

DRAINAGE CONFORMANCE REPORT FOR PANDA EXPRESS

PREPARED FOR

Panda Express, Inc.

Project Location:

**FALCON MARKET PLACE
FALCON, CO 80831**

**Lot 8, Falcon Marketplace
(SE Quarter, Section 1-Township 13 South - Range 65 West)**

BHC Project # 031420.02.01

July 23, 2021



Eric Byrd
Colorado PE 0057965
July 23, 2021



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Executive Summary

BHC has been retained as the Civil Engineer for the development of the Panda Express restaurant located in Falcon, Colorado. The 1.37-acre site is located northwest of the intersection of East Woodman Road and Meridian Road. The project site is located within the Falcon Marketplace Development. Appendix A contains Display A1 – Vicinity Map which shows the project location. The proposed Panda Express includes the construction of a 2,381 square foot building, associated parking, underground service utilities, storm collection system, and a drive-through pick-up window. This report documents the compliance of the proposed Panda Express restaurant with the Falcon Marketplace drainage report requirements.

1.0 Introduction

This Stormwater Management Study is prepared for the development of a Panda Express restaurant in Falcon, Colorado. The project is part the larger Falcon Marketplace Development. The purpose of this study is to demonstrate the project's compliance to the Falcon Marketplace drainage requirements. The project will result in the construction of a 2,381 square foot building, associated parking, storm collection system and underground utilities. Appendix A contains Display A2 – Site Map which shows the project site within the Falcon Marketplace Development.

1.1 Design Criteria

Final Drainage Report for Falcon Marketplace, November 4, 2019.

Prepared by:

Drexel, Barrell & Co.

3 South 7th Street

Colorado Springs, CO 80905

Also Referenced:

Drainage Conformance Letter, June 15, 2021, for Slim Chicken's

Prepared by:

Point Consulting, LLC

2.0 Existing Conditions

2.1 Project Site

The Panda Express will be constructed on Lot 8 of the Falcon Marketplace Development. Lot 8 is currently undeveloped. The road to the north, Falcon Market Place is constructed, and to the west on Lot 9 is a proposed Slim Chicken's restaurant. Lot 7 to the east is currently

undeveloped. The south part of Lot 8 is occupied by water Quality Pond #2. All necessary infrastructure (roads, storm collection system, detention, water quality facilities, etc.) is already provided within the Falcon Marketplace Development. The soils report for the site is included in Appendix C and indicate the on-site soils belong to the Class A hydrologic soil group.

2.2 Hydrology

Lot 8 is within watershed B19 of the Falcon Marketplace Development. Appendix D contains Display D1 showing watershed B19 with Lot 8 highlighted (red). Appendix D contains Display D2 which are hydrology summaries for B19 from the Falcon Marketplace Drainage Report. As may be noted from this information, the part of Lot 8 north of Water Quality Pond #2 is intended to direct its runoff into an east-west 24-inch RCP located just north of Water Quality Pond #2. Watershed B19 is 2.57-acres and is intended to have a composite Rational Runoff Coefficient of 0.85 in the 100-year and 0.77 in the 5-year event. B19 has a 100-yr discharge of 18.8-cfs, and a 5-year discharge of 10.1-cfs. Runoff from B19 (and Lot 8) drains into Water Quality Pond #2.

3.0 Proposed Condition

3.1 Project Site

The proposed development will include the construction of the Panda Express restaurant, parking lot and storm collection system. The proposed storm collection system will connect into the east-west 24-inch RCP in accordance with the Falcon Marketplace Development Drainage Report. Appendix A contains Display A3 showing the proposed watersheds and site development.

3.2 Hydrology

Hydrology parameters for the proposed watersheds is provided in Display B1 in Appendix B. For that part of Lot 8 north of Water Quality Pond #2, the overall impervious area will be 82% which is less than the 90% weighted average for watershed B19. Thus, the proposed Panda Express will comply with the impervious area requirements of the Falcon Marketplace Development.

Peak discharge calculations are also included for the proposed watersheds. Display B3 in Appendix B contains the rational method hydrology calculations for the proposed watersheds. These calculations utilize the NOAA Atlas Rainfall for the area shown in Display B2. The peak discharge calculations indicate:

- The composite weighted average rational curve numbers for the Panda Express are 0.69 for a 5-year event and 0.75 for a 100-year event – both of which are less than the 0.77 for 5-year and 0.85 for 100-year allowed by the Falcon Marketplace Development.

- The total peak runoff from the Panda Express is 2.65-cfs for the 5-year event and 5.98-cfs in the 100-year event. These peak discharges are less than the 5-year 3.71-cfs and 100-year 6.90-cfs allowed by the Falcon Marketplace Development for Lot 8 proportioned by area ($0.944\text{-ac}/2.57\text{-ac} = 0.367$ or 36.7% of B19 area and peak flows).

4.0 Conclusion

The proposed development on Lot 8 will comply with the Falcon Marketplace drainage report requirements. Percent impervious area, the composite weighted runoff curve numbers, and peak flow rates are all within the hydrology limits required by the Falcon Marketplace Drainage Report for Watershed B19. Therefore, the Panda Express development on Lot 8 is in conformance with approved drainage criteria.

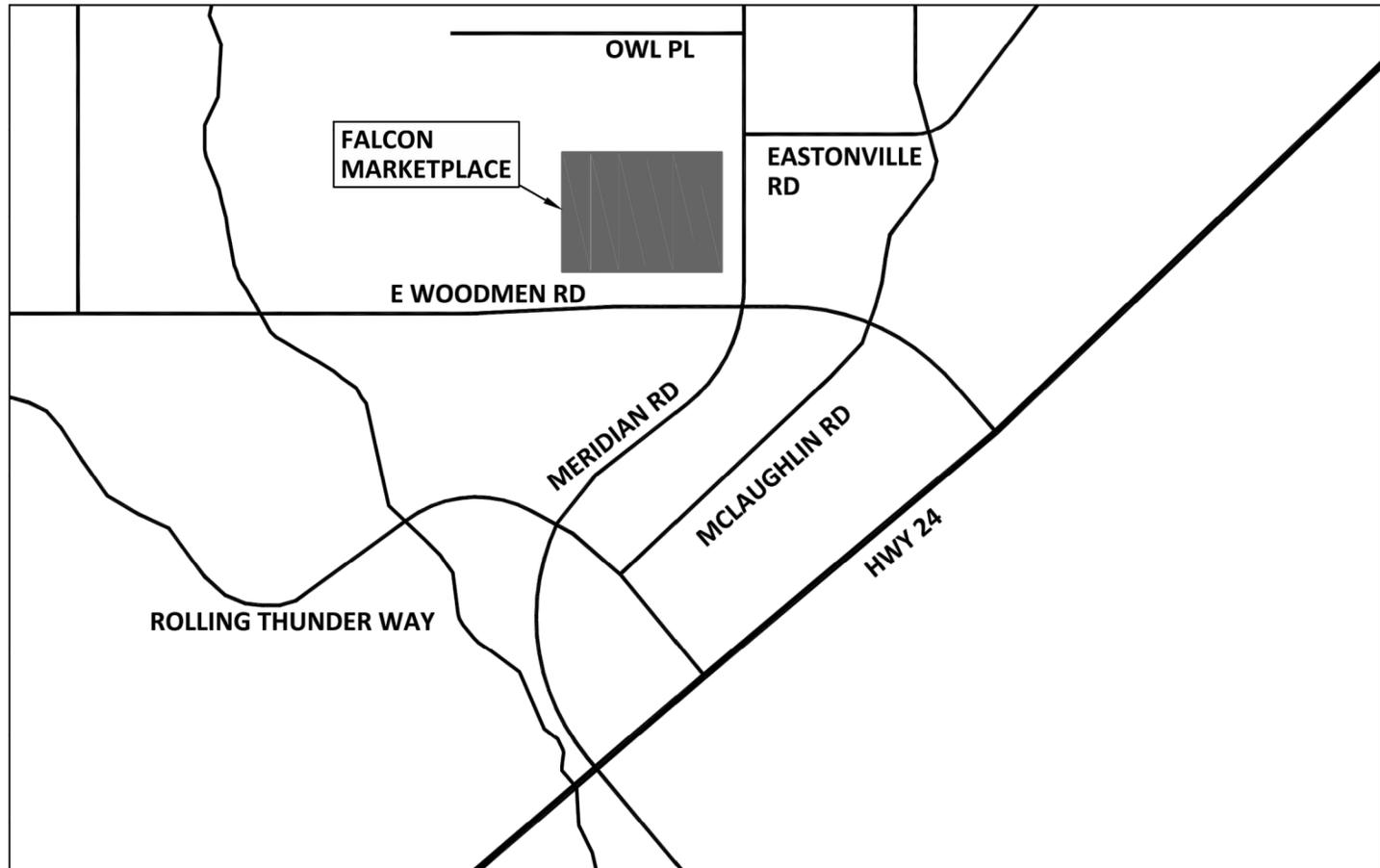
Appendix A – Reference Documents

A1 – Vicinity Map

A2 – Site Map

A3 – Proposed Watersheds Map

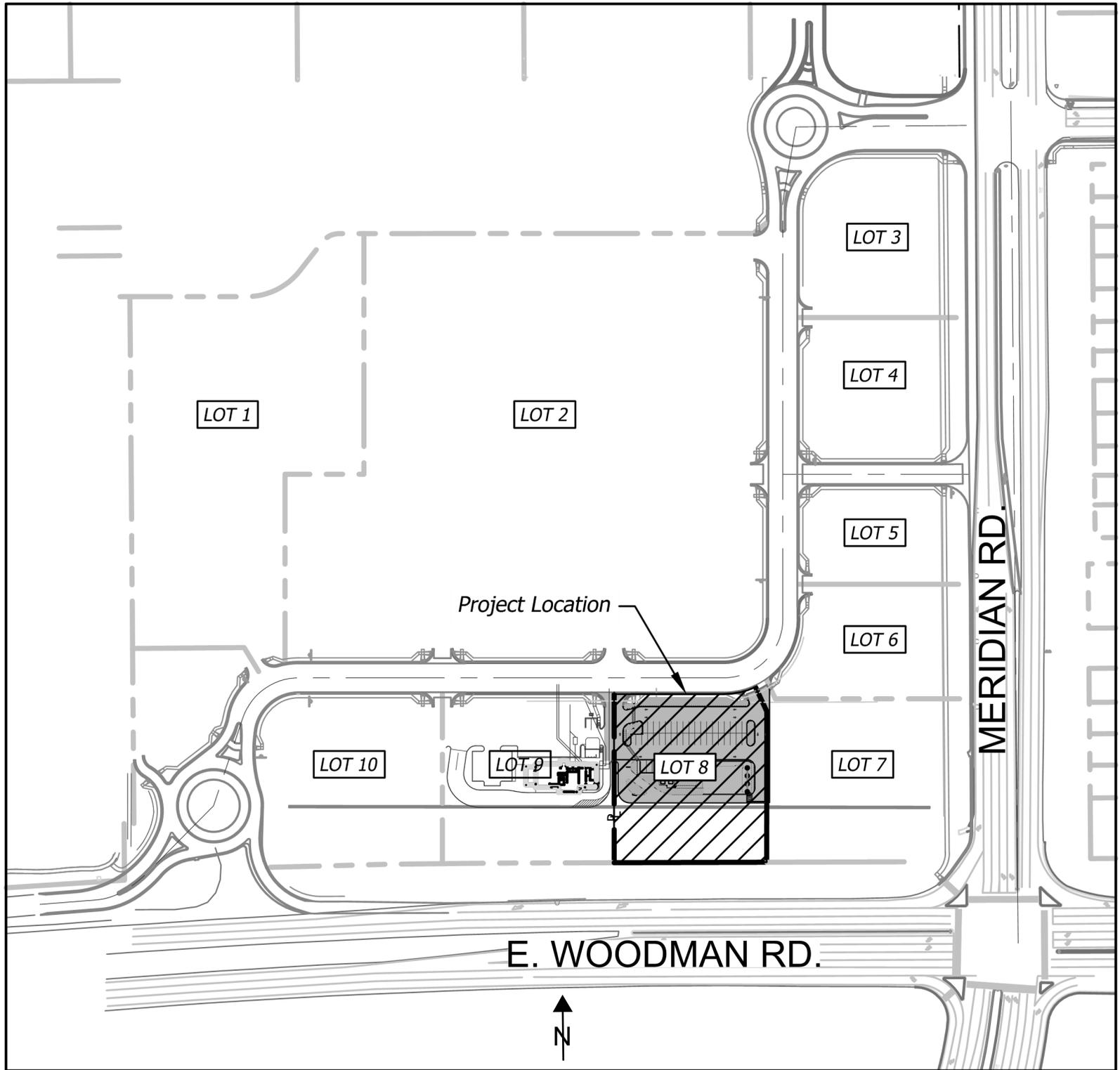
Display A1 - Vicinity Map



VICINITY MAP

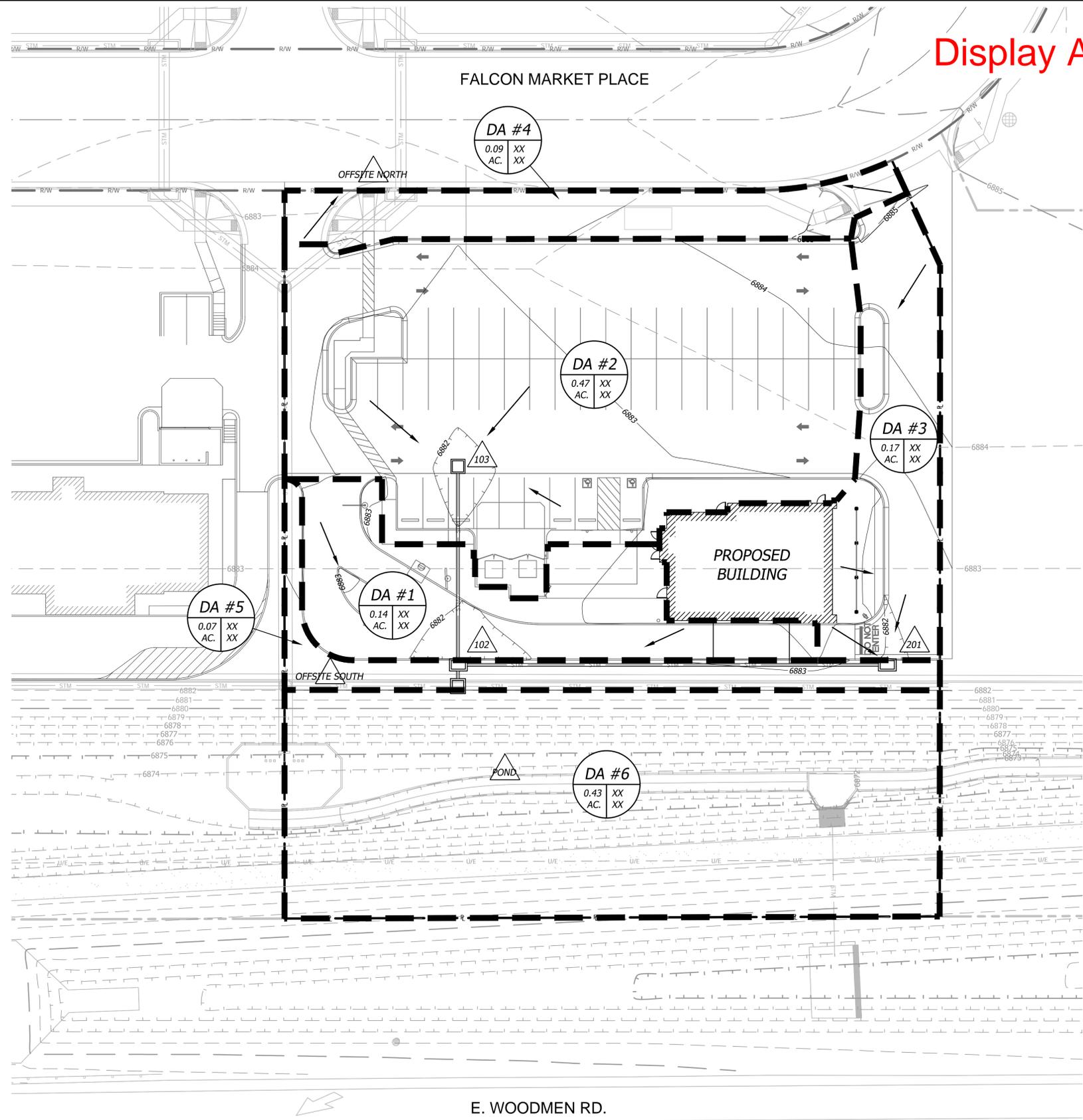
NOT TO SCALE

Display A2 - Site Map

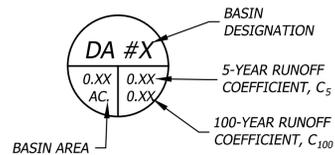


SITE MAP
1"=200'

Display A3 - Proposed Watersheds Map

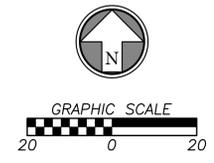


SUMMARY RUNOFF TABLE



DRAINAGE LEGEND

	DRAINAGE AREA BOUNDARY
	DESIGN POINT DESIGNATION
	DRAINAGE DIRECTION
	PROPOSED FINISH GRADE MAJOR CONTOUR
	PROPOSED FINISH GRADE MINOR CONTOUR
	EXISTING GRADE MAJOR CONTOUR
	EXISTING GRADE MINOR CONTOUR
	PROPOSED STORM SEWER LINE
	PROPOSED ROOF LINE DRAIN
	PROPERTY LINE
	RIGHT-OF-WAY LINE



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REVISIONS:

ISSUE DATE:

1ST PERMIT/BID SET 07-15-2021

DRAWN BY: JA

PANDA PROJECT #: S8-22-D8137
PANDA STORE #: -
ARCH PROJECT #: 20044.016



PANDA EXPRESS
TRUE WARM & WELCOME
E WOODMEN RD & MERIDIAN RD, LOT 8
FALCON, CO 80831

DRAINAGE MAP

C5.0

PERMIT/BID SET 07-15-2021

Appendix B – Hydrology Calculations

B1 – Table 1: Proposed Watersheds Summary

B2 – NOAA Atlas 14 Rainfall Rates

B3 – Rational Method Hydrology

Display B1 - Table 1: Proposed Watersheds Summary

Table 1: Proposed Watersheds Summary (all Class A soils)

Watershed	Total Area (sq.ft)	Previous Area (sq.ft)	Impervious Area (sq.ft)	Percent Impervious (%)	Total Area (acres)
DA 1	6,180.22	1,832.52	4,347.70	70	0.142
DA 2	20,558.57	304.35	20,254.22	99	0.472
DA 3	7,619.25	387.35	7,231.90	95	0.175
DA 4	3,835.65	1,997.07	1,838.58	48	0.088
DA 5	2,925.42	2,853.42	72.00	2	0.067
Totals:	41,119.11	7,374.71	33,744.40	82	0.944



POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Deborah Martin, Sandra Pavlovic, Ishani Roy, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Michael Yekta, Geoffery Bonnin

NOAA, National Weather Service, Silver Spring, Maryland

[PF_tabular](#) | [PF_graphical](#) | [Maps & aeriels](#)

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.238 (0.193-0.295)	0.289 (0.234-0.360)	0.379 (0.306-0.473)	0.458 (0.368-0.574)	0.574 (0.447-0.751)	0.669 (0.508-0.885)	0.769 (0.563-1.04)	0.875 (0.614-1.22)	1.02 (0.689-1.46)	1.14 (0.746-1.65)
10-min	0.348 (0.282-0.432)	0.424 (0.343-0.527)	0.555 (0.448-0.692)	0.671 (0.538-0.840)	0.841 (0.655-1.10)	0.980 (0.744-1.30)	1.13 (0.824-1.53)	1.28 (0.898-1.78)	1.50 (1.01-2.14)	1.67 (1.09-2.41)
15-min	0.424 (0.344-0.527)	0.517 (0.418-0.643)	0.677 (0.546-0.844)	0.818 (0.656-1.02)	1.02 (0.799-1.34)	1.20 (0.907-1.58)	1.37 (1.00-1.86)	1.56 (1.10-2.17)	1.83 (1.23-2.61)	2.04 (1.33-2.94)
30-min	0.613 (0.497-0.762)	0.746 (0.605-0.928)	0.976 (0.788-1.22)	1.18 (0.946-1.48)	1.48 (1.15-1.93)	1.72 (1.31-2.27)	1.98 (1.45-2.67)	2.25 (1.57-3.12)	2.62 (1.77-3.75)	2.93 (1.91-4.22)
60-min	0.792 (0.642-0.984)	0.946 (0.766-1.18)	1.22 (0.988-1.53)	1.48 (1.19-1.85)	1.87 (1.46-2.46)	2.19 (1.67-2.91)	2.54 (1.87-3.46)	2.92 (2.05-4.08)	3.46 (2.34-4.96)	3.90 (2.55-5.63)
2-hr	0.970 (0.793-1.20)	1.15 (0.936-1.41)	1.47 (1.20-1.82)	1.78 (1.44-2.21)	2.26 (1.79-2.96)	2.66 (2.05-3.53)	3.11 (2.30-4.21)	3.60 (2.55-5.00)	4.30 (2.93-6.14)	4.88 (3.22-6.99)
3-hr	1.07 (0.875-1.31)	1.24 (1.02-1.53)	1.58 (1.29-1.95)	1.91 (1.55-2.37)	2.44 (1.95-3.21)	2.90 (2.25-3.84)	3.42 (2.55-4.62)	3.98 (2.85-5.53)	4.82 (3.30-6.85)	5.50 (3.64-7.85)
6-hr	1.24 (1.02-1.50)	1.42 (1.18-1.74)	1.80 (1.48-2.20)	2.17 (1.78-2.67)	2.79 (2.25-3.65)	3.33 (2.61-4.39)	3.94 (2.97-5.31)	4.63 (3.34-6.40)	5.64 (3.90-7.99)	6.48 (4.32-9.19)
12-hr	1.42 (1.18-1.71)	1.65 (1.37-1.99)	2.08 (1.73-2.53)	2.52 (2.08-3.06)	3.21 (2.61-4.15)	3.82 (3.01-4.98)	4.50 (3.41-6.00)	5.25 (3.82-7.20)	6.36 (4.43-8.94)	7.28 (4.90-10.3)
24-hr	1.63 (1.37-1.95)	1.91 (1.61-2.29)	2.44 (2.04-2.93)	2.93 (2.44-3.54)	3.69 (3.01-4.71)	4.35 (3.44-5.60)	5.07 (3.87-6.69)	5.85 (4.28-7.93)	6.99 (4.90-9.72)	7.92 (5.37-11.1)
2-day	1.88 (1.60-2.24)	2.23 (1.89-2.65)	2.84 (2.40-3.39)	3.40 (2.85-4.07)	4.23 (3.46-5.32)	4.93 (3.92-6.27)	5.67 (4.35-7.40)	6.48 (4.76-8.68)	7.62 (5.38-10.5)	8.54 (5.84-11.9)
3-day	2.07 (1.76-2.45)	2.44 (2.08-2.89)	3.10 (2.63-3.68)	3.69 (3.11-4.40)	4.57 (3.75-5.72)	5.31 (4.24-6.71)	6.08 (4.69-7.89)	6.92 (5.11-9.23)	8.10 (5.75-11.1)	9.05 (6.23-12.5)
4-day	2.23 (1.91-2.63)	2.62 (2.24-3.09)	3.30 (2.81-3.90)	3.91 (3.31-4.65)	4.83 (3.97-6.01)	5.59 (4.48-7.04)	6.39 (4.94-8.26)	7.26 (5.38-9.65)	8.48 (6.04-11.6)	9.47 (6.53-13.1)
7-day	2.64 (2.27-3.09)	3.05 (2.62-3.58)	3.78 (3.24-4.44)	4.43 (3.77-5.23)	5.40 (4.48-6.68)	6.21 (5.01-7.78)	7.07 (5.51-9.08)	8.00 (5.97-10.6)	9.30 (6.67-12.6)	10.4 (7.19-14.2)
10-day	3.00 (2.59-3.50)	3.45 (2.98-4.02)	4.23 (3.64-4.95)	4.93 (4.22-5.80)	5.96 (4.96-7.33)	6.82 (5.52-8.48)	7.72 (6.03-9.86)	8.69 (6.51-11.4)	10.0 (7.22-13.6)	11.1 (7.77-15.2)
20-day	4.02 (3.50-4.64)	4.62 (4.02-5.35)	5.64 (4.89-6.55)	6.52 (5.62-7.60)	7.76 (6.48-9.39)	8.75 (7.13-10.7)	9.77 (7.68-12.3)	10.8 (8.16-14.1)	12.3 (8.89-16.4)	13.4 (9.45-18.2)
30-day	4.84 (4.24-5.57)	5.58 (4.88-6.43)	6.80 (5.93-7.85)	7.82 (6.77-9.07)	9.23 (7.72-11.1)	10.3 (8.43-12.6)	11.4 (9.01-14.3)	12.5 (9.48-16.2)	14.0 (10.2-18.6)	15.2 (10.7-20.5)
45-day	5.87 (5.16-6.71)	6.77 (5.94-7.75)	8.21 (7.19-9.43)	9.39 (8.17-10.8)	11.0 (9.20-13.0)	12.2 (9.97-14.7)	13.3 (10.6-16.6)	14.5 (11.0-18.6)	16.0 (11.7-21.1)	17.1 (12.2-23.1)
60-day	6.73 (5.94-7.67)	7.75 (6.83-8.84)	9.36 (8.22-10.7)	10.6 (9.30-12.2)	12.4 (10.4-14.6)	13.6 (11.2-16.4)	14.8 (11.8-18.3)	16.0 (12.2-20.4)	17.5 (12.8-23.0)	18.6 (13.3-25.0)

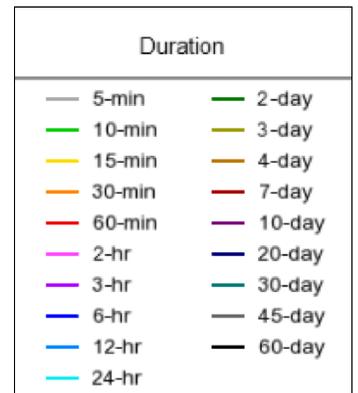
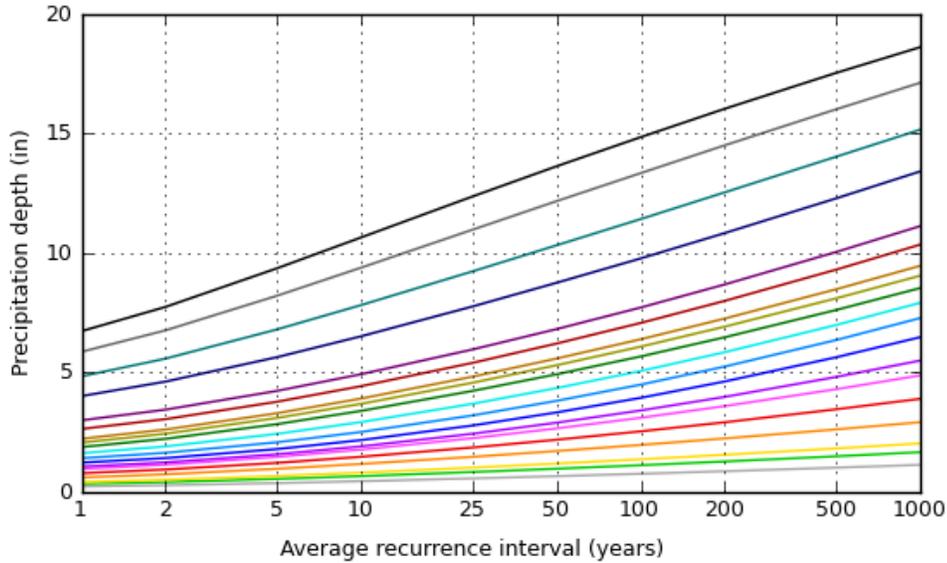
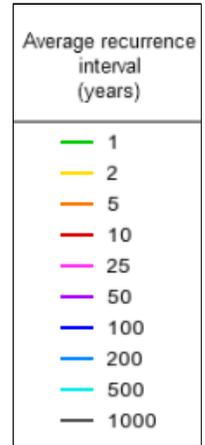
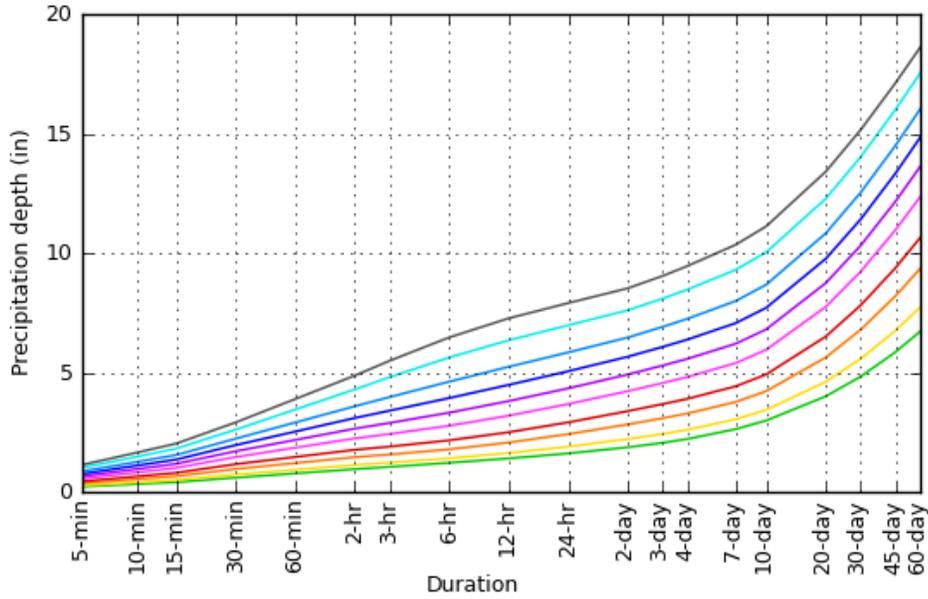
¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS). Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values. Please refer to NOAA Atlas 14 document for more information.

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PF graphical

Display B2 - NOAA Atlas 14 Rainfall Rates

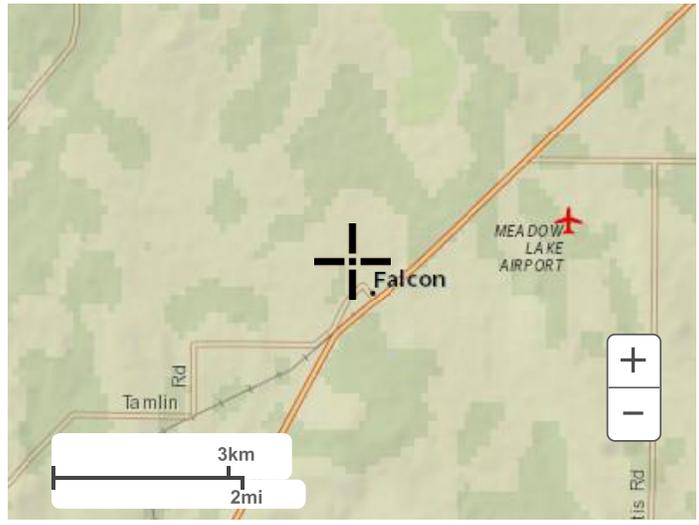
PDS-based depth-duration-frequency (DDF) curves
 Latitude: 38.9393°, Longitude: -104.6130°



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Maps & aerials

Small scale terrain



Large scale terrain



Large scale map



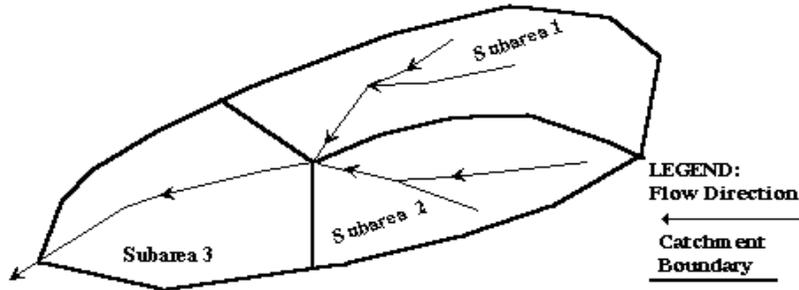
Large scale aerial

Display B3 - Rational Hydrology (1 of 2)

Area-Weighted Runoff Coefficient Calculations

Version 2.00 released May 2017

Designer: WRB
Company: BHC
Date: 7/22/2021
Project: Falcon CO Panda Express
Location: Lot 8 Falcon Market Place



Subcatchment Name
Lot 8

Cells of this color are for required user-input
Cells of this color are for optional override values
Cells of this color are for calculated results based on overrides

See sheet "Design Info" for imperviousness-based runoff coefficient values.

Sub-Area ID	Area (ac)	NRCS Hydrologic Soil Group	Percent Imperviousness	Runoff Coefficient, C						
				2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr
DA 1	0.14	A	70.0	0.53	0.55	0.56	0.59	0.62	0.66	0.71
DA 2	0.47	A	99.0	0.83	0.85	0.86	0.87	0.87	0.88	0.89
DA 3	0.18	A	95.0	0.79	0.81	0.82	0.83	0.84	0.85	0.87
DA 4	0.09	A	48.0	0.32	0.34	0.35	0.39	0.43	0.48	0.56
DA 5	0.07	A	2.0	0.01	0.01	0.01	0.01	0.04	0.13	0.27
Total Area (ac)	0.94			0.67	0.69	0.70	0.72	0.73	0.75	0.78
		Area-Weighted C		0.67	0.69	0.70	0.72	0.73	0.75	0.78
		Area-Weighted Override C		0.67	0.69	0.70	0.72	0.73	0.75	0.78

Display B3 - Rational Method Hydrology (2 of 2)

Calculation of Peak Runoff using Rational Method

Designer: WRB
 Company: BHC
 Date: 7/22/2021
 Project: Falcon CO Panda Express
 Location: Lot 8 Falcon Market Place

Version 2.00 released May 2017

Cells of this color are for required user-input
 Cells of this color are for optional override values
 Cells of this color are for calculated results based on overrides

$$t_i = \frac{0.395(1.1 - C_s)\sqrt{L_i}}{S_i^{0.33}}$$

$$t_i = \frac{L_i}{60K\sqrt{S_i}} = \frac{L_i}{60V_i}$$

Computed $t_c = t_1 + t_t$

Regional $t_c = (26 - 17i) + \frac{L_t}{60(14i + 9)\sqrt{S_i}}$

$t_{\text{minimum}} = 5$ (urban)
 $t_{\text{minimum}} = 10$ (non-urban)

Selected $t_c = \max\{t_{\text{minimum}}, \min(\text{Computed } t_c, \text{Regional } t_c)\}$

Select UDFCD location for NOAA Atlas 14 Rainfall Depths from the pulldown list OR enter your own depths obtained from the NOAA website (click this link)

1-hour rainfall depth, P1 (in) =	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr
	0.95	1.22	1.48	1.87	2.19	2.54	3.46

Rainfall Intensity Equation Coefficients =

a	b	c
28.50	10.00	0.786

$$I(\text{in/hr}) = \frac{a * P_1^b}{(b + t_c)^c}$$

$Q(\text{cfs}) = CIA$

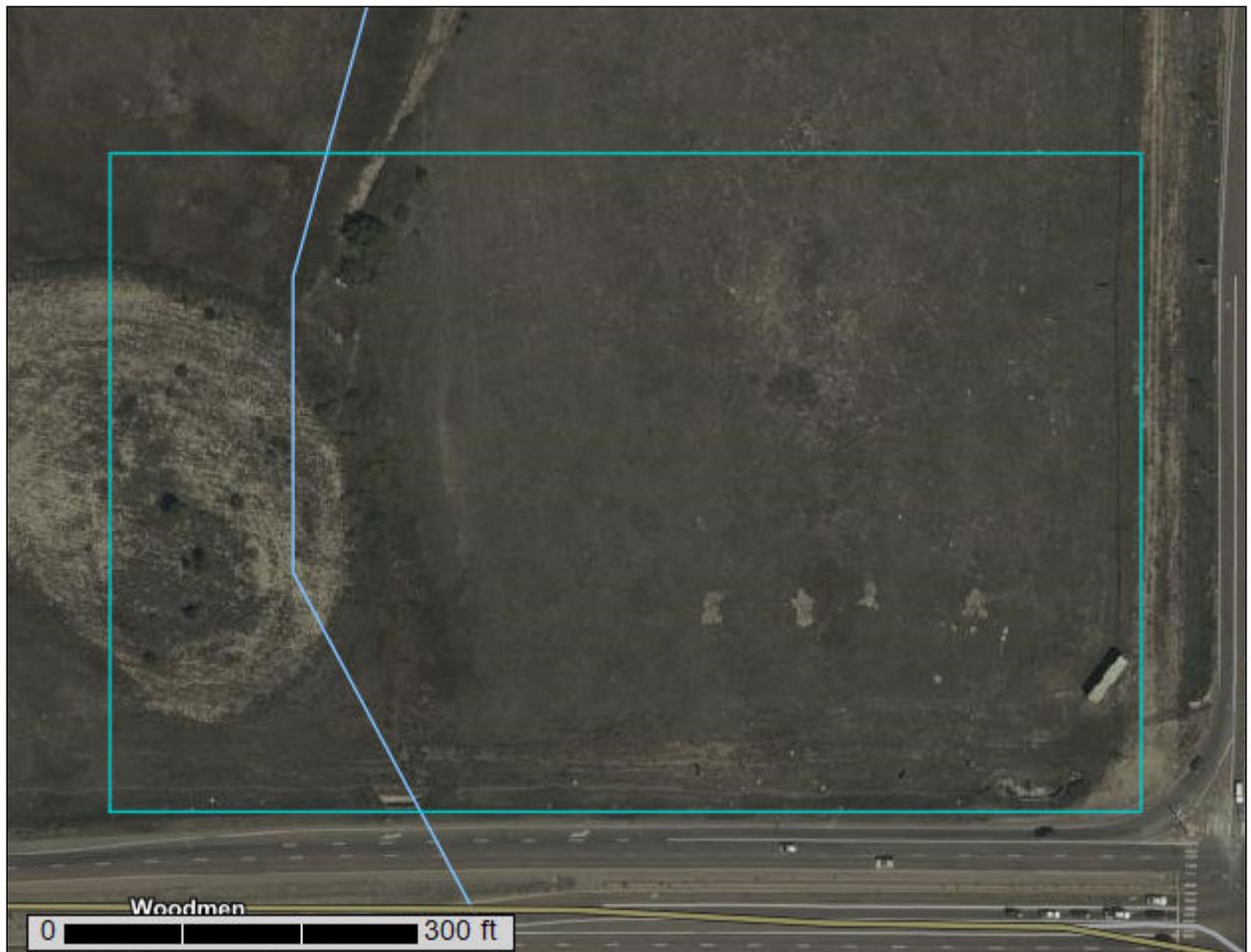
Subcatchment Name	Area (ac)	NRCS Hydrologic Soil Group	Percent Imperviousness	Runoff Coefficient, C							Overland (Initial) Flow Time				Channelized (Travel) Flow Time					Time of Concentration			Rainfall Intensity, I (in/hr)							Peak Flow, Q (cfs)									
				2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr	Overland Flow Length L _i (ft)	U/S Elevation (ft) (Optional)	D/S Elevation (ft) (Optional)	Overland Flow Slope S _i (ft/ft)	Overland Flow Time t _i (min)	Channelized Flow Length L _i (ft)	U/S Elevation (ft) (Optional)	D/S Elevation (ft) (Optional)	Channelized Flow Slope S _i (ft/ft)	NRCS Conveyance Factor K	Channelized Flow Velocity V _i (ft/sec)	Channelized Flow Time t _i (min)	Computed t _c (min)	Regional t _c (min)	Selected t _c (min)	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr
DA 1	0.14	A	70.0	0.53	0.55	0.56	0.59	0.62	0.66	0.71	49.00	6883.18	6882.68	0.010	6.95	37.00	6882.18	6881.50	0.018	20	2.71	0.23	7.18	14.34	7.18	2.90	3.72	4.51	5.70	6.68	7.74	10.55	0.22	0.29	0.36	0.48	0.59	0.72	1.06
DA 2	0.47	A	99.0	0.83	0.85	0.86	0.87	0.87	0.88	0.89	24.00	6882.97	6882.79	0.008	2.43	45.00	6882.29	6881.79	0.011	20	2.11	0.36	2.79	9.48	5.00	3.22	4.14	5.02	6.34	7.43	8.62	11.74	1.26	1.66	2.04	2.62	3.05	3.58	4.94
DA 3	0.18	A	95.0	0.79	0.81	0.82	0.83	0.84	0.85	0.87	35.00	6884.29	6883.57	0.021	2.47	89.00	6883.07	6882.16	0.010	20	2.02	0.73	3.20	10.51	5.00	3.22	4.14	5.02	6.34	7.43	8.62	11.74	0.44	0.58	0.72	0.93	1.09	1.28	1.78
DA 4	0.09	A	48.0	0.32	0.34	0.35	0.39	0.43	0.48	0.56	24.00	6885.00	6884.50	0.021	5.29	117.00	6884.00	6882.50	0.013	20	2.26	0.86	6.15	18.94	6.15	3.04	3.90	4.74	5.98	7.01	8.13	11.07	0.09	0.12	0.15	0.20	0.27	0.35	0.55
DA 5	0.07	A	2.0	0.01	0.01	0.01	0.01	0.04	0.13	0.27	77.00	6883.84	6882.50	0.017	14.44	0.10	6882.40	6882.00	4.000	20	40.00	0.00	14.44	25.66	14.44	2.20	2.82	3.42	4.32	5.06	5.87	8.00	0.00	0.00	0.00	0.01	0.05	0.14	
																							Total: 2.65							Total: 5.98									

Appendix C – USDA NRCS Soils Report

C1 – Soils Report

Custom Soil Resource Report for El Paso County Area, Colorado

Display C1 - Soils Report



Custom Soil Resource Report Soil Map



Map Scale: 1:1,460 if printed on A landscape (11" x 8.5") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge ticks: UTM Zone 13N WGS84



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: Sep 11, 2018—Oct 20, 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
9	Blakeland-Fluvaquentic Haplaquolls	8.0	71.4%
19	Columbine gravelly sandy loam, 0 to 3 percent slopes	3.2	28.6%
Totals for Area of Interest		11.2	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however,

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
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 content: 5 percent
Available water capacity: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: R049XB210CO - Sandy Foothill
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
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
Maximum salinity: 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

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

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 capacity: Very low (about 2.5 inches)

Interpretive groups

Land capability classification (irrigated): 4e

Land capability classification (nonirrigated): 6e

Hydrologic Soil Group: A

Ecological site: R049XB215CO - Gravelly Foothill

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

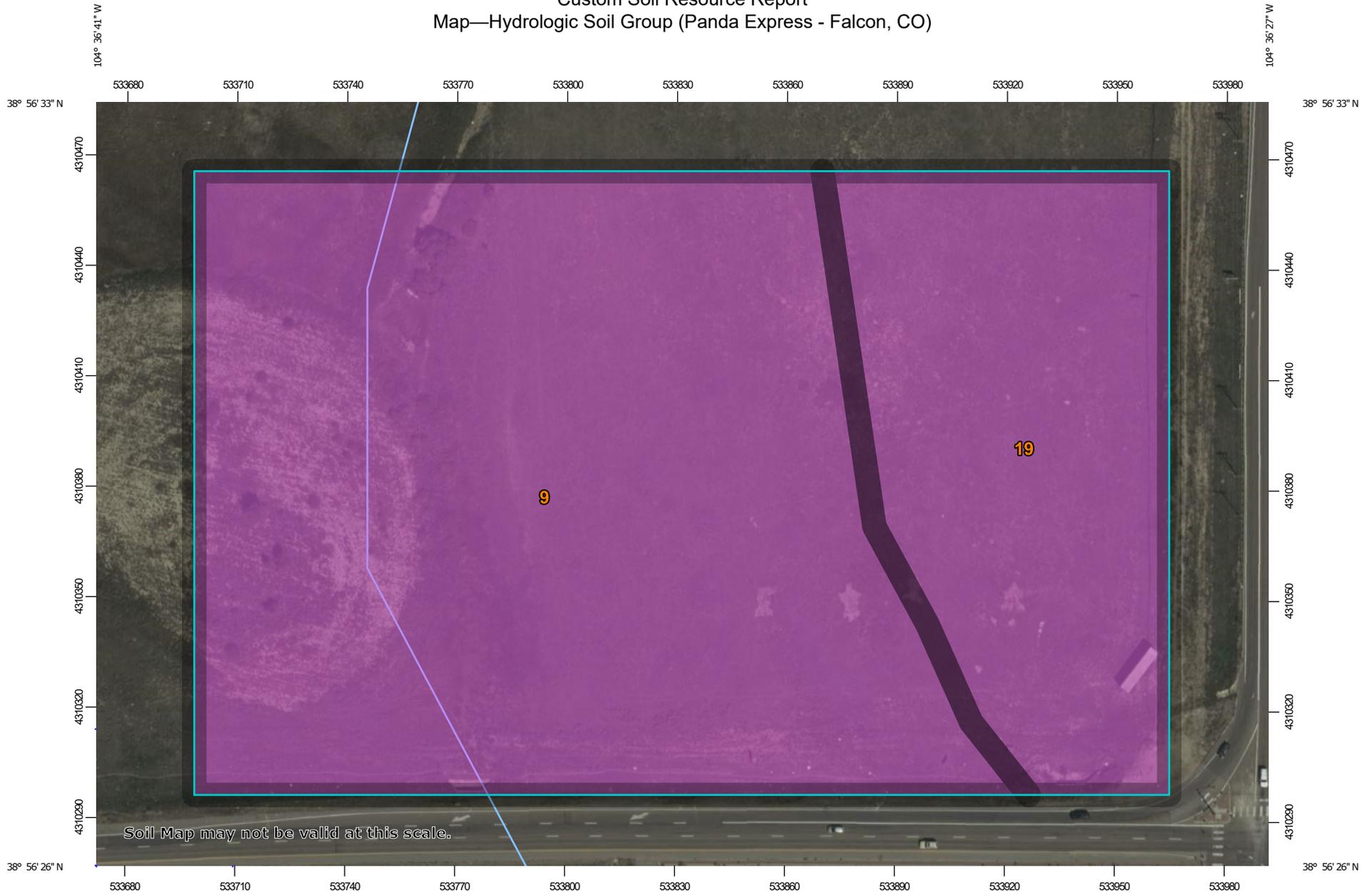
Fluvaquentic haplaquolls

Percent of map unit: 1 percent

Landform: Swales

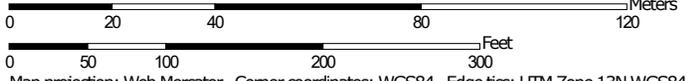
Hydric soil rating: Yes

Custom Soil Resource Report
Map—Hydrologic Soil Group (Panda Express - Falcon, CO)



Soil Map may not be valid at this scale.

Map Scale: 1:1,460 if printed on A landscape (11" x 8.5") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84



MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

Soil Rating Polygons

-  A
-  A/D
-  B
-  B/D
-  C
-  C/D
-  D
-  Not rated or not available

Soil Rating Lines

-  A
-  A/D
-  B
-  B/D
-  C
-  C/D
-  D
-  Not rated or not available

Soil Rating Points

-  A
-  A/D
-  B
-  B/D

-  C
-  C/D
-  D
-  Not rated or not available

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.

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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: Sep 11, 2018—Oct 20, 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.

Table—Hydrologic Soil Group (Panda Express - Falcon, CO)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
9	Blakeland-Fluvaquentic Haplaquolls	A	8.0	71.4%
19	Columbine gravelly sandy loam, 0 to 3 percent slopes	A	3.2	28.6%
Totals for Area of Interest			11.2	100.0%

Rating Options—Hydrologic Soil Group (Panda Express - Falcon, CO)

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Appendix D – Supporting Documents

D1 – Basin B19 Falcon Marketplace Watersheds

D2 – Basin B19 Falcon Marketplace Report Pages

Display D2 - Basin B19 Falcon Marketplace Report Pages

Rational Method Runoff Summary

BASIN	DP	Area (Ac.)	Q ₅ (CFS)	Q ₁₀₀ (CFS)
A1	DP1	1.81	3.4	7.7
	DP2	1.81	3.4	7.7
A2		4.82	1.4	10.2
	DP3	6.63	4.6	17.3
B4	DP4	2.35	7.5	14.6
B5		0.63	2.8	5.1
	DP5	2.99	10.0	19.3
B6	DP6	3.19	12.8	23.6
B7		0.46	2.0	3.7
	DP7	6.63	23.8	28.0
B8	DP8	1.04	3.5	6.9
B9		0.30	1.4	2.5
	DP9	1.35	4.9	9.3
B10		0.18	0.8	1.4
	DP10	8.16	29.2	38.1
B11	DP11	2.01	7.8	14.6
B12		0.18	0.8	1.5
	DP12	10.35	36.4	51.9
B13		0.20	0.9	1.6
	DP13	10.55	37.1	53.2
B14	DP14	2.49	9.1	17.0
B15	DP15	5.73	20.3	38.0
B16		0.35	1.6	2.9
	DP16	8.56	30.6	57.1
B17		0.33	1.5	2.7

BASIN	DP	Area (Ac.)	Q ₅ (CFS)	Q ₁₀₀ (CFS)
	DP17	8.89	31.9	59.3
	DP18	19.44	52.1	88.2
B18	DP19	2.18	7.8	15.0
B19	DP20	2.57	10.1	18.8
	DP21	24.19	67.6	117.5
B20	DP22	2.03	5.6	11.4
B21		1.62	0.5	4.0
	DP23	27.85	67.4	121.8
C1	DP24	0.35	1.3	2.6
C2		0.23	0.8	1.5
	DP25	0.59	2.0	3.8
C3		1.88	0.6	4.2
C4		2.19	6.9	13.8
	DP26	4.08	5.4	13.7
C5	DP27	0.64	0.5	1.9
C6		0.45	0.2	1.2
	DP28	5.31	7.4	18.3
C7	DP29	0.19	0.7	1.3
C8		1.14	2.5	5.5
	DP30	1.33	3.1	6.6
C9		3.43	7.3	16.2
D1		2.62	4.1	8.8
D2		0.07	0.3	0.6
D3		0.07	0.3	0.6
	DPO1	32.50	10.3	30.2

B-GROUP basins represent the bulk of the site, with flows generally travelling southwards via curb and gutter, and storm sewer towards Pond #2. Pond #2 has been designed as a 3.5 ac-ft basin, sufficient to detain and release the WQCV generated by the site.

Basin B4 covers proposed lots 3 and 4 at the northeast corner of the Falcon Marketplace site. Flows generated by this basin Q₅ =7.5 cfs, Q₁₀₀ =14.6 cfs are intended to culminate at **Design Point 4** where a proposed private 24" RCP storm sewer stub is provided to allow for storm sewer connection as needed by the future lot developer(s). Design of the internal storm sewer/drainage configuration for lots 3 and 4 will be determined by the individual lot developer(s) at a later date.

Basin B5 covers a portion of the east side of Falcon Market Place adjacent to lots 3 and 4. Flows of Q₅ =2.8 cfs, Q₁₀₀ =5.1 cfs are generated by this basin and will travel to the south towards a proposed public 10' Type R at-grade inlet (**Design Point 5**). Flows exit this proposed in let IB1 to the west via public 24" RCP storm sewer.

Basin B6 covers the northeast corner of lot 2. Flows generated by this basin Q₅ =12.8 cfs, Q₁₀₀ =23.6 cfs are intended to culminate at **Design Point 6** where a proposed private 24" RCP storm sewer stub is provided to allow for storm sewer connection as needed by the

Display D2 - Basin B19 Falcon Marketplace Report Pages

$Q_{100} = 17.0$ cfs are intended to culminate at **Design Point 14** where a proposed private 30" RCP storm sewer stub is provided to allow for storm sewer connection as needed by the future lot developer. Design of the internal storm sewer/drainage configuration for lot 1 will be determined by the individual lot developer at a later date.

A private 24" RCP stub has been provided into proposed manhole MA1 on the 96" outfall from pond SR4, at the northwest corner of lot 2. However, in accordance with El Paso County water quality guidelines, any flow entering this 24" stub, will need to be treated for water quality prior to entering the storm system. Alternatively all flow from this basin may travel via internal storm system to the south, as designed by this drainage report.

Basin B15 covers the western side of lot 2 and a portion of lot 1. Flows generated by this basin $Q_5 = 20.3$ cfs, $Q_{100} = 38.0$ cfs are intended to culminate at **Design Point 15** where a proposed private 30" RCP storm sewer stub is provided to allow for storm sewer connection as needed by the future lot developer. Design of the internal storm sewer/drainage configuration for lots 1 and 2 will be determined by the individual lot developer(s) at a later date.

Basin B16 covers a portion of the north side of Falcon Market Place adjacent lot 1. Flows of $Q_5 = 1.6$ cfs, $Q_{100} = 2.9$ cfs are generated by this basin and will travel to the east towards a proposed public 10' Type R at-grade inlet IB7 and further on to low point and public 10' Type R sump inlet IB8 (**Design Point 16**). Flows exiting this inlet will travel to the south via proposed public 36" RCP storm sewer.

Basin B17 covers a portion of the south side of Falcon Market Place adjacent lots 9 and 10. Flows of $Q_5 = 1.5$ cfs, $Q_{100} = 2.7$ cfs are generated by this basin and will travel to the east towards a proposed low point and public 10' Type R sump inlet IB9 (**Design Point 17**). Flows exiting this inlet will travel to the southeast via proposed public 36" RCP storm sewer.

Design Point 18 represents the combining of flows from Design Points 13 and 17 at proposed manhole MB1. Flows at this point ($Q_5 = 52.1$ cfs, $Q_{100} = 88.2$ cfs) will travel to the south via proposed public 48" RCP storm sewer.

Basin B18/Design Point 19 covers lots 9 and 10. Flows generated by this basin $Q_5 = 7.8$ cfs, $Q_{100} = 15.0$ cfs are intended to enter a proposed private 24" RCP storm sewer stub that has been extended through lot 9 into lot 10. This stub is provided to allow for storm sewer connection as needed by the future lot developer(s). Design of the internal storm sewer/drainage configuration for lots 9 and 10 will be determined by the individual lot developer(s) at a later date.

Basin B19/Design Point 20 covers lots 7 and 8. Flows generated by this basin $Q_5 = 10.1$ cfs, $Q_{100} = 18.8$ cfs are intended to enter a proposed private 24" RCP storm sewer stub that has been extended through lot 8 into lot 7. This stub is provided to allow for storm sewer connection as needed by the future lot developer(s). Design of the internal storm sewer/drainage configuration for lots 7 and 8 will be determined by the individual lot developer(s) at a later date.

Design Point 21 represents the combining of flows from Design Points 18, 19 and 20 at proposed manhole MB2. Flows at this point ($Q_5 = 67.6$ cfs, $Q_{100} = 117.5$ cfs) will travel to the

Display D2 - Basin B19 Falcon Marketplace Report Pages

PROJECT INFORMATION

PROJECT:
PROJECT NO:
DESIGN BY:
REV. BY:
AGENCY:
REPORT TYPE:
DATE:

Falcon Marketplace
20988-00CSCV
KGV
TDM
El Paso County
Final
4/17/2019



	C2*	C5*	C10*	C100*	% IMPERV
Commercial Development		0.81		0.88	95
Open Space		0.08		0.35	0
Asphalt Roadway		0.90		0.96	100

*C-Values and Basin Imperviousness based on Table 5-1, City of Colorado Springs and El Paso County "Drainage Criteria Manual"

B11	Commercial Development	82352	1.07		0.01		0.00	95
	Open Space	5276	0.12		0.08		0.35	0
	Asphalt Roadway	0	0.00		0.90		0.96	100
TOTAL	WEIGHTED AVERAGE	87628	2.01		0.77		0.85	89
B12	Commercial Development	0	0.00		0.81		0.88	95
	Open Space	0	0.00		0.08		0.35	0
	Asphalt Roadway	7868	0.18		0.90		0.96	100
TOTAL	WEIGHTED AVERAGE	7868	0.18		0.90		0.96	100
B13	Commercial Development	0	0.00		0.81		0.88	95
	Open Space	0	0.00		0.08		0.35	0
	Asphalt Roadway	8699	0.20		0.90		0.96	100
TOTAL	WEIGHTED AVERAGE	8699	0.20		0.90		0.96	100
B14	Commercial Development	100956	2.32		0.81		0.88	95
	Open Space	7304	0.17		0.08		0.35	0
	Asphalt Roadway	0	0.00		0.90		0.96	100
TOTAL	WEIGHTED AVERAGE	108260	2.49		0.76		0.84	89
B15	Commercial Development	230636	5.29		0.81		0.88	95
	Open Space	18865	0.43		0.08		0.35	0
	Asphalt Roadway	0	0.00		0.90		0.96	100
TOTAL	WEIGHTED AVERAGE	249501	5.73		0.75		0.84	88
B16	Commercial Development	0	0.00		0.81		0.88	95
	Open Space	0	0.00		0.08		0.35	0
	Asphalt Roadway	15279	0.35		0.90		0.96	100
TOTAL	WEIGHTED AVERAGE	15279	0.35		0.90		0.96	100
B17	Commercial Development	0	0.00		0.81		0.88	95
	Open Space	0	0.00		0.08		0.35	0
	Asphalt Roadway	14340	0.33		0.90		0.96	100
TOTAL	WEIGHTED AVERAGE	14340	0.33		0.90		0.96	100
B18	Commercial Development	81327	1.87		0.81		0.88	95
	Open Space	13537	0.31		0.08		0.35	0
	Asphalt Roadway	0	0.00		0.90		0.96	100
TOTAL	WEIGHTED AVERAGE	94864	2.18		0.71		0.80	81
B19	Commercial Development	106398	2.44		0.81		0.88	95
	Open Space	5768	0.13		0.08		0.35	0
	Asphalt Roadway	0	0.00		0.90		0.96	100
TOTAL	WEIGHTED AVERAGE	112166	2.57		0.77		0.85	90
B20	Commercial Development	0	0.00		0.81		0.88	95
	Open Space	30159	0.69		0.08		0.35	0