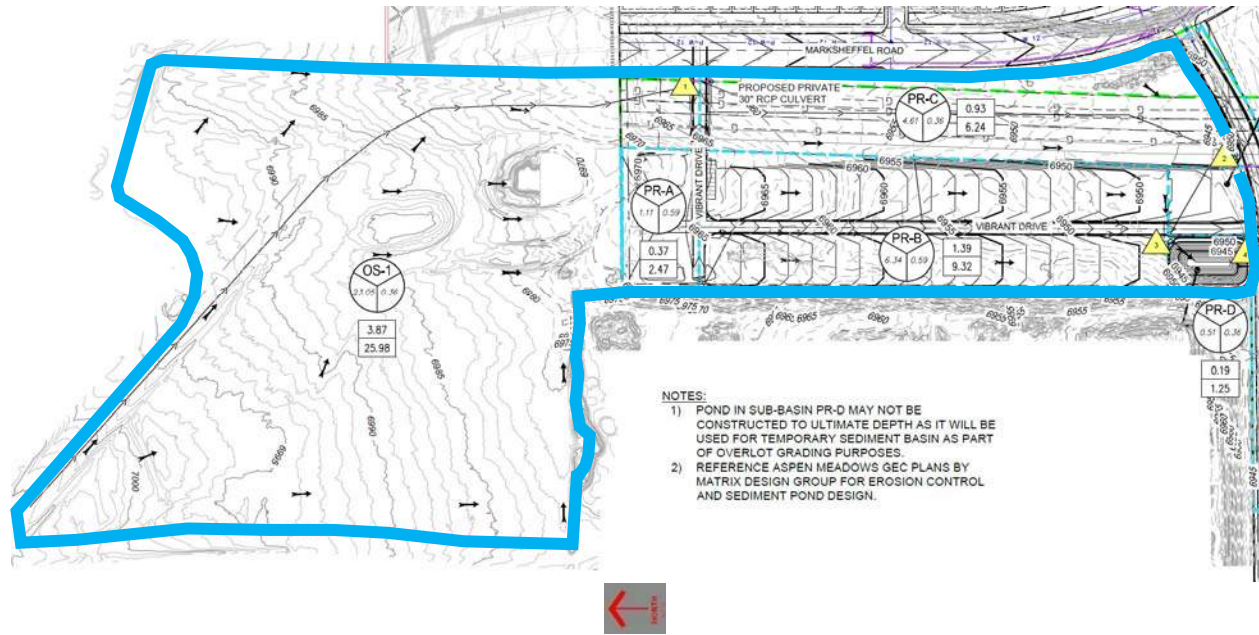
C. Specific Details

Design Point 1, below, is located at the southern end of the existing offsite Sub-basin, OS-1 (23.05 acres and produces a 5-year storm runoff event of 3.9 cfs and a 100-year storm event runoff of 26.0 cfs. Runoff is routed through a proposed 30" RCP culvert downstream across the proposed town homes access road (Vibrant Drive). When Sterling Ranch develops, runoff will be routed to the development's detention facility located north of Aspen Meadows Filing No. 1 to the east. Further discussion of the offsite basins will be included in the Final Drainage Report.

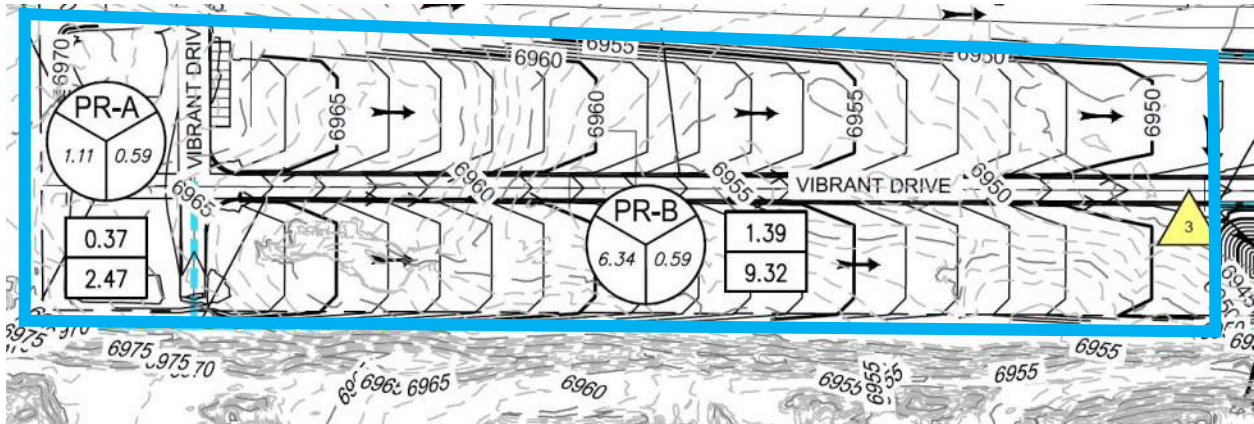


Preliminary Drainage Report
Aspen Meadows Filing No. 2 and No. 4

Design Point 2, below, is located just north of Cowpoke Road at the southern end of the existing 145-foot wide gas main easement, draining north to south. This Design Point collects runoff through two flow-by inlets from Sub-basins OS-1 and PR-C (27.66 acres). The combined flows produce a 5-year storm runoff event of 3.7 cfs and a 100-year storm event runoff of 25.0 cfs. Runoff is routed through a proposed 30" RCP culvert downstream across the proposed extension of Cowpoke Road into a 2.5-foot deep triangular swale conveying runoff from the existing 145-foot wide gas main easement north of Cowpoke Road, southward to Sand Creek.



Design Point 3, below, is located at the southernmost end of the proposed townhomes area, draining from north to south. There is an existing built-up berm along the El Paso County/City of Colorado Springs boundary along the western boundary that keeps onsite flows to the south and prevents off site flow from the west from drainage to the Aspen Meadows Filing No. 2 and No. 4 project site. The Design Point collects runoff from Sub-basins PR-A (1.11 acres) and PR-B (6.34 acres), which produces a 5-year storm runoff event of 1.7 cfs and a 100-year storm event runoff of 11.5 cfs. Flows from this design point will be routed downstream to Design Point 4 within a proposed temporary sediment basin per the Urban Storm Drainage Criteria Manual (USDCM Volume 3, SB-1).



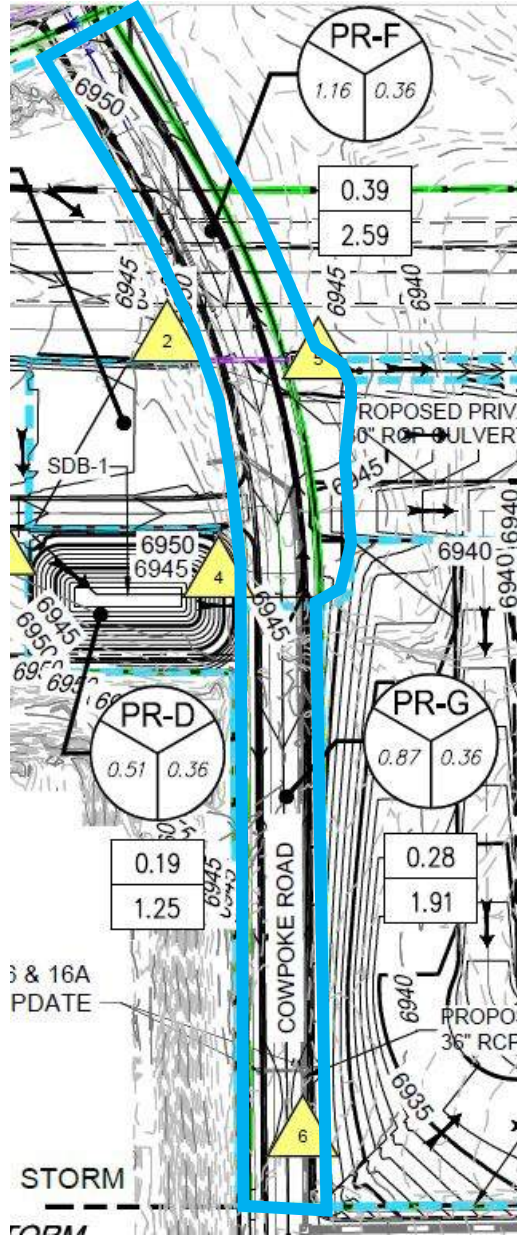
Preliminary Drainage Report
Aspen Meadows Filing No. 2 and No. 4

Design Point 4, below, is located within the proposed temporary sediment pond at the southwest corner of the proposed townhomes area, just north of Cowpoke Road. The Design Point combines runoff from Sub-basins PR-A (1.11 acres), PR-B (6.34 acres), PR-D (0.51 acres), and PR-E (0.56 acres). These combined flows produce a 5-year storm runoff event of 1.6 cfs and a 100-year storm event runoff of 10.5 cfs. Flows from this design point will be treated in a temporary sediment pond, outfall via a proposed overflow spillway from the temporary sediment basin into a 2.5-foot deep triangular swale directing treated runoff eastward to combine with runoff from the existing 145-foot gas easement south of Cowpoke Road at Design Point 5, southward to Sand Creek.

Design Point 5, below, is located immediately south of Cowpoke Road, just downstream from Design Point 2. The Design Point combines runoff from Design Point 2 (27.66 acres of tributary area) and Design Point 4 (7.96 acres of tributary area). The combined flows produce a 5-year storm runoff event of 4.7 cfs and a 100-year storm event runoff of 31.8 cfs.



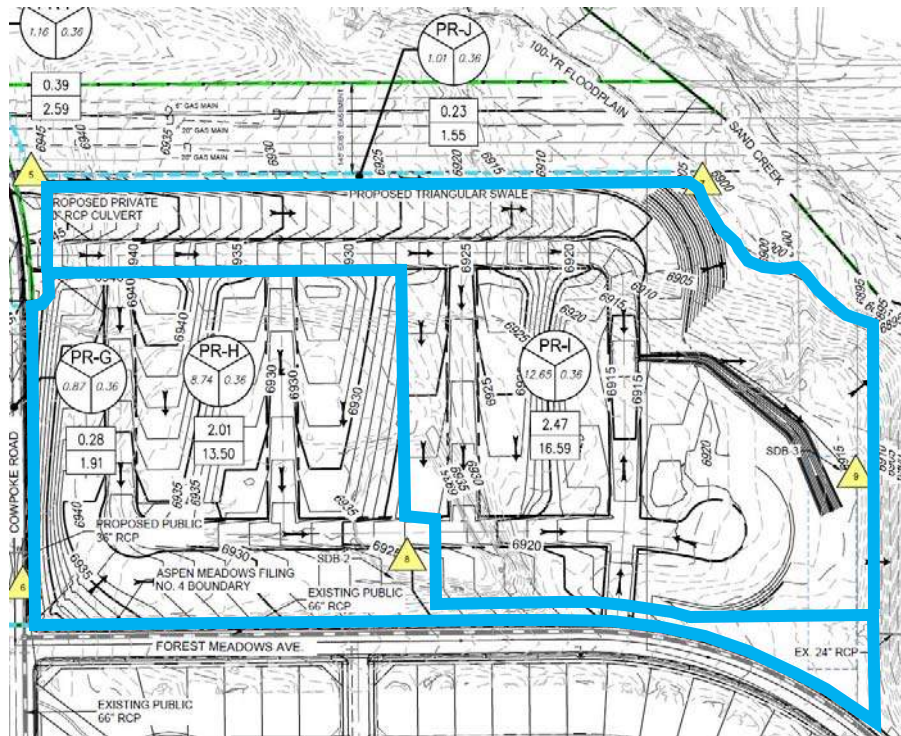
Design Point 6, below, is located at the northeast corner of Cowpoke Road and Forest Meadows Avenue at a proposed low point. The Design Point collects runoff from Sub-basin PR-G (0.87 acres), which produces a 5-year storm runoff event of 0.28 cfs and a 100-year storm event runoff of 1.9 cfs. Flows from this design point will be conveyed downstream to Design Point 8 via sheet flow.



Design Point 7, below, is located at the southeastern most corner of the small lot P.U.D. property at the downstream end of the proposed triangular swale, just upstream of Regional Detention Basin No. 3 in Sand Creek, draining from north to south. The Design Point collects runoff from Design Point 5 and Sub-basin PR-J (1.01 acres), which produces a combined 5-year storm runoff event of 3.9 cfs and a 100-year storm event runoff of 36.71 cfs. Flows from this design point will have been treated in SDB-1 and continue downstream to Regional Detention Basin No. 3.

Design Point 8, below, is located at the southwestern corner of Sub-basin PR-H, just east of Forest Meadows Ave. The Design Point collects runoff from Design Point 6 and Sub-basin PR-H (9.61 acres), which produces a combined 5-year storm runoff event of 1.3 cfs and a 100-year storm event runoff of 7.4 cfs. Runoff from this design point will be treated in a temporary sediment basin (SDB-2), based on contributing tributary area (per the Urban Storm Drainage Criteria Manual (USDCM Volume 3, SB-1), prior to being released to Regional Detention Basin No. 3.

Design Point 9, below, is located at the southernmost portion of the small lot P.U.D. site, immediately north of Regional Detention Basin No. 3. The Design Point combines runoff from Sub-basin PR-I (12.65 acres). The flows produce a 5-year storm runoff event of 2.5 cfs and a 100-year storm event runoff of 16.5 cfs. Runoff from this design point will be treated in a temporary sediment basin (SDB-3), based on contributing tributary area (per the Urban Storm Drainage Criteria Manual (USDCM Volume 3, SB-1), prior to being released to Regional Detention Basin No. 3. In the fully developed condition, a proposed water quality and detention facility will be installed at the far southwestern corner of the small lot P.U.D. area. Further discussion of the detention facility will be included in the Final Drainage Report.



VI. Summary

As there is no increase in the imperviousness of the site in the interim conditions, no increase in runoff is anticipated. The calculations included in this preliminary drainage report adhere to the Colorado Springs DCM specifications for this site, do not impact the historic drainage patterns within the study area and do not increase developed flows. The existing discharges from the site are estimated to be approximately $Q_5 = 6.65$ cfs and $Q_{100} = 44.72$ cfs. The existing site has no treatment for the water quality capture volume. Under interim conditions, this report has demonstrated that discharges from the site will be an estimated $Q_5 = 6.45$ cfs and $Q_{100} = 43.35$ cfs which is a slight decrease and therefore detention will not be required for the interim condition. These changes will not have an adverse impact on downstream facilities. Further development of the two sites will require Final Drainage Reports and analysis sizing detention and storm sewer facilities for the two developments.

VII. References

- (1) *City of Colorado Springs Drainage Criteria Manual Volume 1 and 2*, dated May 2014.
- (2) *Web Soil Survey of El Paso County Area, Colorado*. United States Department of Agriculture Soil Conservation Service, July 2020.
- (3) *Flood Insurance Rate Map for El Paso County, Colorado and Incorporated Areas, Panel 533 of 1300*, Federal Emergency Management Agency, Effective Date December 7, 2018.
- (4) *Master Development Drainage Plan for Woodmen Heights Master Plan*, by *Classic Consulting Engineers and Surveyors, LLC*, June 2004.
- (5) *Master Development Drainage Plan Update for Woodmen Heights and Final Drainage Report for Forest Meadows Filing No. 1 and No. 4*, by *Engineering and Surveying, Inc.*, February 2006.
- (6) *Final Drainage Report for Sterling Ranch Filing No. 2, El Paso County*, by *M & S Civil Consultants, Inc.*, December 2017.
- (7) *Design Memorandum, Sand Creek Detention Facility No. 3, West Full Spectrum Detention Basin Design*, by *Kiowa Engineering Corporation, Inc.*, Revised March 2, 2016.

APPENDIX

HYDROLOGIC RATIONAL CALCULATIONS

STANDARD DESIGN CHARTS AND TABLES

MAPS

Project Name: Aspen Meadows Filing No. 2 and No. 4
Project Location: Colorado Springs, CO
Designer: BAS
Notes: Existing Condition

Channel Flow Type Key

Heavy Meadow 2
Tillage/Field 3
Short Pasture and Lawns 4
Nearly Bare Ground 5
Grassed Waterway 6
Paved Areas 7

Average Channel Velocity 4 ft/s (If specific channel vel is used, this will be ignored)
 Average Slope for Initial Flow 0.04 ft/ft (If Elevations are used, this will be ignored)

Sub-basin	Comments	Area		Rational 'C' Values										Flow Lengths				Initial Flow			Channel Flow				Tc	Rainfall Intensity & Rational Flow Rate						
		sf	acres	Surface Type 1 (Residential 1/8 Acre Lots)			Surface Type 2 (Impervious)			Surface Type 3 (Undeveloped)			Composite		Initial ft	Initial Length ft	Channel ft	Channel Length ft	Average (decimal) Slope	Initial Tc (min)	Average (%) Slope	Channel Flow Type (See Key above) Ground Type	Velocity (ft/s)	Channel Tc (min)		Total (min)	i2 in/hr	Q2 cfs	i5 in/hr	Q5 cfs	i100 in/hr	Q100 cfs
				C5	C100	Area (SF)	C5	C100	Area (SF)	C5	C100	Area	C5	C100																		
EX-1		383,376	8.80	0.45	0.59		0.90	0.96		0.09	0.36	383,376	0.09	0.36	100	100.00	1630	1630.00	0.009	18.69	2.02	4	1.0	27.4	46.1	1.5	1.2	1.9	1.49	3.1	10.05	
EX-2		1,080,724	24.81	0.45	0.59		0.90	0.96		0.09	0.36	1,080,724	0.09	0.36	200	200.0	2155	2155.0	0.029	18.11	2.14	4	1.0	35.4	53.5	1.4	3.0	1.7	3.84	2.9	25.78	
EX-3-NW		172,062	3.95	0.45	0.59		0.90	0.96		0.09	0.36	172,062	0.09	0.36	200	200.00	1131	1131.00	0.023	19.39	2.44	4	1.1	17.4	36.8	1.7	0.6	2.2	0.77	3.6	5.18	
EX-4		1,004,058	23.05	0.45	0.59		0.90	0.96		0.09	0.36	1,004,058	0.09	0.36	200	100.0	1510	1610.0	0.020	20.41	1.77	4	0.9	29.4	49.8	1.4	3.0	1.8	3.73	3.0	25.07	
DESIGN POINTS INCLUDED SUB-BASINS																																
EX1	EX1	383,376	8.80	0.45	0.59		0.90	0.96		0.09	0.36	383,376	0.09	0.36	100	100.0	1630	1630.0	0.009	18.69	2.02	4	1.0	27.4	46.1	1.5	1.2	1.9	1.49	3.1	10.05	
EX2	EX2, EX4	2,084,782	47.86	0.45	0.59		0.90	0.96		0.09	0.36	2,084,782	0.09	0.36	200	100.00	4156	4256.00	0.029	18.03	2.04	4	1.0	71.7	89.7	1.0	4.2	1.2	5.25	2.0	35.31	
EX3	EX3	172,062	3.95	0.45	0.59		0.90	0.96		0.09	0.36	172,062	0.09	0.36	200	200.00	1131	1131.00	0.023	19.39	2.44	4	1.1	17.4	36.8	1.7	0.6	2.2	0.77	3.6	5.18	
TOTAL AREA		2,640,220	60.61							0.09	0.36	2,640,220	0.09	0.36	200	200.00	4156	4256.00	0.029	18.03	2.04	4	1.0	71.7	89.7	1.0	5.3	1.2	6.65	2.0	44.72	

Note: Q2, Q5 & Q10 are based on C5; Q25, Q50 & Q100 are based on C100

Project Name: Aspen Meadows Filing No. 2 and No. 4
Project Location: Colorado Springs, CO
Designer: BAS
Notes: Interim Condition

Channel Flow Type Key	
Heavy Meadow	2
Tillage/Field	3
Short Pasture and Lawns	4
Nearly Bare Ground	5
Grassed Waterway	6
Paved Areas	7

Average Channel Velocity 4 ft/s (If specific channel vel is used, this will be ignored)
 Average Slope for Initial Flow 0.04 ft/ft (If Elevations are used, this will be ignored)
 Flow Length: True Initial
 Max 100 ft Developed
 Max 300 ft Undeveloped

Basin	Area Description	Area		Rational 'C' Values										Flow Lengths				Initial Flow		Channel Flow				Tc	Rainfall Intensity & Rational Flow Rate								
		sf	acres	Surface Type 1 (Residential 1/8 Acre Lots)			Surface Type 2 (Impervious)			Surface Type 3 (Vegetated Areas)			Composite		Initial ft	True Initial Length ft	Channel ft	True Channel Length ft	Average (decimal) Slope	Initial Tc (min)	Average (%) Slope	Channel Flow Type (See Key above) Ground Type	Velocity (ft/s)	Channel Tc (min)	Total (min)	i2 in/hr	Q2 cfs	i5 in/hr	Q5 cfs	i100 in/hr	Q100 cfs		
				C5	C100	Area (SF)	C5	C100	Area (SF)	C5	C100	Area	C5	C100																			
OS-1	Offsite sub-basin north of project site	1,004,058	23.05	0.45	0.59		0.90	0.96		0.09	0.36	1,004,058	0.09	0.36	200	100.0	1,510	1610.0	0.020	20.41	1.77	4	0.9	29.4	49.8	1.4	3.0	1.8	3.73	3.0	25.07		
A	Northwest sub-basin	48,352	1.11	0.45	0.59		0.90	0.96		0.09	0.36	48,352	0.09	0.36	50	50.0	188	188.0	0.020	10.20	1.00	5	1.0	3.1	13.3	2.9	0.3	3.6	0.37	6.1	2.47		
B	Northwest mid-Sub-Basin	276,170	6.34	0.45	0.59		0.90	0.96		0.09	0.36	276,170	0.09	0.36	100	100.0	950	950.0	0.020	14.43	1.00	5	1.0	15.8	30.3	1.9	1.1	2.4	1.39	4.0	9.32		
C	Gas Main Easement Central	200,812	4.61	0.45	0.59		0.90	0.96		0.09	0.36	200,812	0.09	0.36	150	100.0	972	1022.0	0.020	17.67	2.00	4	1.0	17.2	34.9	1.8	0.7	2.2	0.93	3.7	6.24		
D	Proposed Detention Pond	22,216	0.51	0.45	0.59		0.90	0.96		0.09	0.36	22,216	0.09	0.36	25	25.0	141	141.4	0.020	7.21	1.00	4	0.7	3.4	10.6	3.2	0.1	4.0	0.19	6.7	1.25		
E	Southeast Towne Home Sub-Basin	24,394	0.56	0.45	0.59		0.90	0.96		0.09	0.36	24,394	0.09	0.36	75	75.0	143	143.0	0.020	12.50	1.00	4	0.7	3.4	15.9	2.7	0.1	3.4	0.17	5.7	1.15		
F	East Cowpoke Road	50,530	1.16	0.45	0.59		0.90	0.96		0.09	0.36	50,530	0.09	0.36	25	25.0	511	511.0	0.020	7.21	2.00	5	1.4	6.0	13.2	2.9	0.3	3.7	0.39	6.2	2.59		
G	West Cowpoke Road	37,897	0.87	0.45	0.59		0.90	0.96		0.09	0.36	37,897	0.09	0.36	25	25.0	394	394.0	0.020	7.21	1.00	5	1.0	6.6	13.8	2.9	0.2	3.6	0.28	6.0	1.91		
H	North Small Lot P.U.D.	380,714	8.74	0.45	0.59		0.90	0.96		0.09	0.36	380,714	0.09	0.36	50	50.0	958	958.0	0.020	10.20	1.72	4	0.9	17.5	27.7	2.0	1.6	2.5	2.01	4.3	13.50		
I	South Small Lot P.U.D.	551,034	12.65	0.45	0.59		0.90	0.96		0.09	0.36	551,034	0.09	0.36	50	50.0	1,195	1496.0	0.020	10.20	1.82	4	0.9	26.5	36.8	1.7	2.0	2.2	2.47	3.6	16.59		
J	Gas Main Swale	43,996	1.01	0.45	0.59		0.90	0.96		0.09	0.36	43,996	0.09	0.36	50	50.0	1,045	1300.0	0.020	10.20	3.07	4	1.2	17.9	28.1	2.0	0.2	2.5	0.23	4.2	1.55		
Design Points	Contributing Sub-basins																																
1	OS-1	1,004,058	23.05	0.45	0.59		0.90	0.96		0.09	0.36	1,004,058	0.09	0.36	200	100.0	1,510	1610.0	0.020	20.41	2.50	4	1.1	24.2	44.7	1.5	3.2	1.9	4.00	3.1	25.98		
2	OS-1, PR-C	1,204,870	27.66	0.45	0.59		0.90	0.96		0.09	0.36	1,204,870	0.09	0.36	200	100.0	2,357	2457.0	0.020	20.41	2.00	4	1.0	41.4	61.8	1.2	3.1	1.6	3.90	2.5	25.02		
3	PR-A, PR-B	324,522	7.45	0.45	0.59		0.90	0.96		0.09	0.36	324,522	0.09	0.36	100	100.0	1,138	1138.0	0.020	14.43	2.00	5	1.4	13.4	27.8	2.0	1.4	2.5	1.71	4.2	11.48		
4	DP3, PR-D	346,738	7.96	0.45	0.59		0.90	0.96		0.09	0.36	346,738	0.09	0.36	100	100.0	1,303	1303.0	0.020	14.43	2.00	4	1.0	21.9	36.4	1.7	1.2	2.2	1.56	3.6	10.51		
5	DP2, DP4	1,551,607	35.62	0.45	0.59		0.90	0.96		0.09	0.36	1,551,607	0.09	0.36	300	100.0	2,441	2641.0	0.020	24.99	2.00	4	1.0	44.5	69.5	1.1	3.7	1.4	4.65	2.5	31.77		
6	PR-G	37,897	0.87	0.45	0.59		0.90	0.96		0.09	0.36	37,897	0.09	0.36	25	25.0	394	394.0	0.020	7.21	1.00	5	1.0	6.6	13.8	2.9	0.2	3.6	0.28	6.0	1.91		
7	DP5, PR-I	1,595,603	36.63	0.45	0.59		0.90	0.96		0.09	0.36	1,595,603	0.09	0.36	300	100.0	3,341	3541.0	0.020	24.99	1.50	4	0.9	68.8	93.8	0.9	3.1	1.2	3.90	2.8	36.71		
8	DP6, PR-H	418,612	9.61	0.45	0.59		0.90	0.96		0.09	0.36	418,612	0.09	0.36	50	1352.0	3,012	3012.0	0.020	10.20	1.72	4	0.9	55.0	65.2	1.2	1.0	1.5	1.31	2.1	7.43		
9	PR-I	551,034	12.65	0.45	0.59		0.90	0.96		0.09	0.36	551,034	0.09	0.36	50	50.0	1,195	1496.0	0.020	10.20	1.82	4	0.9	26.5	36.8	1.7	2.0	2.2	2.47	3.6	16.59		
					Percent Impervious	65%																											
Filing No. 2	On-site Town Homes	371,131	8.52				0					371,131																					
Filing No. 4	Future Small Lot P.U.D.	931,748	21.39				0					931,748																					
	TOTAL AREA	2,640,172	60.61									2,640,172	0.09	0.36	300	100.0	3,341	3541.0	0.020	24.99	1.50	4	0.9	68.8	93.8	0.9	5.1	1.2	6.45	2.0	43.35		

Note: Q2, Q5 & Q10 are based on C5; Q25, Q50 & Q100 are based on C100

Culvert Report

OS-1/DP1

Invert Elev Dn (ft)	= 6962.25
Pipe Length (ft)	= 55.00
Slope (%)	= 1.00
Invert Elev Up (ft)	= 6962.80
Rise (in)	= 30.0
Shape	= Circular
Span (in)	= 30.0
No. Barrels	= 1
n-Value	= 0.012
Culvert Type	= Circular Concrete
Culvert Entrance	= Square edge w/headwall (C)
Coeff. K,M,c,Y,k	= 0.0098, 2, 0.0398, 0.67, 0.5

Embankment

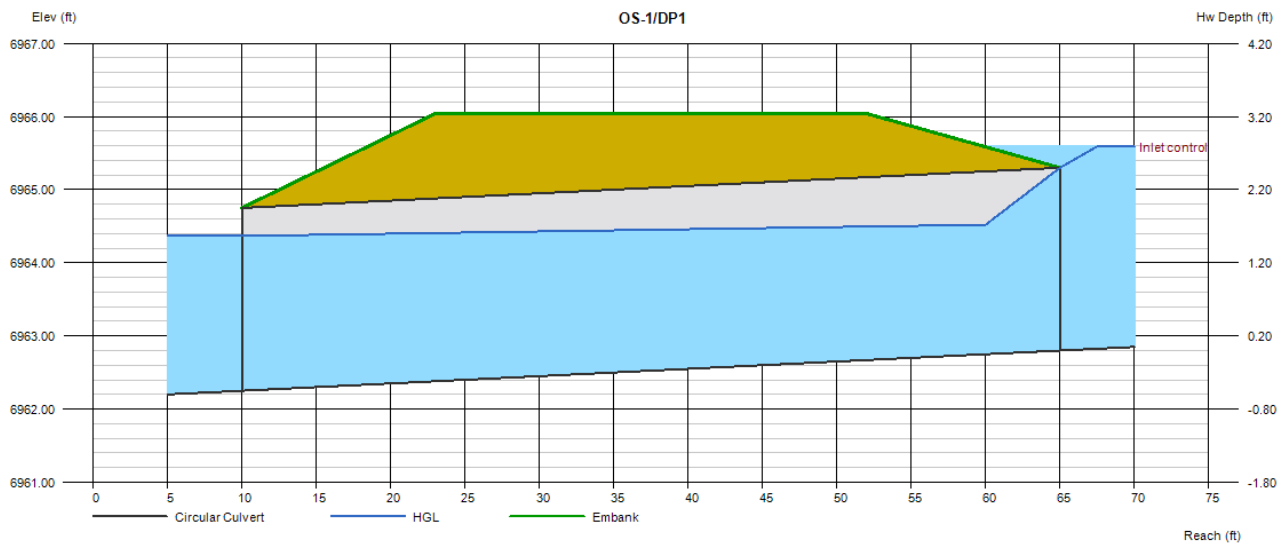
Top Elevation (ft)	= 6966.04
Top Width (ft)	= 29.00
Crest Width (ft)	= 75.00

Calculations

Qmin (cfs)	= 25.98
Qmax (cfs)	= 25.98
Tailwater Elev (ft)	= (dc+D)/2

Highlighted

Qtotal (cfs)	= 25.98
Qpipe (cfs)	= 25.98
Qovertop (cfs)	= 0.00
Veloc Dn (ft/s)	= 5.86
Veloc Up (ft/s)	= 7.14
HGL Dn (ft)	= 6964.37
HGL Up (ft)	= 6964.54
Hw Elev (ft)	= 6965.59
Hw/D (ft)	= 1.12
Flow Regime	= Inlet Control



Culvert Report

DP2

Invert Elev Dn (ft)	= 6942.95
Pipe Length (ft)	= 72.00
Slope (%)	= 1.00
Invert Elev Up (ft)	= 6943.67
Rise (in)	= 30.0
Shape	= Circular
Span (in)	= 30.0
No. Barrels	= 1
n-Value	= 0.012
Culvert Type	= Circular Concrete
Culvert Entrance	= Square edge w/headwall (C)
Coeff. K,M,c,Y,k	= 0.0098, 2, 0.0398, 0.67, 0.5

Embankment

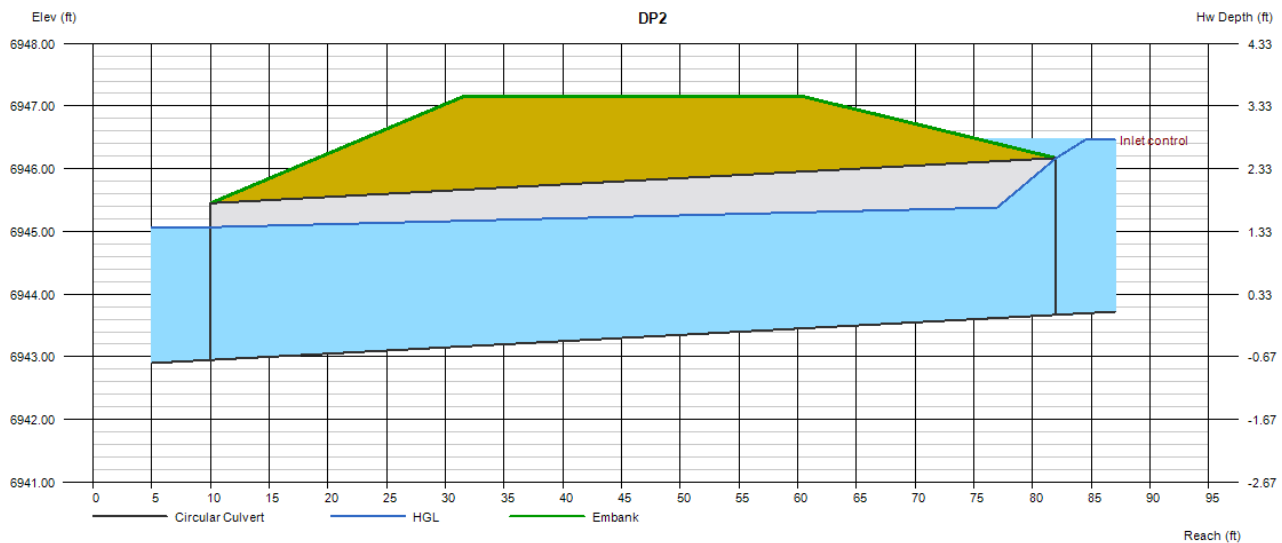
Top Elevation (ft)	= 6947.15
Top Width (ft)	= 29.00
Crest Width (ft)	= 75.00

Calculations

Qmin (cfs)	= 25.98
Qmax (cfs)	= 25.98
Tailwater Elev (ft)	= (dc+D)/2

Highlighted

Qtotal (cfs)	= 25.98
Qpipe (cfs)	= 25.98
Qovertop (cfs)	= 0.00
Veloc Dn (ft/s)	= 5.86
Veloc Up (ft/s)	= 7.14
HGL Dn (ft)	= 6945.07
HGL Up (ft)	= 6945.41
Hw Elev (ft)	= 6946.46
Hw/D (ft)	= 1.12
Flow Regime	= Inlet Control



Channel Report

GAS EASMENT SWALE

Triangular

Side Slopes (z:1) = 3.00, 3.00
Total Depth (ft) = 2.50

Invert Elev (ft) = 6942.95
Slope (%) = 1.00
N-Value = 0.020

Calculations

Compute by: Known Q
Known Q (cfs) = 25.98

Highlighted

Depth (ft) = 1.28
Q (cfs) = 25.98
Area (sqft) = 4.92
Velocity (ft/s) = 5.29
Wetted Perim (ft) = 8.10
Crit Depth, Yc (ft) = 1.37
Top Width (ft) = 7.68
EGL (ft) = 1.71

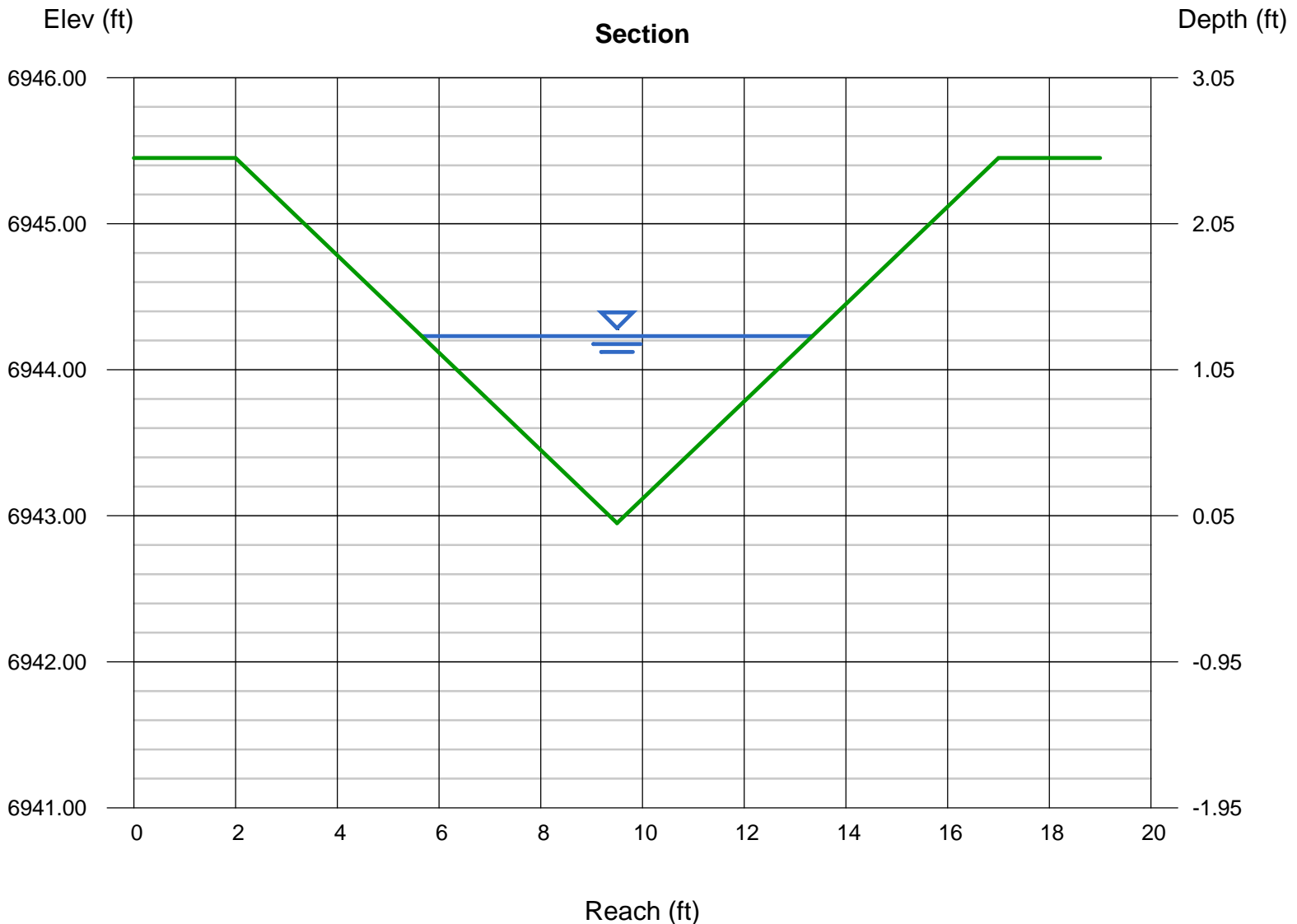


Table 6-6. Runoff Coefficients for Rational Method

(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

3.2 Time of Concentration

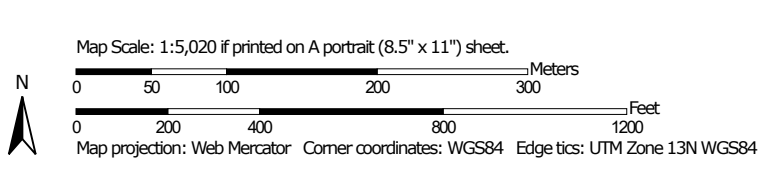
One of the basic assumptions underlying the Rational Method is that runoff is a function of the average rainfall rate during the time required for water to flow from the hydraulically most remote part of the drainage area under consideration to the design point. However, in practice, the time of concentration can be an empirical value that results in reasonable and acceptable peak flow calculations.

For urban areas, the time of concentration (t_c) consists of an initial time or overland flow time (t_i) plus the travel time (t_t) in the storm sewer, paved gutter, roadside drainage ditch, or drainage channel. For non-urban areas, the time of concentration consists of an overland flow time (t_i) plus the time of travel in a concentrated form, such as a swale or drainageway. The travel portion (t_t) of the time of concentration can be estimated from the hydraulic properties of the storm sewer, gutter, swale, ditch, or drainageway. Initial time, on the other hand, will vary with surface slope, depression storage, surface cover, antecedent rainfall, and infiltration capacity of the soil, as well as distance of surface flow. The time of concentration is represented by Equation 6-7 for both urban and non-urban areas.

Soil Map—El Paso County Area, Colorado



Soil Map may not be valid at this scale.



MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features



Blowout



Borrow Pit



Clay Spot



Closed Depression



Gravel Pit



Gravelly Spot



Landfill



Lava Flow



Marsh or swamp



Mine or Quarry



Miscellaneous Water



Perennial Water



Rock Outcrop



Saline Spot



Sandy Spot



Severely Eroded Spot



Sinkhole



Slide or Slip



Sodic Spot



Spoil Area



Stony Spot



Very Stony Spot



Wet Spot



Other



Special Line Features

Water Features



Streams and Canals

Transportation



Rails



Interstate Highways



US Routes



Major Roads



Local Roads

Background



Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
 Web Soil Survey URL:
 Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: El Paso County Area, Colorado
 Survey Area Data: Version 18, Jun 5, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 19, 2018—Sep 23, 2018

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
8	Blakeland loamy sand, 1 to 9 percent slopes	4.4	16.5%
9	Blakeland-Fluvaquentic Haplaquolls	14.3	53.5%
19	Columbine gravelly sandy loam, 0 to 3 percent slopes	8.0	30.0%
Totals for Area of Interest		26.6	100.0%

El Paso County Area, Colorado

8—Blakeland loamy sand, 1 to 9 percent slopes

Map Unit Setting

National map unit symbol: 369v

Elevation: 4,600 to 5,800 feet

Mean annual precipitation: 14 to 16 inches

Mean annual air temperature: 46 to 48 degrees F

Frost-free period: 125 to 145 days

Farmland classification: Not prime farmland

Map Unit Composition

Blakeland and similar soils: 98 percent

Minor components: 2 percent

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

Description of Blakeland

Setting

Landform: Hills, flats

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

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Alluvium derived from sedimentary rock and/or eolian deposits derived from sedimentary rock

Typical profile

A - 0 to 11 inches: loamy sand

AC - 11 to 27 inches: loamy sand

C - 27 to 60 inches: sand

Properties and qualities

Slope: 1 to 9 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Somewhat excessively drained

Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum in profile: 5 percent

Available water storage in profile: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): 3e

Land capability classification (nonirrigated): 6e

Hydrologic Soil Group: A

Ecological site: Sandy Foothill (R049XB210CO)

Hydric soil rating: No

Minor Components

Pleasant

Percent of map unit: 1 percent

Landform: Depressions

Hydric soil rating: Yes

Other soils

Percent of map unit: 1 percent

Hydric soil rating: No

Data Source Information

Soil Survey Area: El Paso County Area, Colorado

Survey Area Data: Version 18, Jun 5, 2020

El Paso County Area, Colorado

9—Blakeland-Fluvaquentic Haplaquolls

Map Unit Setting

National map unit symbol: 36b6

Elevation: 3,500 to 5,800 feet

Mean annual precipitation: 13 to 17 inches

Mean annual air temperature: 46 to 55 degrees F

Frost-free period: 110 to 165 days

Farmland classification: Not prime farmland

Map Unit Composition

Blakeland and similar soils: 60 percent

Fluvaquentic haplaquolls and similar soils: 38 percent

Minor components: 2 percent

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

Description of Blakeland

Setting

Landform: Hills, flats

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

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Sandy alluvium derived from arkose and/or eolian deposits derived from arkose

Typical profile

A - 0 to 11 inches: loamy sand

AC - 11 to 27 inches: loamy sand

C - 27 to 60 inches: sand

Properties and qualities

Slope: 1 to 9 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Somewhat excessively drained

Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum in profile: 5 percent

Available water storage in profile: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): 3e

Land capability classification (nonirrigated): 6e

Hydrologic Soil Group: A

Ecological site: Sandy Foothill (R049XB210CO)

Hydric soil rating: No

Description of Fluvaquentic Haplaquolls

Setting

Landform: Swales

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Alluvium

Typical profile

H1 - 0 to 12 inches: variable

Properties and qualities

Slope: 1 to 2 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Poorly drained

Runoff class: Very high

Capacity of the most limiting layer to transmit water (Ksat):

Moderately high to high (0.20 to 6.00 in/hr)

Depth to water table: About 0 to 24 inches

Frequency of flooding: Occasional

Frequency of ponding: None

Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)

Interpretive groups

Land capability classification (irrigated): 6w

Land capability classification (nonirrigated): 6w

Hydrologic Soil Group: D

Hydric soil rating: Yes

Minor Components

Other soils

Percent of map unit: 1 percent

Hydric soil rating: No

Pleasant

Percent of map unit: 1 percent

Landform: Depressions

Hydric soil rating: Yes

Data Source Information

Soil Survey Area: El Paso County Area, Colorado

Survey Area Data: Version 18, Jun 5, 2020

El Paso County Area, Colorado

19—Columbine gravelly sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 367p
Elevation: 6,500 to 7,300 feet
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 46 to 50 degrees F
Frost-free period: 125 to 145 days
Farmland classification: Not prime farmland

Map Unit Composition

Columbine and similar soils: 97 percent
Minor components: 3 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Columbine

Setting

Landform: Fans, flood plains, fan terraces
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

A - 0 to 14 inches: gravelly sandy loam
C - 14 to 60 inches: very gravelly loamy sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 2.5 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: Gravelly Foothill (R049XB215CO)
Hydric soil rating: No

Minor Components

Pleasant

Percent of map unit: 1 percent

Landform: Depressions
Hydric soil rating: Yes

Other soils

Percent of map unit: 1 percent
Hydric soil rating: No

Fluvaquentic haplaquolls

Percent of map unit: 1 percent
Landform: Swales
Hydric soil rating: Yes

Data Source Information

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 18, Jun 5, 2020

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The community map repository should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where Base Flood Elevations (BFEs) and/or floodways have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by flood control structures. Refer to section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The projection used in the preparation of this map was Universal Transverse Mercator (UTM) zone 13. The horizontal datum was NAD83, GRS83 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988 (NAVD88). These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at <http://www.ngs.noaa.gov/> or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, NNGS12
National Geodetic Survey
SSM-C-3, #9202
1315 East-West Highway
Silver Spring, MD 20910-3282

To obtain current elevation, description, and/or location information for bench marks shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242 or visit its website at <http://www.ngs.noaa.gov/>.

Base Map information shown on this FIRM was provided in digital format by El Paso County, Colorado Springs Utilities, and Anderson Consulting Engineers, Inc. These data are current as of 2009.

This map reflects more detailed and up-to-date stream channel configurations and floodplain delineations than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map. The profile baselines depicted on this map represent the hydraulic modeling baselines that match the flood profiles and Floodway Data Tables if applicable, in the FIS report. As a result, the profile baselines may deviate significantly from the new base map channel representation and may appear outside of the floodplain.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

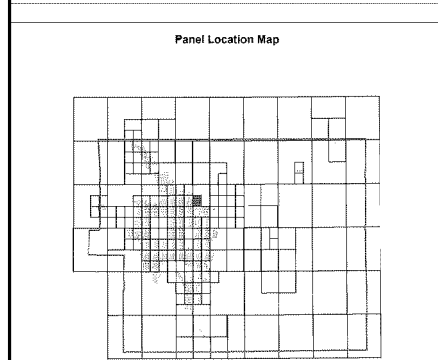
Please refer to the separately printed Map Index for an overview map of the county showing the layout of map panels, community map repository addresses, and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact FEMA Map Service Center (MSC) via the FEMA Map Information eXchange (FMIX) 1-877-336-2627 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. The MSC may also be reached by Fax at 1-800-358-9620 and its website at <http://www.msc.fema.gov/>.

If you have questions about this map or questions concerning the National Flood Insurance Program in general, please call 1-877-FEMA MAP (1-877-336-2627) or visit the FEMA website at <http://www.fema.gov/business/nfp>.

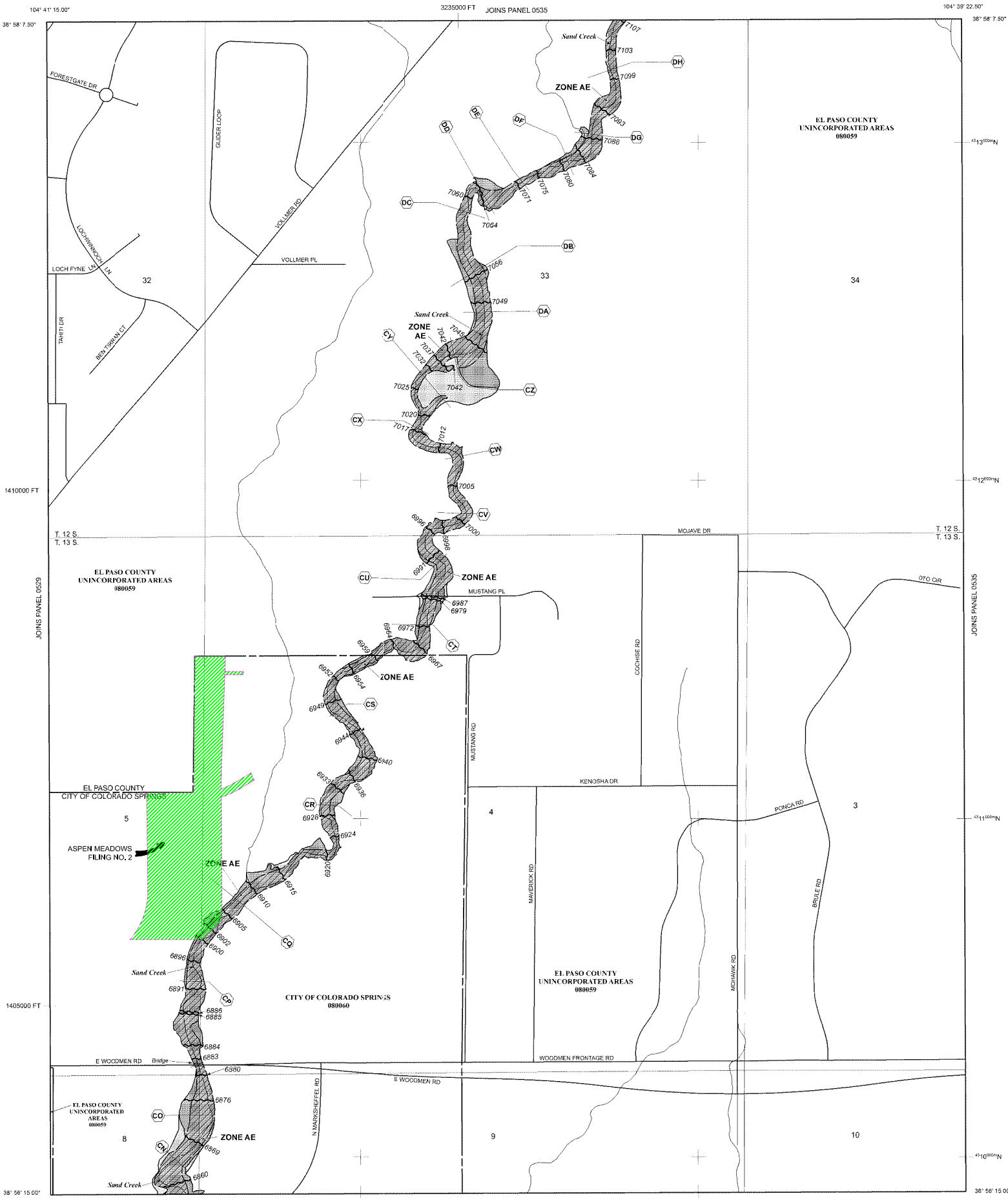
El Paso County Vertical Datum Offset Table	
Flooding Source	Vertical Datum Offset (ft)

REFER TO SECTION 3.3 OF THE EL PASO COUNTY FLOOD INSURANCE STUDY REPORT FOR STREAM BY STREAM VERTICAL DATUM CONVERSION INFORMATION



This Digital Flood Insurance Rate Map (DFIRM) was produced through a Cooperating Technical Partner (CTP) agreement between the State of Colorado Water Conservation Board (CWCB) and the Federal Emergency Management Agency (FEMA).

Additional Flood Hazard information and resources are available from local communities and the Colorado Water Conservation Board.



NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 12 SOUTH, RANGE 65 WEST, AND TOWNSHIP 13 SOUTH, RANGE 65 WEST.

LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAS) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

- ZONE A** No Base Flood Elevations determined.
- ZONE AE** Base Flood Elevations determined.
- ZONE AH** Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
- ZONE AO** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
- ZONE AR** Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
- ZONE A99** Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
- ZONE V** Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
- ZONE VE** Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE D Areas determined to be outside the 0.2% annual chance floodplain.

ZONE U Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- Floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- Base Flood Elevation line and value; elevation in feet* (EL 887)
- Base Flood Elevation value where uniform within zone; elevation in feet

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

- Cross section line
- Transect line
- 97° 07' 30.00" 32° 22' 30.00" Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
- 475999N 1000-meter Universal Transverse Mercator grid ticks, zone 13
- 6000000 FT 5000-foot grid ticks: Colorado State Plane coordinate system, central zone (FIPSZONE 5002), Lambert Conformal Conic Projection
- DX5510 Bench mark (see explanation in Notes to Users section of this FIRM page)
- M1.5 River Mile

MAP REPOSITORIES

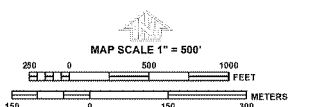
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
MARCH 17, 1997

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
DECEMBER 7, 2018 - to update corporate limits, to change Base Flood Elevations and Special Flood Hazard Areas, to update map format, to add roads and road names, and to incorporate previously issued Letters of Map Revision.

For community map revision history prior to countywide mapping, refer to the Community Map History Table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.



NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0533G

FIRM

FLOOD INSURANCE RATE MAP

EL PASO COUNTY, COLORADO AND INCORPORATED AREAS

PANEL 533 OF 1300

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:	COMMUNITY	NUMBER	PANEL	SUFFIX
	COLORADO SPRINGS CITY OF	08069	0533	0
	EL PASO COUNTY	08029	0533	0

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

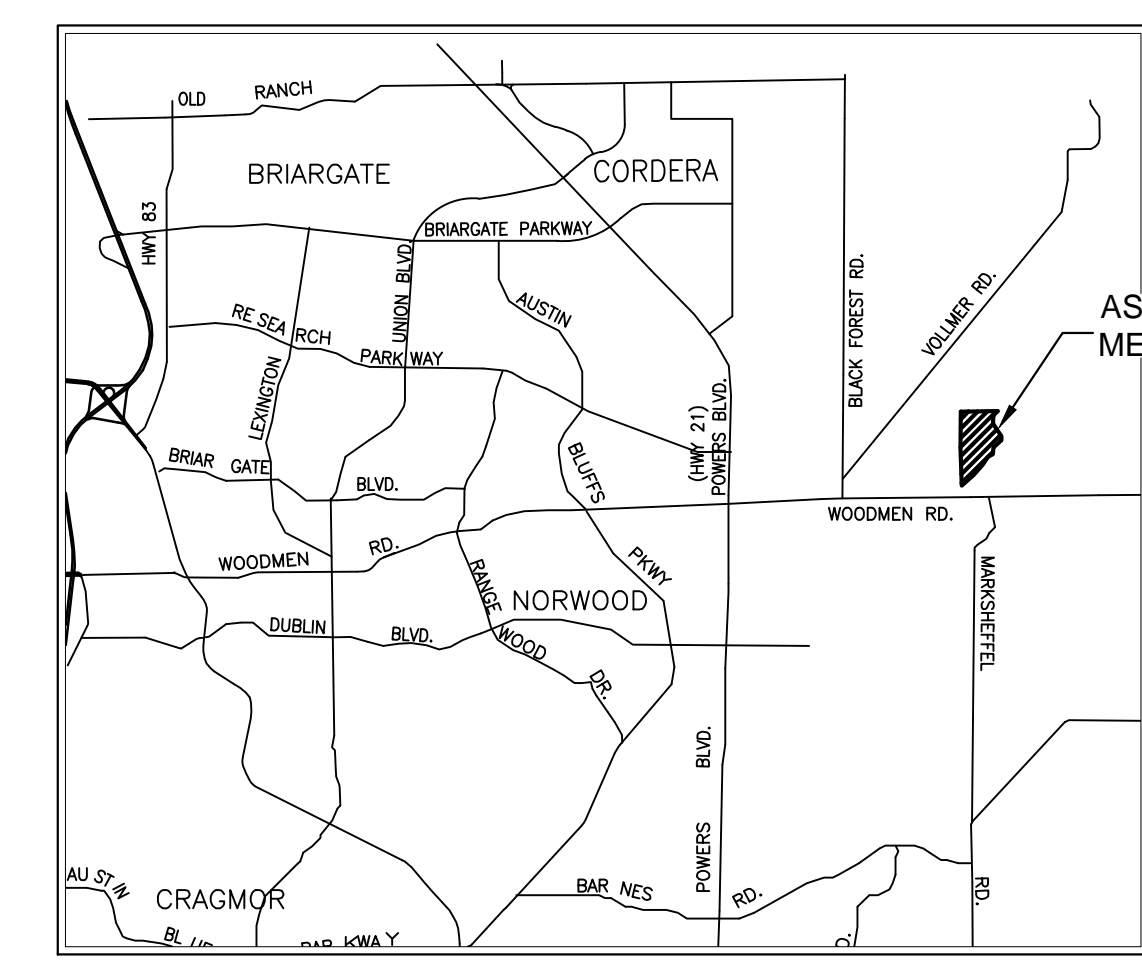
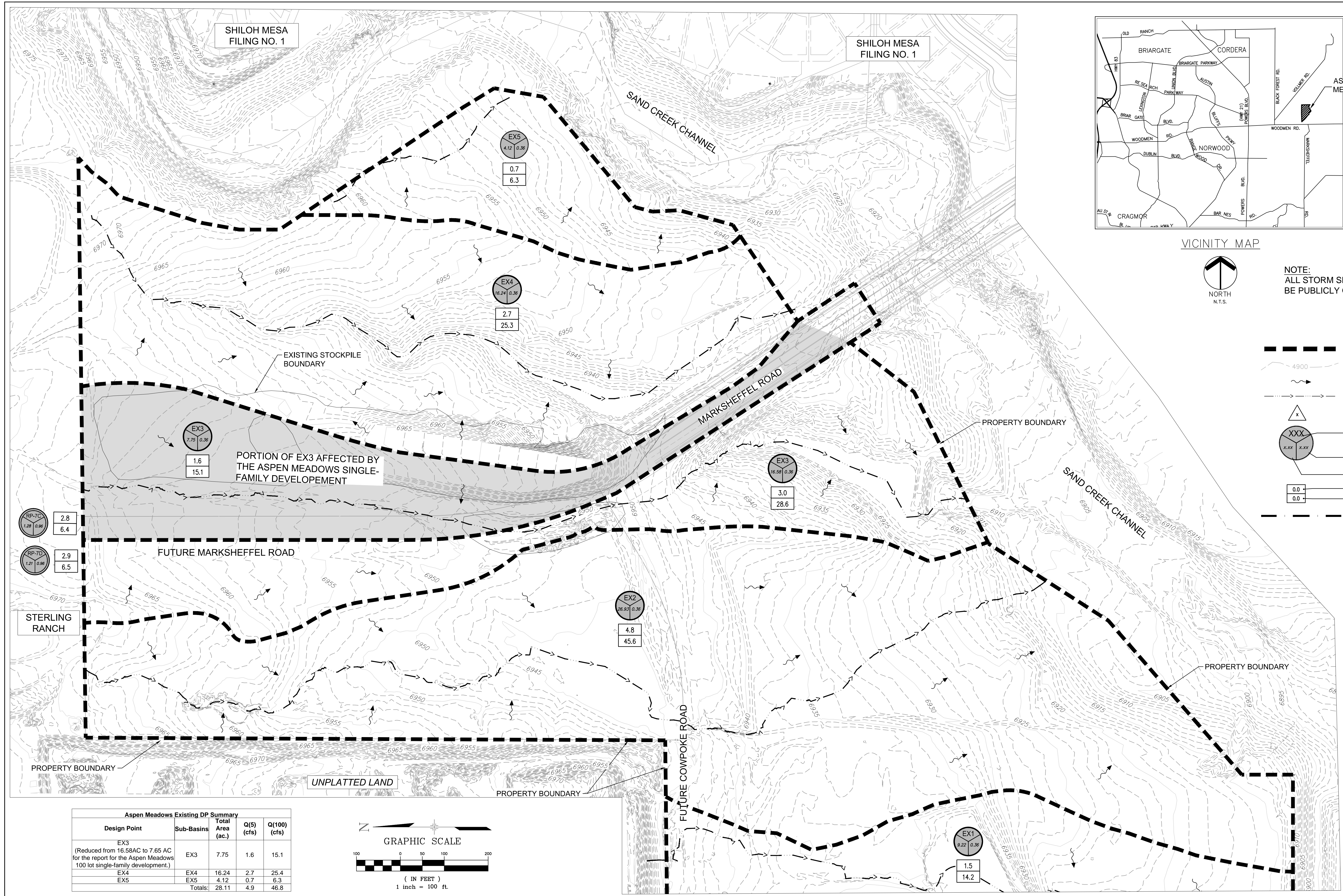
MAP NUMBER
08041C0533G

MAP REVISED
DECEMBER 7, 2018

Federal Emergency Management Agency



Know what's below.
Call before you dig.



VICINITY MAP



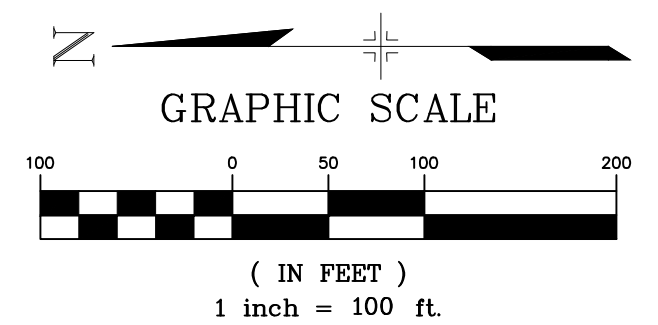
NOTE:
ALL STORM SEWER INFRASTRUCTURE TO
BE PUBLICLY OWNED AND MAINTAINED

LEGEND

- SUB-BASIN BOUNDARY
- EXISTING CONTOUR
- FLOW DIRECTION
- FLOODPLAIN WAY
- DESIGN POINT
- SUB BASIN DESIGNATION
- SUB BASIN RUNOFF COEFFICIENT
- SUB BASIN AREA (AC.)
- 5-YEAR STORM EVENT PEAK FLOW (CFS)
- 100-YEAR STORM EVENT PEAK FLOW (CFS)
- PROPERTY LINE

Aspen Meadows Existing DP Summary

Design Point	Sub-Basins	Total Area (ac.)	Q(5) (cfs)	Q(100) (cfs)
EX3 (Reduced from 16.58 AC to 7.65 AC for the report for the Aspen Meadows 100 lot single-family development.)	EX3	7.75	1.6	15.1
EX4	EX4	16.24	2.7	25.4
EX5	EX5	4.12	0.7	6.3
Totals:		28.11	4.9	46.8



REFERENCE DRAWINGS		SHEET KEY	
X-886-EX-MAP			
X-886-EX-STOCKPILE-011618			
X-MC-BASE-RES			
X-Offsite-base_Marksheffel_Rd			
X-886-PR-MAP			
X-97-011			
X-UR			
X-886-PR-Parcels			

No.	DATE	DESCRIPTION REVISIONS	BY

COMPUTER FILE MANAGEMENT

FILE NAME:
CTB FILE:
PLOT DATE:
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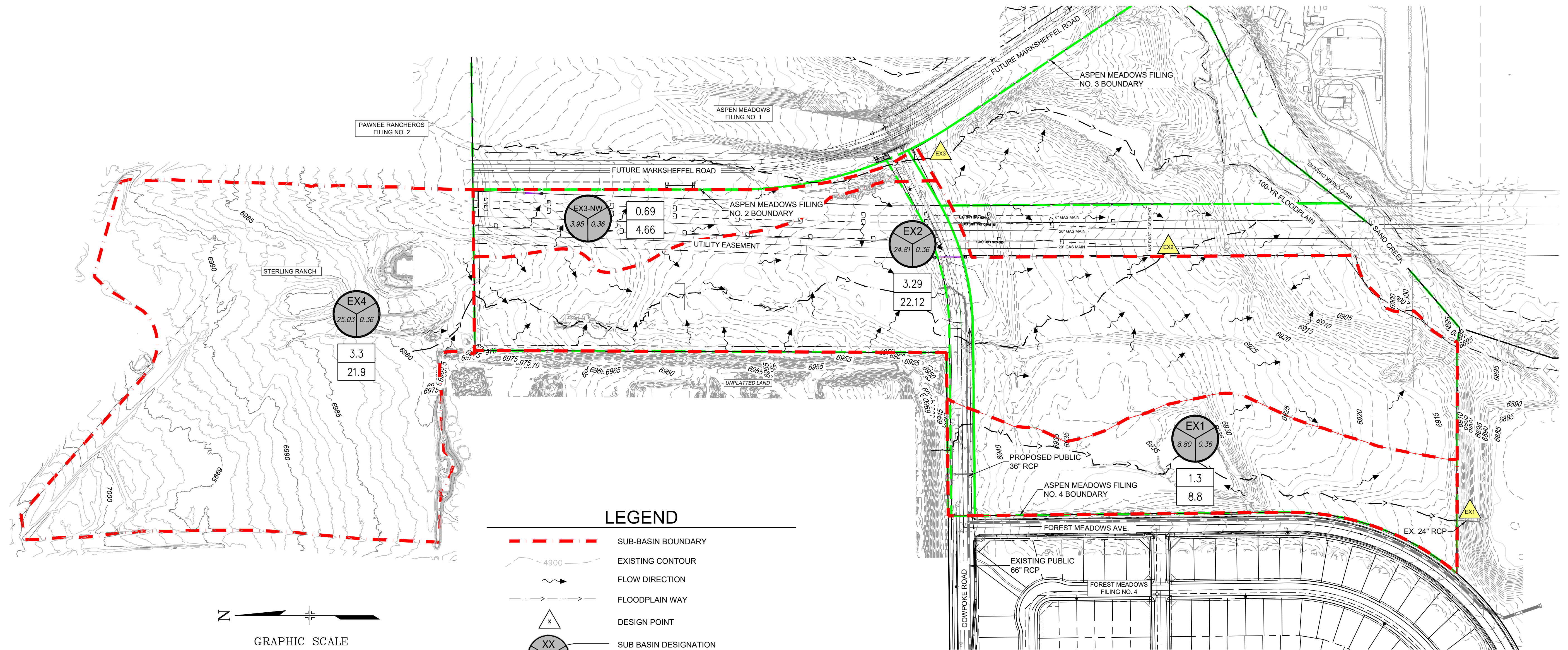


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PRELIMINARY
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BEEN APPROVED BY
GOVERNING AGENCIES AND
IS SUBJECT TO CHANGE

ASPEN MEADOWS			
EXISTING DRAINAGE MAP			
DESIGNED BY: JTB	SCALE: HORIZ. 1"=100'	DATE ISSUED: January 2019	DRAWING No. 1
CHECKED BY: JS	VERT. SHEET	1 OF 3	

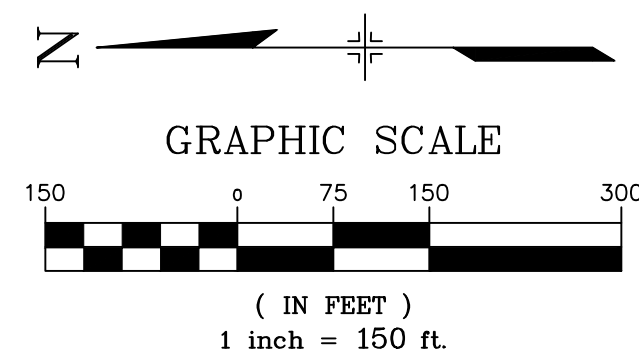


Know what's below.
Call before you dig.



LEGEND

- SUB-BASIN BOUNDARY
- EXISTING CONTOUR
- FLOW DIRECTION
- FLOODPLAIN WAY
- DESIGN POINT
- SUB BASIN DESIGNATION
- SUB BASIN RUNOFF COEFFICIENT
- SUB BASIN AREA (AC.)
- 5-YEAR STORM EVENT PEAK FLOW (CFS)
- 100-YEAR STORM EVENT PEAK FLOW (CFS)
- PROPERTY LINE



NOTE:
ALL STORM SEWER INFRASTRUCTURE TO
BE PUBLICLY OWNED AND MAINTAINED

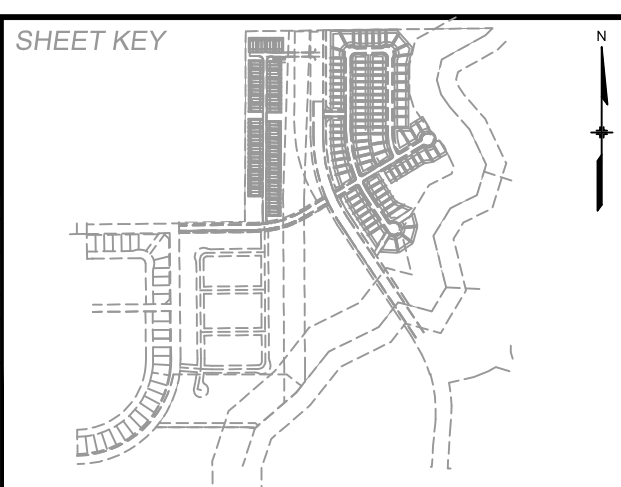
SAND CREEK SUB-BASIN SUMMARY TABLE

SUB-BASIN ID	AREA (AC.)	Q(5) (CFS)	Q(100) (CFS)
EX-1	8.80	1.31	8.77
EX-2	24.81	3.29	22.12
EX-3-NW	3.95	0.69	4.66
EX-4	23.05	3.26	21.88

SAND CREEK DESIGN POINT SURFACE FLOW SUMMARY TABLE

DESIGN POINT ID	AREA (AC.)	Q(5) (CFS)	Q(100) (CFS)	SUB-BASINS
EX1	23.05	3.87	25.98	EX-1
EX2	47.86	4.34	29.34	EX-2, EX-4
EX3	3.95	0.69	4.66	EX-3-NW

No.	DATE	DESCRIPTION	BY
REVISIONS			
COMPUTER FILE MANAGEMENT			
FILE NAME:			
CTB FILE:			
PLOT DATE:			
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PREPARED BY:
Matrix

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FOR AND ON BEHALF OF
MATRIX DESIGN GROUP, INC.
PROJECT No.

ASPEN MEADOWS FILING NO. 2 AND NO. 4

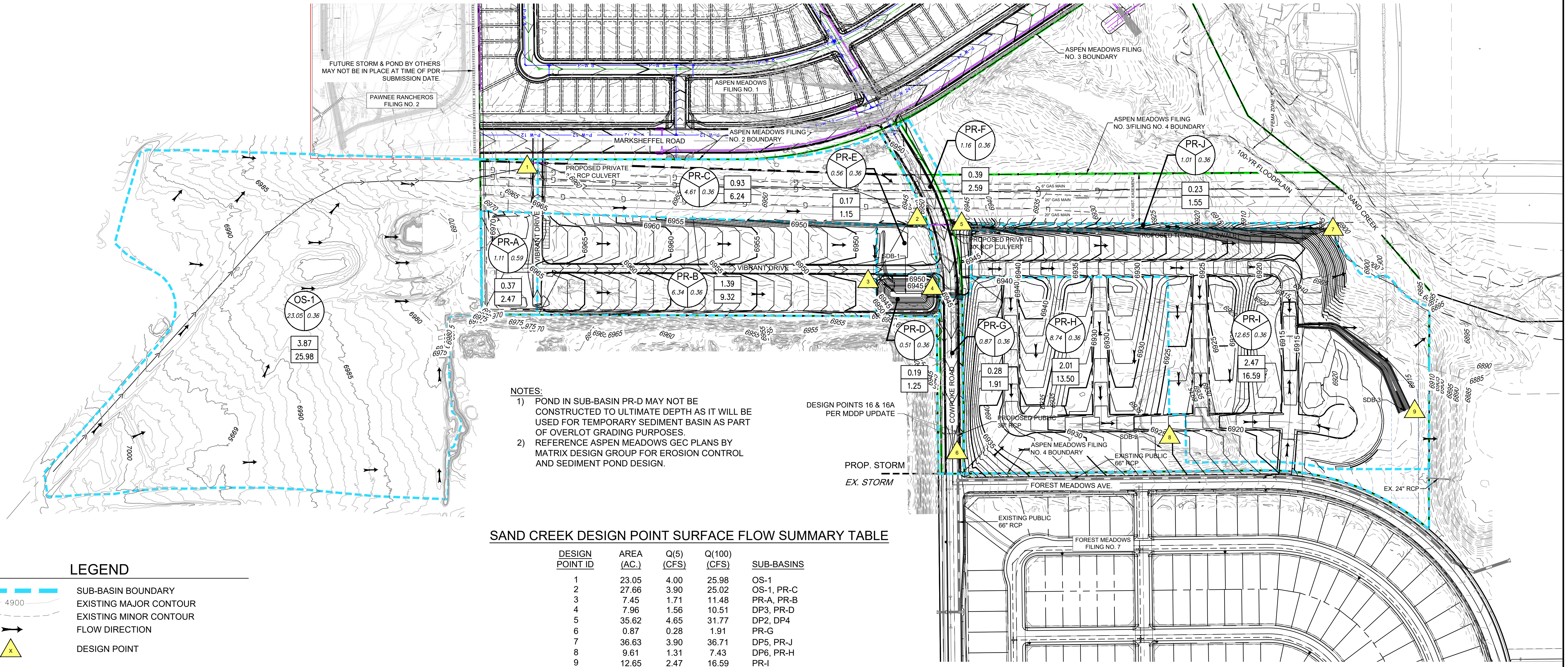
CITY OF COLORADO SPRINGS

EXISTING CONDITIONS DRAINAGE MAP

DESIGNED BY: BAS	SCALE: HORIZ 1"=150'	DATE ISSUED: JANUARY 2021	DRAWING No. DP01
DRAWN BY: BAS	VERT. N/A	SHEET 1 OF 2	
CHECKED BY: JAO			



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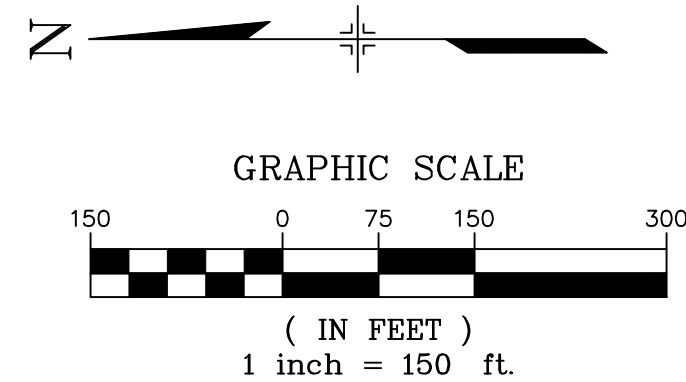
- NOTES:**
- 1) POND IN SUB-BASIN PR-D MAY NOT BE CONSTRUCTED TO ULTIMATE DEPTH AS IT WILL BE USED FOR TEMPORARY SEDIMENT BASIN AS PART OF OVERLOT GRADING PURPOSES.
 - 2) REFERENCE ASPEN MEADOWS GEC PLANS BY MATRIX DESIGN GROUP FOR EROSION CONTROL AND SEDIMENT POND DESIGN.

SAND CREEK DESIGN POINT SURFACE FLOW SUMMARY TABLE

DESIGN POINT ID	AREA (AC.)	Q(5) (CFS)	Q(100) (CFS)	SUB-BASINS
1	23.05	4.00	25.98	OS-1
2	27.66	3.90	25.02	OS-1, PR-C
3	7.45	1.71	11.48	PR-A, PR-B
4	7.96	1.56	10.51	DP3, PR-D
5	35.62	4.65	31.77	DP2, DP4
6	0.87	0.28	1.91	PR-G
7	36.63	3.90	36.71	DP5, PR-J
8	9.61	1.31	7.43	DP6, PR-H
9	12.65	2.47	16.59	PR-I

LEGEND

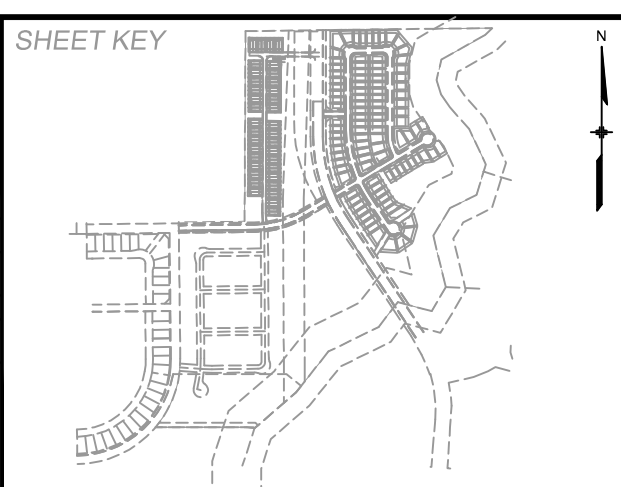
- SUB-BASIN BOUNDARY
- 4900 EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- FLOW DIRECTION
- DESIGN POINT
- SUB BASIN DESIGNATION
- SUB BASIN RUNOFF COEFFICIENT
- SUB BASIN AREA (AC.)
- 5-YEAR STORM EVENT PEAK FLOW (CFS)
- 100-YEAR STORM EVENT PEAK FLOW (CFS)
- PROPERTY LINE



No.	DATE	DESCRIPTION	BY
REVISIONS			

COMPUTER FILE MANAGEMENT

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PREPARED BY:

PRELIMINARY
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FOR AND ON BEHALF OF
MATRIX DESIGN GROUP, INC.
PROJECT No. 19.886.021

ASPEN MEADOWS FILING NO. 2 AND NO. 4			
CITY OF COLORADO SPRINGS			
OVERLOT GRADING INTERIM CONDITIONS DRAINAGE MAP			
DESIGNED BY: BAS	SCALE: HORIZ 1"=150'	DATE ISSUED: JANUARY 2021	DRAWING No. DP02
CHECKED BY: JAO	VERT. N/A	SHEET 1 OF 2	