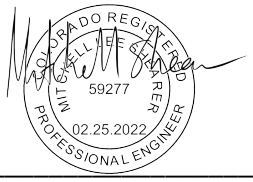
February 25, 2022

El Paso County
Planning and Community Development Department
2880 International Circle, Suite 110
Colorado Springs, CO 80910
PCD File No. PPR-21-026

RE: Drainage Conformance Letter
Falcon Marketplace, Lot 9
Falcon, CO 80831

Design Engineer's Statement:

The attached drainage plan and report were prepared under my direction and supervision and are correct to the best of my knowledge and belief. Said drainage report has been prepared according to the criteria established by the County for drainage reports and said report is in conformity with the applicable master plan of the drainage basin. I accept responsibility for any liability caused by any negligent acts, errors or omissions on my part in preparing this report.



Mitchell Shearer, P.E. #59277 — Date: 02.25.2022

Owner's Statement:

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

Rick Stucy — Date: 03.01.2022
7535 Falcon Market Place LLC
5450 Montana Vista Way, STE 200
Castle Rock, CO 80108

El Paso County:

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

Approved
by Jeff Rice
El Paso County Planning and Community Development
on behalf of Elizabeth Nijkamp, Engineering Review Manager
03/09/2022 3:14:14 PM

Jennifer Irvine, P.E.
County Engineer / ECM Administrator

Conditions:

To Whom it May Concern,

Introduction

The Slim Chicken's – Falcon proposed project is a 67,520 Sq-ft (1.55-acre) lot located in the Falcon Market Place in Falcon, Colorado. The site will include a Slim Chicken's restaurant with an asphalt parking lot with a concrete drive-thru wrapped around the building. The site also includes a portion of Approved Water Quality Pond #2 located south of the proposed building/parking lot. The site will encompass a building that is approximately 4,150 Sq-ft (0.10-acres), 31,265 Sq-ft (0.72-acres) of drive and walks, and 32,105 Sq-ft (0.74-acres) of landscaping/open space, with 22,220 Sq-ft (.51-acres) being the Approved Water Quality Pond #2 dedicated area . The historic impervious area on site is 0 Sq-ft (0-acres) and the proposed impervious area on site is 35,415 Sq-ft (0.82-acres), therefore, the increase in impervious area due to the development of this site is 35,415 Sq-ft (0.82-acres). The site is in Basin B18 of the approved Final Drainage Report for Falcon Marketplace, and the historic site was designed with the intention of developing the site with a commercial building.

The proposed project is part of Falcon Marketplace. The overall lot is being divided into 11 lots. This project is the development of Lot 9. This site flows into the southern pond and adheres to the parameters set in the approved Final Drainage Report for Falcon Marketplace, dated 04 November 2019, prepared by Drexel, Barrell & Co. A LOMR was submitted and approved on October 7th, 2021 with an effective date of February 22nd, 2022. Please refer to the Appendix for the conditional approval letter and let of map revision.

The overall drainage pattern for the site will follow the Falcon Marketplace Final Drainage Report. An existing private 24" storm line running east to west along the mid-part of the project property will convey flow to Water Quality Pond #2. The runoff will then be directed to unnamed tributary to Black Squirrel Creek. The hydrologic soil group present on this site is Type A, and the type of soil found is Blakeland-Fluvaquentic Haplaquolls.

General Concept

The proposed layout connects to the existing 24" storm line to the south of the development, within the property, via two 5' inlets. Drainage will surface flow to a proposed inlet before entering the existing pipe and discharging into the southern pond, named "Water Quality Pond #2" in the Falcon Marketplace Final Drainage Report. The minor storm is the 5-year storm, and the major storm is the 100-year storm.

Sub-basin Analysis

Basin A-1, 8,325 Sq-ft (0.19-acres), is in the western portion of the site and consists of asphalt and concrete drive/walk. The storm water will sheet flow due to the drive-thru lane, then due south along the curb and gutter, and finally enter the proposed inlet and exiting pipe at design point A-1. The minor storm coefficient is 0.84 and the major storm coefficient is 0.92; with an imperviousness of 93.0%. Basin A-1's flows are 0.83 cfs and 1.52 cfs for the minor and major storm, respectively.

Basin A-2, 15,729 Sq-ft (0.36-acres), is in the middle of the site and consists mostly of asphalt pavement and concrete drive/walk with a small portion of landscape. The storm water will sheet flow across the proposed parking lot to the southwest before entering the proposed inlet at design point A-2. The flows from Basin A-2 will then flow through a proposed storm pipe before entering the existing pipe at design point A-1. The minor storm coefficient is 0.74 and the Major storm coefficient is 0.84; with an imperviousness of 80.4%. Basin A-2's flows are 1.32 cfs and 2.51 cfs for the minor and major storm, respectively.

Basin A-3, 10,238 Sq-ft (0.24-acres), is in the eastern portion of the site and consists mostly asphalt pavement and concrete drive/walk with a small portion of landscape area. Storm water will flow south through the parking lot and drive-thru until it reaches design point A-3 and discharges into the proposed inlet. The minor storm coefficient is 0.81 and the major storm coefficient is 0.89; with an imperviousness of 88.9%. Basin A-3's flows are 0.97 cfs and 1.79 cfs for the minor and major storm, respectively.

Basin R-1, 3,700 Sq-ft (0.09-acres), consists entirely of rooftop. The storm water will collect on the roof and be conveyed to downspouts at design point R-1 and connect with the runoff from Basin A-3 into the proposed inlet at design point A-3. The minor storm coefficient is 0.73 and the major storm coefficient is 0.81; with an imperviousness of 90%. Basin R-1's flows are 0.32 cfs and 0.60 cfs for the minor and major storm, respectively.

Basin B-1, 22,220 Sq-ft (0.51-acres), consists entirely of the landscape located in southern portion of site. This Basin is not to be touched in the development of this site. The storm water will collect in the proposed pond and then discharge to the inlet located at design point B-1. The pond was approved with the design of Falcon Marketplace, and the proposed development lies within the restraints given in the Falcon Marketplace Drainage Report.

Basin B-2, 464 Sq-ft (0.01-acres), consists entirely of landscape that is located on the southeast corner of the lot just above the pond (Basin B-1). Storm water will flow south down the lot boundary until it reaches design point B-2 and discharges into the pond in tract B. The minor storm coefficient is 0.08 and the major storm coefficient is 0.35; with an imperviousness of 0%. Basin B-2's flows are 0.003 cfs and 0.02 cfs for the minor and major storm, respectively.

Basin B-3, 1,232 Sq-ft (0.03-acres), consists entirely of landscape that is located on the southwest corner of the site. Storm water will flow south down the lot boundary until it reaches design point B-3 and discharges into the pond in tract B. The minor storm coefficient is 0.08 and the major storm coefficient is 0.35; with an imperviousness of 0%. Basin B-2's flows are 0.01 cfs and 0.06 cfs for the minor and major storm, respectively.

Basin C-1, 5,585 Sq-ft (0.13-acres), consists primarily of landscape with a portion of drive/walk. Basin C-1 is located on the northern part of the lot. Storm water will overland until reaching the curb and gutter, and eventually reach the storm inlet located just north of the property line by the east access. The minor storm coefficient is 0.39 and the major storm coefficient is 0.58; with an imperviousness of 38.2%. Basin C-1's flows are 0.21 cfs and 0.51 cfs for the minor and major storm, respectively. According to the Falcon Marketplace Final Drainage Report, the inlet was designed to hold 2.7 cfs for the 100-yr storm event. The inlet has been analyzed and can contain the major storm event's combined flow of 3.21 cfs. See the Appendix for calculations.

The Four Step Process

El Paso County Engineering Criteria Manual Section I.7.2.A details the appropriate BMP selection based on a Four-Step Process.

Step 1: Employ Runoff Reduction Practices

- The site layout was intentionally designed to minimize hardscape, while still achieving site functionality. As such the limits of disturbance for earthwork are minimized and perimeter landscaping is maximized.

Step 2: Stabilized Drainageways

- All stormwater control measures exist in hard-piped underground infrastructure. Therefore, there are not drainageways requiring stabilization measures.

Step 3: Provide Water Quality Capture Volume (WQCV)

- Please refer to the Final Drainage Report for Falcon Marketplace, dated 04 November 2019, prepared by Drexel, Barrell & Co. previously approved by El Paso County for further discussion as to detailed information regarding how the subdivision pond provides water quality satisfying El Paso County Engineering Criteria Manual section I.7.2.D. Permanent water quality and detention is provided in the Approved Water Quality Pond #2 per the aforementioned Final Drainage Report. The pond was designed for EURV.

Step 4: Consider Need for Industrial and Commercial BMPs

- Permanent water quality is provided by the Approved Water Quality Pond #2 per the overall Final Drainage Report. The pond was designed for EURV. The pond is an acceptable permanent BMP for this site per Appendix I of the Engineering Criteria Manual. The construction document plan set submittal accompanying this letter will include a Grading and Erosion Control Plan, as required for the ESQCP permit. Therefore, erosion control details will accompany the construction plans specifying the necessary procedures and measures to ensure water quality during the construction phase.

Conclusion

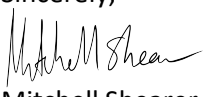
As previously stated, the proposed impervious area due to the development is 35,415 Sq-ft (0.82-acres), and the proposed minor and major storm runoff is 3.65 cfs and 7.03 cfs, disregarding basin B-1 as it is to remain untouched. With the proposed flows, The Falcon Marketplace development has designed the pond and its corresponding storm network to withstand such a demand. The Falcon Marketplace Final Drainage Report places Lot 9 in the eastern half of Basin B18. This basin allows for 7.8 cfs and 15.0 cfs for the minor and major storm events, respectively. As Lot 9 is half of Basin B18, it is allowed to release flows at the rate of 3.9 cfs and 7.5 cfs for the minor and major storm events, respectively. Therefore, the proposed flows of 3.65 cfs and 7.03 cfs for the minor and major storm events, respectively, are in conformance with the Overall Drainage Report.

The drainage fees were paid at the time of the Final Plat recording.

The drainage improvements proposed with the construction of Falcon Marketplace is in conformance with the El Paso County Site Drainage requirements for a new development. This project will economically benefit the El Paso County without negatively impacting the local environment.

If there are any questions, feel free to reach out to us at 720-258-6836.

Sincerely,

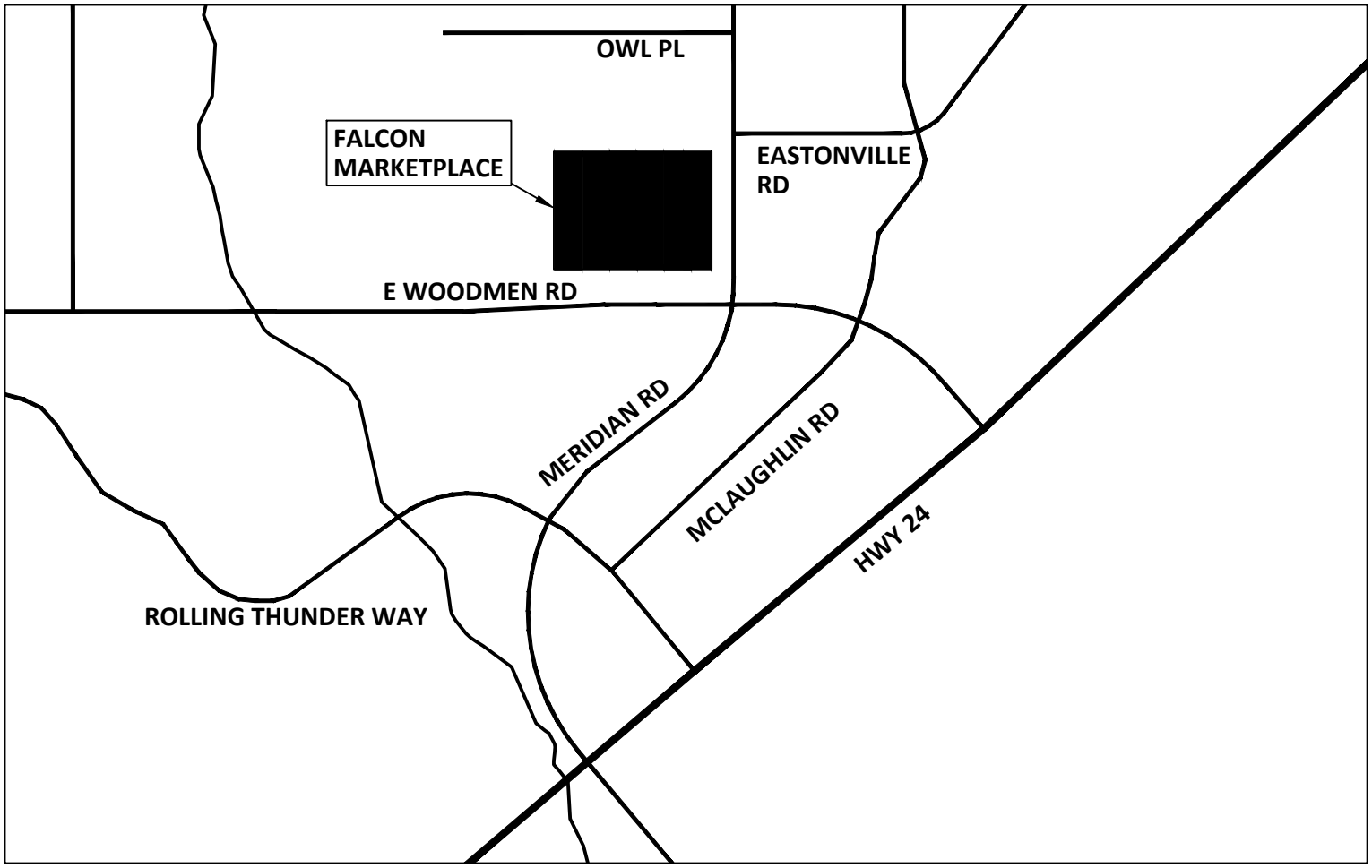


Mitchell Shearer, PE
Point Consulting, LLC
Registered Professional Engineer
State of Colorado No. 59277

Appendix

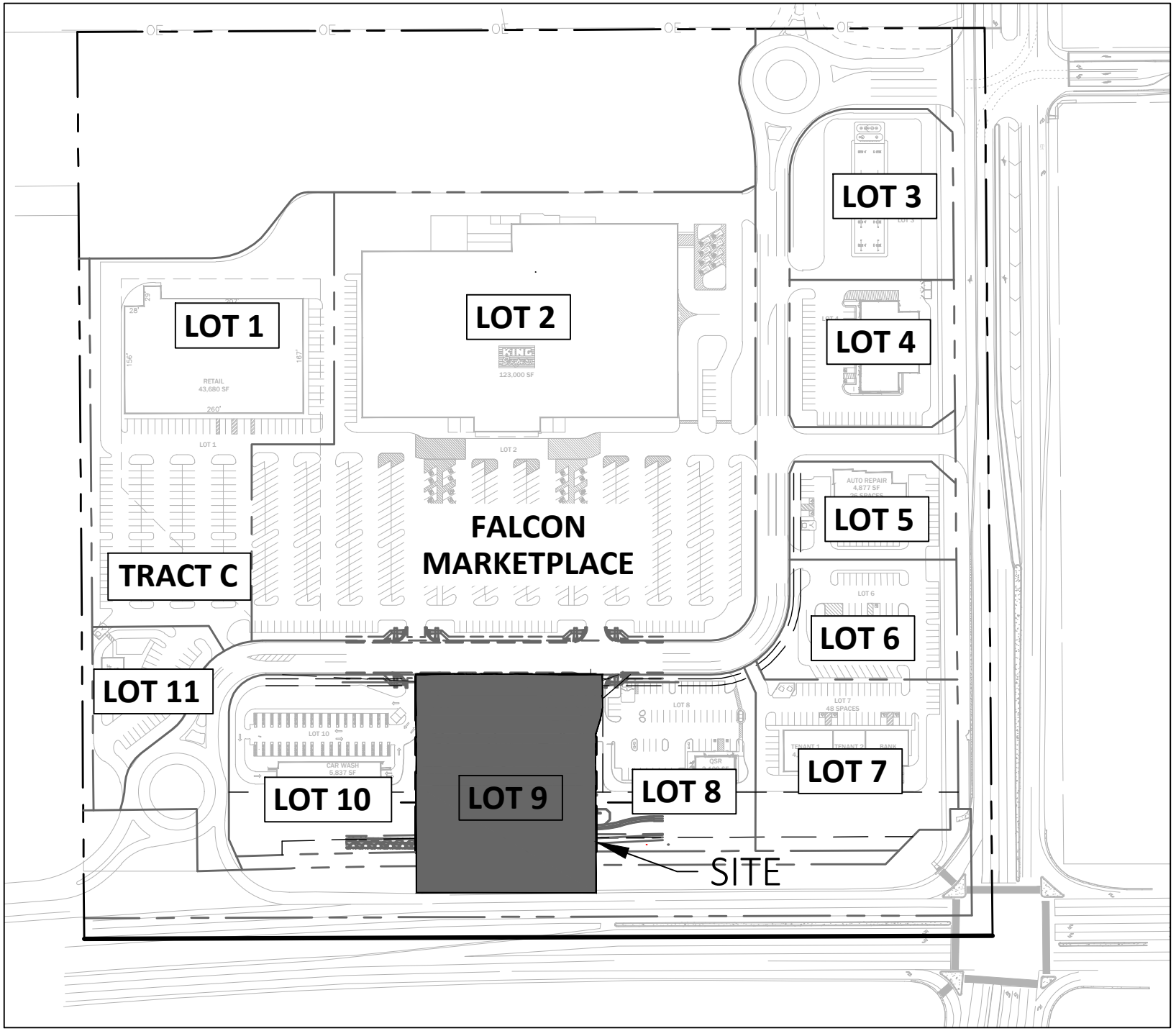
Attached to this letter are the following documents:

- Vicinity Map
- FEMA Conditional Approval Letter
- Soils Report
- Hydrology Calculations
- Excerpt from Final Drainage Report for Falcon Marketplace
- Excerpt from Drainage Criteria Manual: Table 6-2, Table 6-6, and Figure 6-5
- Proposed Drainage Map



VICINITY MAP

NOT TO SCALE



SITE MAP

1"=200'

Federal Emergency Management Agency

Washington, D.C. 20472

October 7, 2021

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

The Honorable Stan VanderWerf
Chairman, El Paso County Board of Commissioners
200 South Cascade Avenue, Suite 100
Colorado Springs, CO 80903

IN REPLY REFER TO:
Case No.: 21-08-0534P
Follows Conditional
Case No.: 17-08-0074R
Community Name: El Paso County, CO
Community No.: 080059
Effective Date of
This Revision: February 22, 2022

Dear Mr. VanderWerf:

The Flood Insurance Study (FIS) report and Flood Insurance Rate Map (FIRM) for your community have been revised by this Letter of Map Revision (LOMR). Please use the enclosed annotated map panel revised by this LOMR for floodplain management purposes and for all flood insurance policies and renewals issued in your community.

Additional documents are enclosed that provide information regarding this LOMR. Please see the List of Enclosures below to determine which documents are included. Other enclosures specific to this request may be included as referenced in the Determination Document. If you have any questions regarding floodplain management regulations for your community or the National Flood Insurance Program (NFIP) in general, please contact the Consultation Coordination Officer for your community. If you have any technical questions regarding this LOMR, please contact the Director, Mitigation Division of the Department of Homeland Security's Federal Emergency Management Agency (FEMA) in Denver, Colorado, at (303) 235 4830, or the FEMA Mapping and Insurance eXchange (FMIX) toll free at 1 877 336 2627 (1 877 FEMA MAP). Additional information about the NFIP is available on our website at https://www.fema.gov/flood-insurance.

Sincerely,

Patrick "Rick" F. Sacbibit, P.E., Branch Chief
Engineering Services Branch
Federal Insurance and Mitigation Administration

List of Enclosures:

Letter of Map Revision Determination Document
Annotated Flood Insurance Rate Map
Annotated Flood Insurance Study Report

cc: Mr. Keith Curtis, P.E., CFM
Floodplain Administrator
Pikes Peak Regional Building Department

Ms. Karen Levitt Ortiz
Development Manager
Evergreen Devco, Inc.

Ms. Michelle Iblings, P.E., CFM
Water Resources Group Lead
Drexel, Barrell & Co.

Follows Conditional Case No.: 17-08-0074R

Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION DETERMINATION DOCUMENT

COMMUNITY AND REVISION INFORMATION		PROJECT DESCRIPTION	BASIS OF REQUEST
COMMUNITY	El Paso County Colorado (Unincorporated Areas)	CHANNELIZATION CULVERT DETENTION BASIN FILL	1D HYDRAULIC ANALYSIS HYDROLOGIC ANALYSIS UPDATED TOPOGRAPHIC DATA
	COMMUNITY NO.: 080059		
IDENTIFIER	Falcon Marketplace	APPROXIMATE LATITUDE AND LONGITUDE: 38.942, -104.610 SOURCE: Other DATUM: NAD 83	

ANNOTATED MAPPING ENCLOSURES	ANNOTATED STUDY ENCLOSURES
TYPE: FIRM* NO.: 08041C0553G DATE: December 7, 2018	DATE OF EFFECTIVE FLOOD INSURANCE STUDY: December 07, 2018 PROFILE: 404P(a) SUMMARY OF DISCHARGE TABLE: 4

Enclosures reflect changes to flooding sources affected by this revision.
* FIRM - Flood Insurance Rate Map

FLOODING SOURCE AND REVISED REACH

Unnamed Tributary to Black Squirrel Creek - from approximately the downstream side of Meridian Road to approximately 530 feet downstream of Owl Place

SUMMARY OF REVISIONS

Flooding Source	Effective Flooding	Revised Flooding	Increases	Decreases
Unnamed Tributary to Black Squirrel Creek	No BFEs*	BFEs	YES	NONE
	Zone A	Zone A	YES	YES
	Zone AE	Zone AE	YES	YES

* BFEs - Base Flood Elevations

DETERMINATION

This document provides the determination from the Department of Homeland Security's Federal Emergency Management Agency (FEMA) regarding a request for a Letter of Map Revision (LOMR) for the area described above. Using the information submitted, we have determined that a revision to the flood hazards depicted in the Flood Insurance Study (FIS) report and/or National Flood Insurance Program (NFIP) map is warranted. This document revises the effective NFIP map, as indicated in the attached documentation. Please use the enclosed annotated map panels revised by this LOMR for floodplain management purposes and for all flood insurance policies and renewals in your community.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Mapping and Insurance eXchange (FMIX) toll free at 1 877 336 2627 (1 877 FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 3601 Eisenhower Avenue, Suite 500, Alexandria, VA 22304 6426. Additional Information about the NFIP is available on our website at https://www.fema.gov/flood-insurance.

Patrick "Rick" F. Sacbibit, P.E., Branch Chief
Engineering Services Branch
Federal Insurance and Mitigation Administration

Federal Emergency Management Agency
Washington, D.C. 20472

LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)

COMMUNITY INFORMATION

APPLICABLE NFIP REGULATIONS/COMMUNITY OBLIGATION

We have made this determination pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (P.L. 93-234) and in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, P.L. 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65. Pursuant to Section 1361 of the National Flood Insurance Act of 1968, as amended, communities participating in the NFIP are required to adopt and enforce floodplain management regulations that meet or exceed NFIP criteria. These criteria, including adoption of the FIS report and FIRM, and the modifications made by this LOMR, are the minimum requirements for continued NFIP participation and do not supersede more stringent State/Commonwealth or local requirements to which the regulations apply.

NFIP regulations Subparagraph 60.3(b)(7) requires communities to ensure that the flood-carrying capacity within the altered or relocated portion of any watercourse is maintained. This provision is incorporated into your community's existing floodplain management ordinances; therefore, responsibility for maintenance of the altered or relocated watercourse, including any related appurtenances such as bridges, culverts, and other drainage structures, rests with your community. We may request that your community submit a description and schedule of maintenance activities necessary to ensure this requirement.

COMMUNITY REMINDERS

We based this determination on the 1-percent-annual-chance discharges computed in the submitted hydrologic model. Future development of projects upstream could cause increased discharges, which could cause increased flood hazards. A comprehensive restudy of your community's flood hazards would consider the cumulative effects of development on discharges and could, therefore, indicate that greater flood hazards exist in this area.

Your community must regulate all proposed floodplain development and ensure that permits required by Federal and/or State/Commonwealth law have been obtained. State/Commonwealth or community officials, based on knowledge of local conditions and in the interest of safety, may set higher standards for construction or may limit development in floodplain areas. If your State/Commonwealth or community has adopted more restrictive or comprehensive floodplain management criteria, those criteria take precedence over the minimum NFIP requirements.

We will not print and distribute this LOMR to primary users, such as local insurance agents or mortgage lenders; instead, the community will serve as a repository for the new data. We encourage you to disseminate the information in this LOMR by preparing a news release for publication in your community's newspaper that describes the revision and explains how your community will provide the data and help interpret the NFIP maps. In that way, interested persons, such as property owners, insurance agents, and mortgage lenders, can benefit from the information.

This revision has met our criteria for removing an area from the 1-percent-annual-chance floodplain to reflect the placement of fill. However, we encourage you to require that the lowest adjacent grade and lowest floor (including basement) of any structure placed within the subject area be elevated to or above the Base (1-percent-annual-chance) Flood Elevation.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Mapping and Insurance eXchange (FMIX) toll free at 1 877 336 2627 (1 877 FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 3601 Eisenhower Avenue, Suite 500, Alexandria, VA 22304 6426. Additional Information about the NFIP is available on our website at https://www.fema.gov/flood-insurance.

Patrick "Rick" F. Sacbibit, P.E., Branch Chief
Engineering Services Branch
Federal Insurance and Mitigation Administration

Federal Emergency Management Agency
Washington, D.C. 20472

LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)

We have designated a Consultation Coordination Officer (CCO) to assist your community. The CCO will be the primary liaison between your community and FEMA. For information regarding your CCO, please contact:

Ms. Jeanine D. Petterson
Director, Mitigation Division
Federal Emergency Management Agency, Region VIII
Denver Federal Center, Building 710
P.O. Box 25267
Denver, CO 80225-0267
(303) 235-4830

STATUS OF THE COMMUNITY NFIP MAPS

We will not physically revise and republish the FIRM and FIS report for your community to reflect the modifications made by this LOMR at this time. When changes to the previously cited FIRM panel and FIS report warrant physical revision and republication in the future, we will incorporate the modifications made by this LOMR at that time.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Mapping and Insurance eXchange (FMIX) toll free at 1 877 336 2627 (1 877 FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 3601 Eisenhower Avenue, Suite 500, Alexandria, VA 22304 6426. Additional Information about the NFIP is available on our website at https://www.fema.gov/flood-insurance.

Patrick "Rick" F. Sacbibit, P.E., Branch Chief
Engineering Services Branch
Federal Insurance and Mitigation Administration

Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)

PUBLIC NOTIFICATION OF REVISION

A notice of changes will be published in the *Federal Register*. This information also will be published in your local newspaper on or about the dates listed below, and through FEMA's Flood Hazard Mapping website at https://www.floodmaps.fema.gov/fhm/bfe_status/bfe_main.asp

LOCAL NEWSPAPER

Name: *The Colorado Springs Gazette*

Dates: October 18, 2021 and October 25, 2021

Within 90 days of the second publication in the local newspaper, any interested party may request that we reconsider this determination. Any request for reconsideration must be based on scientific or technical data. Therefore, this letter will be effective only after the 90-day appeal period has elapsed and we have resolved any appeals that we receive during this appeal period. Until this LOMR is effective, the revised flood hazard determination presented in this LOMR may be changed.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Mapping and Insurance eXchange (FMIX) toll free at 1 877 336 2627 (1 877 FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 3601 Eisenhower Avenue, Suite 500, Alexandria, VA 22304 6426. Additional Information about the NFIP is available on our website at https://www.fema.gov/flood-insurance.

Patrick "Rick" F. Sacbibit, P.E., Branch Chief
Engineering Services Branch
Federal Insurance and Mitigation Administration

Table 4. Summary of Discharges (cont.)

Flooding Source and Location	Drainage Area (Square Miles)	Peak Discharges (Cubic Feet Per Second) 10-Year	50-Year	100-Year	500-Year
Spring Creek					
At confluence with Fountain Creek	6.7	960	1,790	2,340	4,340
Spring Run					
At Interstate 25	3.63	890	1,350	1,660	2,340
Sutherland Creek					
At confluence with Fountain Creek	5.09	1,810	3,400	4,700	7,500
Teachout Creek					
At Santa Fe Trail Railroad	1.72	--[1]	--[1]	794	--[1]
Telephone Exchange					
At confluence with Black Squirrel Creek	--[1]	--[1]	--[1]	3,230	--[1]
At River Station 4,447	--[1]	--[1]	--[1]	3,100	--[1]
At River Station 8,068	--[1]	--[1]	--[1]	2,570	--[1]
At River Station 19,971	--[1]	--[1]	--[1]	1,800	--[1]
At River Station 29,131	--[1]	--[1]	--[1]	1,030	--[1]
Templeton Gap Floodway					
At Academy Boulevard	2.49	2,820	4,180	5,040	6,800
Approximately 2,300 feet above Academy Boulevard	2.14	2,440	3,610	4,340	5,850
Tributary to East Cherry Creek					
At Confluence with East Cherry Creek	0.15	--[1]	--[1]	289	--[1]
Tributary to Sand Creek East Fork (Reach No. 6)					
At confluence with East Fork of Sand Creek	1.13	--[1]	--[1]	551	--[1]
Unnamed Tributary to Black Squirrel Creek					
At mouth	1.62	--[1]	--[1]	675	--[1]
At East Woodmen Road [2]	1.36	--[1]	--[1]	761	--[1]
Approximately 1,700 feet downstream of Owl Road	1.16	--[1]	--[1]	1,016	--[1]

REVISED DATA

[1]Data not available

[2]Peak discharges reduced by effects of detention pond

REVISED TO REFLECT LOMR EFFECTIVE: February 22, 2022

404P(a)

FEDERAL EMERGENCY MANAGEMENT AGENCY

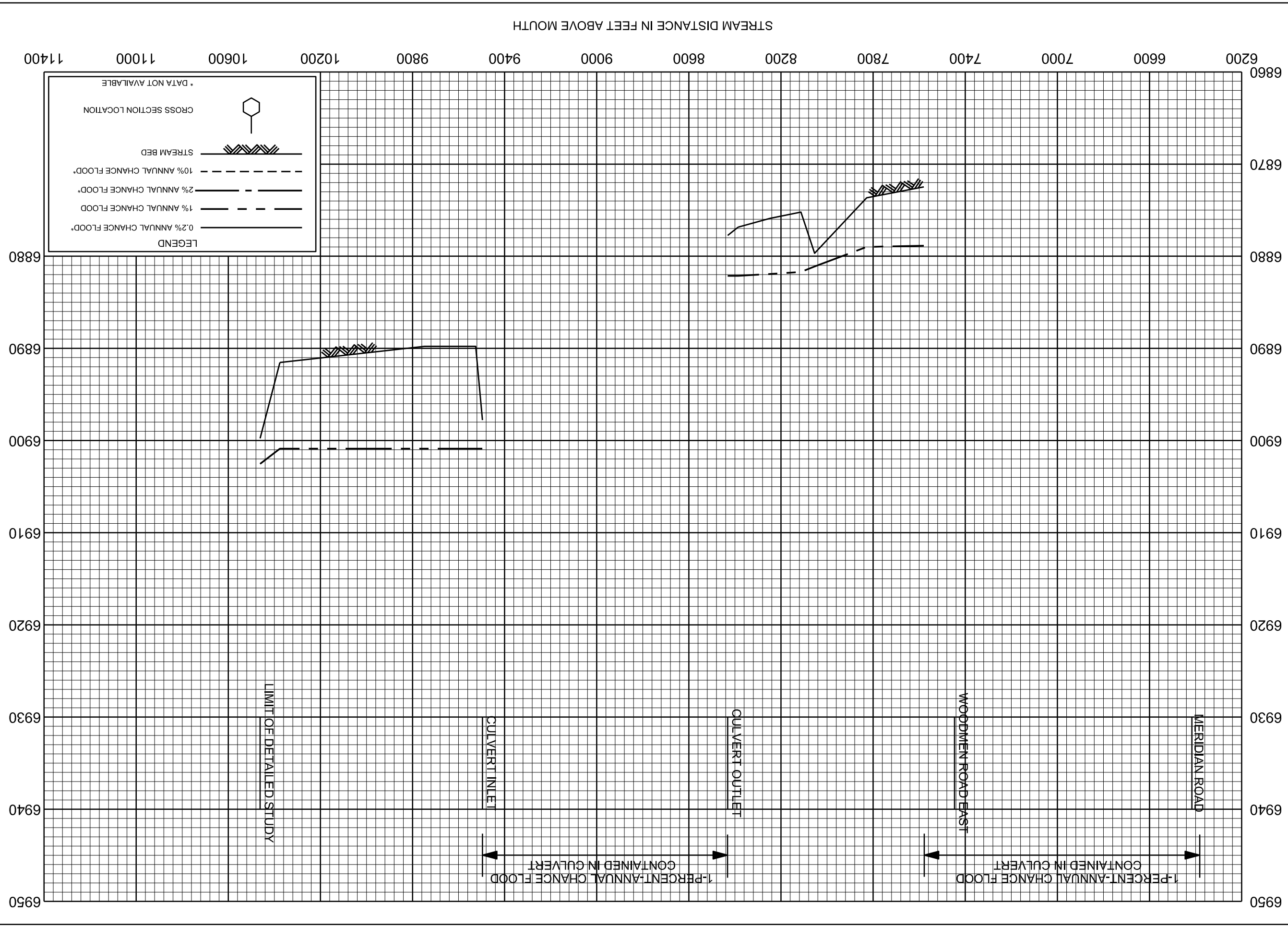
EL PASO COUNTY, CO

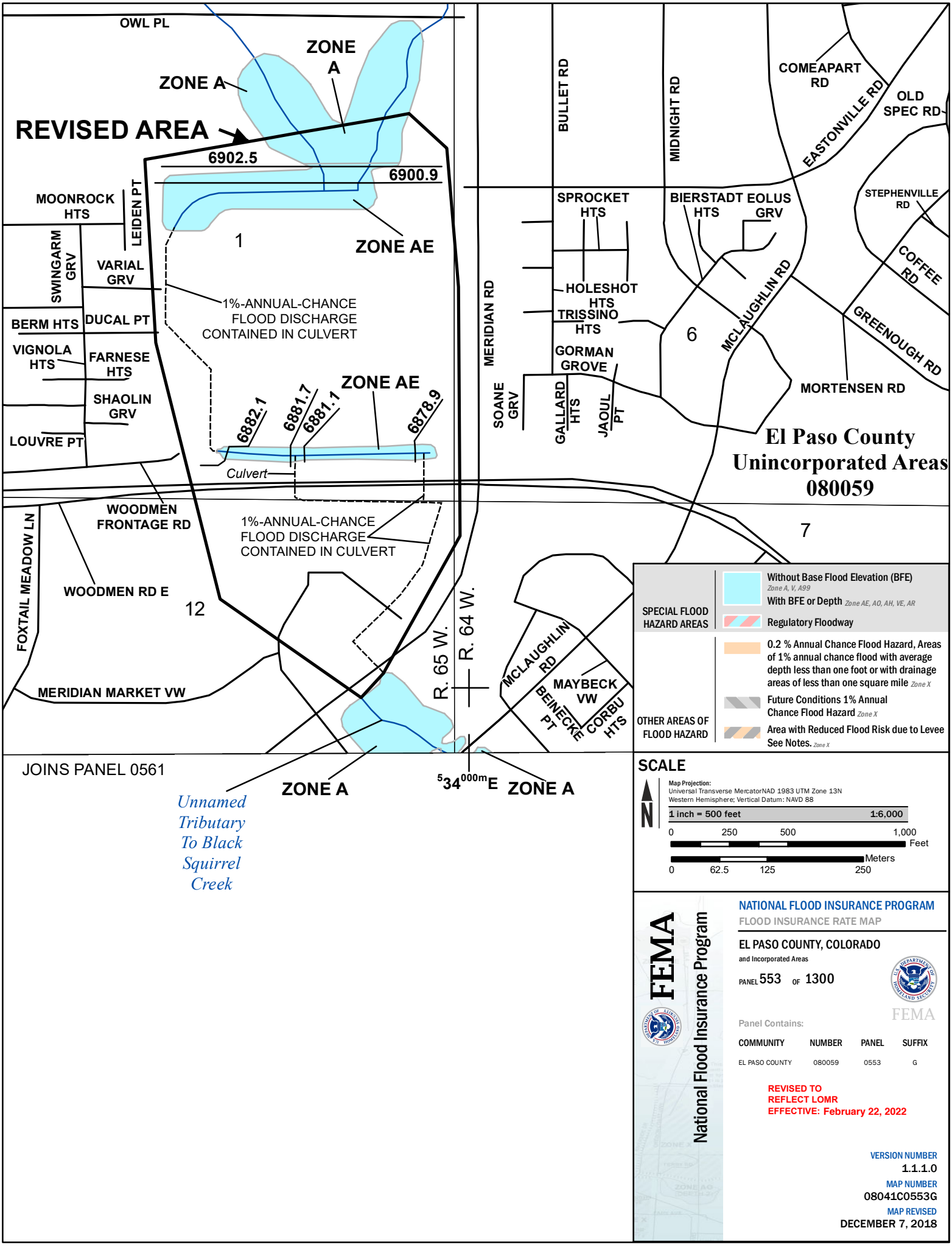
(AND INCORPORATED AREAS)

UNNAMED TRIBUTARY TO BLACK SQUIRREL CREEK

FLOOD PROFILES

REVISED TO
REFLECT LOMR
EFFECTIVE: February 22, 2022




OWL PL
ZONE A
ZONE A
REVISED AREA
6902.5
6900.9
ZONE AE
1
1%-ANNUAL-CHANCE FLOOD DISCHARGE CONTAINED IN CULVERT
ZONE AE
6882.1
6881.7
6881.1
6878.9
Culvert
1%-ANNUAL-CHANCE FLOOD DISCHARGE CONTAINED IN CULVERT
MOONROCK HTS
LEIDEN PT
SWINGARM GRV
VARIAL GRV
BERM HTS
DUCAL PT
VIGNOLA HTS
FARNESE HTS
SHAOLIN GRV
LOUVRE PT
WOODMEN FRONTAGE RD
WOODMEN RD E
FOXTAIL MEADOW LN
MERIDIAN MARKET VW
12
BULLET RD
MIDNIGHT RD
COMEAPART RD
EASTONVILLE RD
OLD SPEC RD
STEPHENVILLE RD
COFFEE RD
GREENOUGH RD
SPROCKET HTS
BIERSTADT HTS
EOLUS GRV
MERIDIAN RD
HOLESHOT HTS
TRISSINO HTS
GORMAN GROVE
SOANE GRV
GALLARD HTS
JAOUL PT
MCLAUGHLIN RD
6
MORTENSEN RD
7
El Paso County
Unincorporated Areas
080059
R. 65 W.
R. 64 W.
MCLAUGHLIN RD
MAYBECK VW
BEINECKE PT
CORBU HTS
JOINS PANEL 0561
ZONE A
534000mE
ZONE A
Unnamed Tributary To Black Squirrel Creek
SPECIAL FLOOD HAZARD AREAS
Without Base Flood Elevation (BFE) Zone A, V, A99
With BFE or Depth Zone AE, AO, AH, VE, AR
Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD
0.2 % Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
Future Conditions 1% Annual Chance Flood Hazard Zone X
Area with Reduced Flood Risk due to Levee See Notes. Zone X
SCALE
N
Map Projection:
Universal Transverse MercatorNAD 1983 UTM Zone 13N
Western Hemisphere; Vertical Datum: NAVD 88
1 inch = 500 feet 1:6,000
0 250 500 1,000 Feet
0 62.5 125 250 Meters
FEMA
National Flood Insurance Program
NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP
EL PASO COUNTY, COLORADO
and Incorporated Areas
PANEL 553 OF 1300
FEMA
Panel Contains:
COMMUNITY NUMBER PANEL SUFFIX
EL PASO COUNTY 080059 0553 G
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Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for El Paso County Area, Colorado

June 2, 2021

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

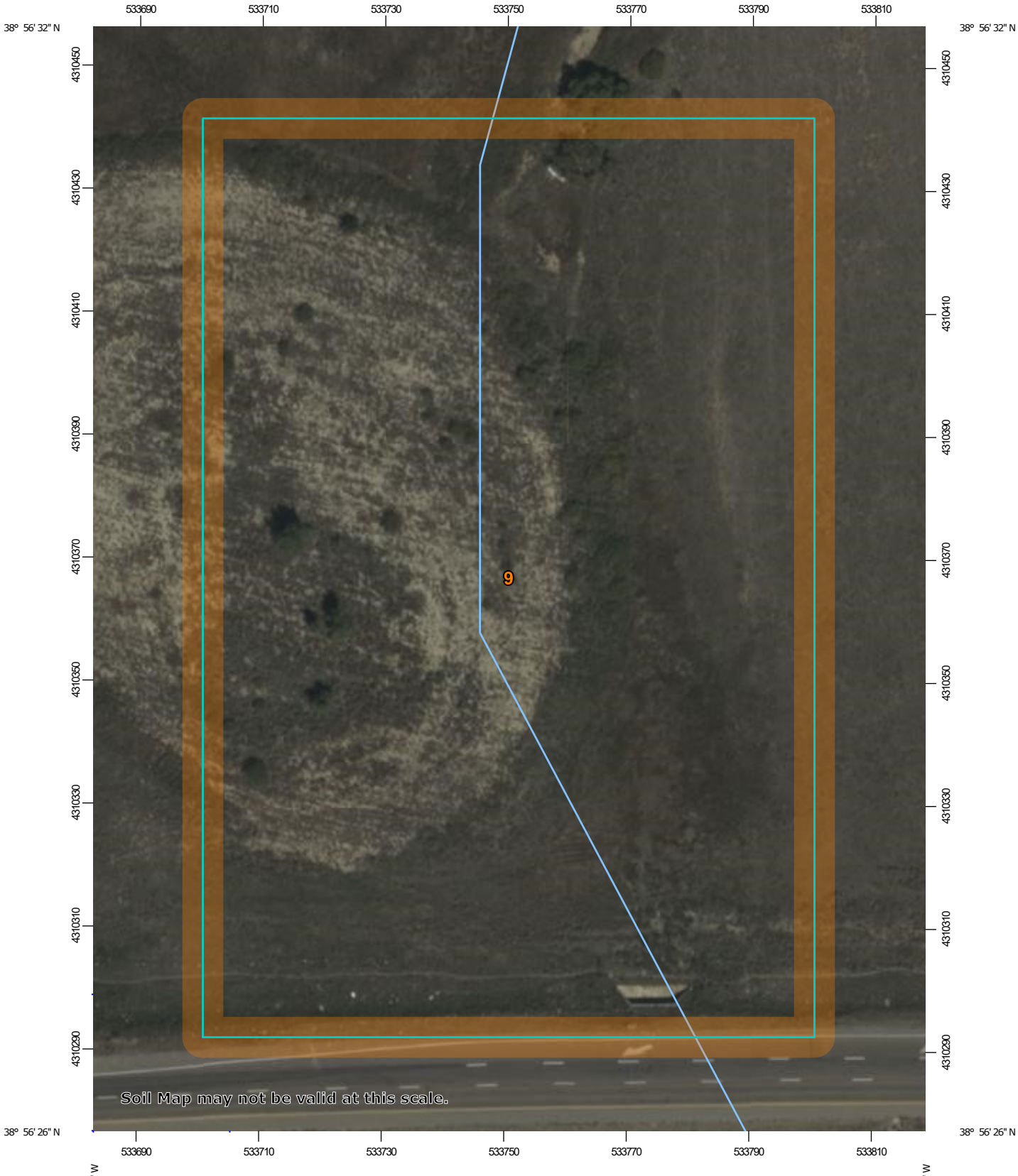
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:876 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 10 20 40 60

Feet
0 40 80 160 240

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 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	3.7	100.0%
Totals for Area of Interest		**3.7**	**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, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

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

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PROJECT: Slim Chicken's - Falcon
PROJECT NO. 21-030
DESIGN BY: GJB
DATE: 8/26/2021

Soil Type: Blakeland-Fluvaquentic Haplaquolls **Hydrologic Grouping: Type A**

Land use (Proposed/Existing)

		Runoff Coefficients					
Land Use	**%Imp**	**2-Year**	**5-Year**	**10-Year**	**25-Year**	**50-Year**	**100-Year**
Roof	90	0.71	0.73	0.75	0.78	0.80	0.81
Drive/Walk	100	0.89	0.90	0.92	0.94	0.95	0.96
Landscape	0	0.02	0.08	0.15	0.25	0.30	0.35

Proposed Basins (Proposed conditions)

		Land Use (Acres)			Weighted Runoff Coefficient				
Basin	**Total Area**	**Roof**	**Drive/Walk**	**Landscape**	**C2**	**C5**	**C10**	**C100**	**%Imp**
A-1	0.19	0.00	0.18	0.01	0.83	0.84	0.87	0.92	93.0
A-2	0.36	0.01	0.28	0.07	0.72	0.74	0.77	0.84	80.4
A-3	0.24	0.00	0.21	0.03	0.79	0.81	0.83	0.89	88.9
R-1	0.09	0.09	0.00	0.00	0.71	0.73	0.75	0.81	90.0
B-1*	0.51	0.00	0.00	0.51	0.02	0.08	0.15	0.35	0.0
B-2	0.01	0.00	0.00	0.01	0.02	0.08	0.15	0.35	0.0
B-3	0.03	0.00	0.00	0.03	0.02	0.08	0.15	0.35	0.0
C-1	0.13	0.00	0.05	0.08	0.35	0.39	0.44	0.58	38.2

*Basin B-1 remains untouched throughout this entire project. The existing basin is the same as the proposed basin.

	WITH BASIN B-1	**WITHOUT BASIN B-1**
TOTAL AREA (ACRES):	**1.55**	**1.04**
TOTAL IMPERVIOUSNESS (%):	**51.82**	**77.23**

Historic Basins (Existing conditions)

		Land Use (Acres)			Weighted Runoff Coefficient				
Basin	**Total Area**	**Roof**	**Drive/Walk**	**Landscape**	**C2**	**C5**	**C10**	**C100**	**%Imp**
H-1	1.42	0.00	0.00	1.42	0.02	0.08	0.15	0.35	0.0
H-2	0.13	0.00	0.00	0.13	0.02	0.08	0.15	0.35	0.0

TOTAL AREA (ACRES): **1.55**
TOTAL IMPERVIOUSNESS (%): **0.00**

Calculation of Peak Runoff Per El Paso Standards

Designer: GJB
Company: POINT CONSULTING, LLC
Date: 8/26/2021
Project: SLIM CHICKEN'S FALCON
Location: FALCON PARKETPLACE

Cells of this color are for required user-input

$$t_i = \frac{0.395(1.1 - C_5)\sqrt{L_i}}{S_i^{0.33}}$$

$$t_t = \frac{L_t}{60K\sqrt{S_t}} = \frac{L_t}{60V_t}$$

Computed $t_c = t_i + t_t$

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

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

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

1-hour rainfall depth, P1 (in) =	2-yr	5-yr	10-yr	100-yr
	1.19	1.50	1.75	2.52

Intensity Equations can be found in Figure 6-5 of Colorado Springs' *Drainage Criteria Manual Vol. 1*

$Q(cfs) = CIA$

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	100-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_t (ft)	U/S Elevation (ft) (Optional)	D/S Elevation (ft) (Optional)	Channelized Flow Slope S_t (ft/ft)	NRCS Conveyance Factor K	Channelized Flow Velocity V_t (ft/sec)	Channelized Flow Time t_t (min)	Computed t_c (min)	Regional t_c (min)	Selected t_c (min)	2-yr	5-yr	10-yr	100-yr	2-yr	5-yr	10-yr	100-yr
A-1	0.19	A	93.0	0.83	0.84	0.87	0.92	69.50			0.010	3.87	160.00			0.015	20	2.45	1.09	4.96	11.18	5.00	4.12	5.17	6.03	8.68	0.65	0.83	1.00	1.52
A-2	0.36	A	80.4	0.72	0.74	0.77	0.84	100.00			0.019	5.30	60.30			0.011	20	2.10	0.48	5.78	12.81	5.78	3.95	4.95	5.78	8.31	1.02	1.32	1.60	2.51
A-3	0.24	A	88.9	0.79	0.81	0.83	0.89	100.00			0.017	4.40	103.00			0.010	20	1.95	0.88	5.29	11.71	5.29	4.05	5.09	5.93	8.54	0.76	0.97	1.16	1.79
R-1	0.09	A	90.0	0.71	0.73	0.75	0.81	35.00			0.005	4.97	5.00			0.005	20	1.41	0.06	5.03	10.75	5.03	4.11	5.16	6.02	8.67	0.25	0.32	0.39	0.60
B-1*	0.51	A	0.0	0.02	0.08	0.15	0.35	20.00			0.030	5.73	250.00			0.010	5	0.50	8.33	14.06	30.63	14.06	2.89	3.62	4.22	6.07	0.03	0.15	0.32	1.08
B-2	0.01	A	0.0	0.02	0.08	0.15	0.35	30.00			0.010	10.09	5.00			0.010	7	0.70	0.12	10.21	26.09	10.21	3.27	4.10	4.78	6.88	0.00	0.00	0.01	0.02
B-3	0.03	A	0.0	0.02	0.08	0.15	0.35	80.20			0.030	11.48	5.00			0.030	7	1.21	0.07	11.55	26.05	11.55	3.12	3.91	4.57	6.57	0.00	0.01	0.02	0.06
C-1	0.13	A	38.2	0.35	0.39	0.44	0.58	40.00			0.005	10.15	13.00			0.020	7	0.99	0.22	10.37	19.61	10.37	3.25	4.08	4.75	6.84	0.15	0.21	0.27	0.51
H-1	1.42	A	0.0	0.02	0.08	0.15	0.35	100.00			0.015	16.11	142.00			0.062	7	1.74	1.36	17.47	27.06	17.47	2.63	3.29	3.84	5.53	0.07	0.37	0.82	2.75
H-2	0.13	A	0.0	0.02	0.08	0.15	0.35	21.00			0.017	7.08	13.00			0.019	7	0.96	0.22	7.31	26.17	10.00	3.29	4.13	4.82	6.93	0.01	0.04	0.09	0.32

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INLET MANAGEMENT

Worksheet Protected

INLET NAME	Inlet for Basin C-1	Inlet for Basin A-1	Inlet for Basin A-2	Inlet for Basin A-3
Site Type (Urban or Rural)	URBAN	URBAN	URBAN	URBAN
Inlet Application (Street or Area)	STREET	STREET	STREET	STREET
Hydraulic Condition	In Sump	In Sump	In Sump	In Sump
Inlet Type	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{Known} (cfs)	1.7	0.8	1.3	1.0
Major Q_{Known} (cfs)	3.2	1.5	2.5	1.9

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received
Minor Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.0	0.0
Major Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.0	0.0

Watershed Characteristics

Subcatchment Area (acres)				
Percent Impervious				
NRCS Soil Type				

Watershed Profile

Overland Slope (ft/ft)				
Overland Length (ft)				
Channel Slope (ft/ft)				
Channel Length (ft)				

Minor Storm Rainfall Input

Design Storm Return Period, T_r (years)				
One-Hour Precipitation, P_1 (inches)				

Major Storm Rainfall Input

Design Storm Return Period, T_r (years)				
One-Hour Precipitation, P_1 (inches)				

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	**1.7**	**0.8**	**1.3**	**1.0**
Major Total Design Peak Flow, Q (cfs)	**3.2**	**1.5**	**2.5**	**1.9**
Minor Flow Bypassed Downstream, Q_b (cfs)	N/A	N/A	N/A	N/A
Major Flow Bypassed Downstream, Q_b (cfs)	N/A	N/A	N/A	N/A

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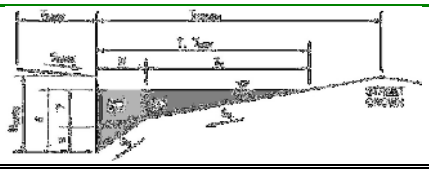
ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project:

Inlet ID: **Inlet for Basin C-1**



Gutter Geometry:

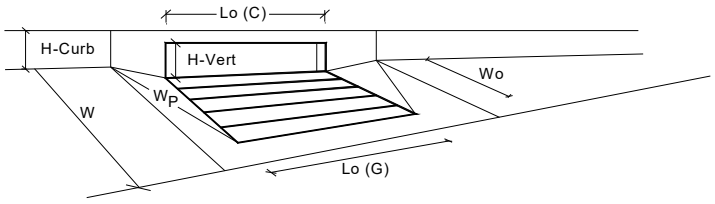
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	0.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	24.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.012	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	20.0	20.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	6.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)



CDOT Type R Curb Opening

Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	6.0	6.0	☐ Override Depths
Grate Information		MINOR	MAJOR	
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	

Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.33	0.33	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.57	0.57	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.93	0.93	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	

		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**8.3**	**8.3**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	1.7	3.2	cfs

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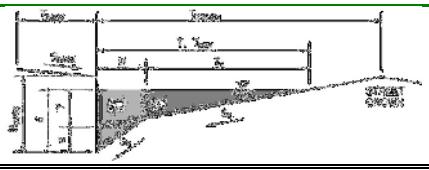
ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project:

Inlet ID: **Inlet for Basin A-1**



Gutter Geometry:

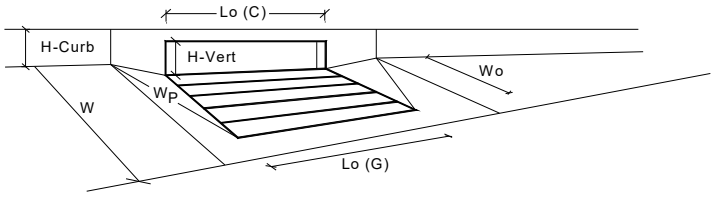
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	0.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.018	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	12.0	ft
Gutter Width	W =	1.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	12.0	12.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	6.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)



CDOT Type R Curb Opening

Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	3.6	3.6	☐ Override Depths
Grate Information		MINOR	MAJOR	
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	1.00	1.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	

Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.22	0.22	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.47	0.47	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	

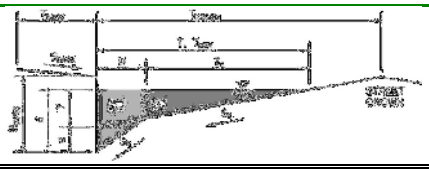
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**2.3**	**2.3**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	0.8	1.5	cfs

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project:

Inlet ID: **Inlet for Basin A-2**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	6.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.018	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	25.0	ft
Gutter Width	W =	1.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.012	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	25.0	25.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	6.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

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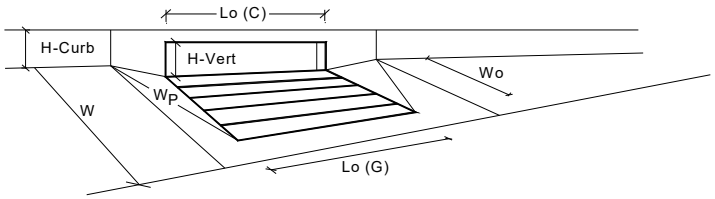


CDOT Type R Curb Opening

Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	6.0	6.0	☐ Override Depths
Grate Information		MINOR	MAJOR	
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	1.00	1.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	

Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.42	0.42	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.77	0.77	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	

		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**5.9**	**5.9**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	1.3	2.5	cfs

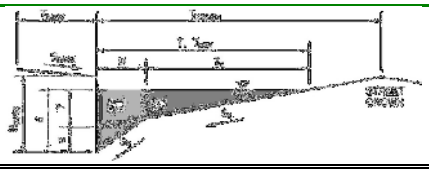
MHFD-Inlet, Version 5.01 (April 2021)

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project:

Inlet ID: **Inlet for Basin A-3**



Gutter Geometry:

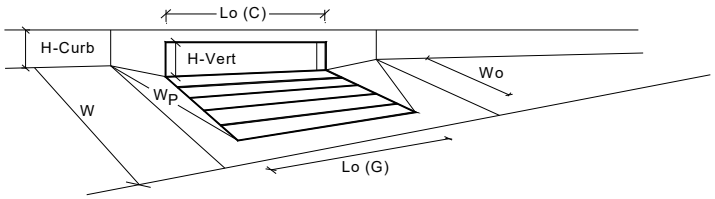
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	0.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.018	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	12.0	ft
Gutter Width	W =	1.00	ft
Street Transverse Slope	S_X =	0.047	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.012	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	12.0	12.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	6.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

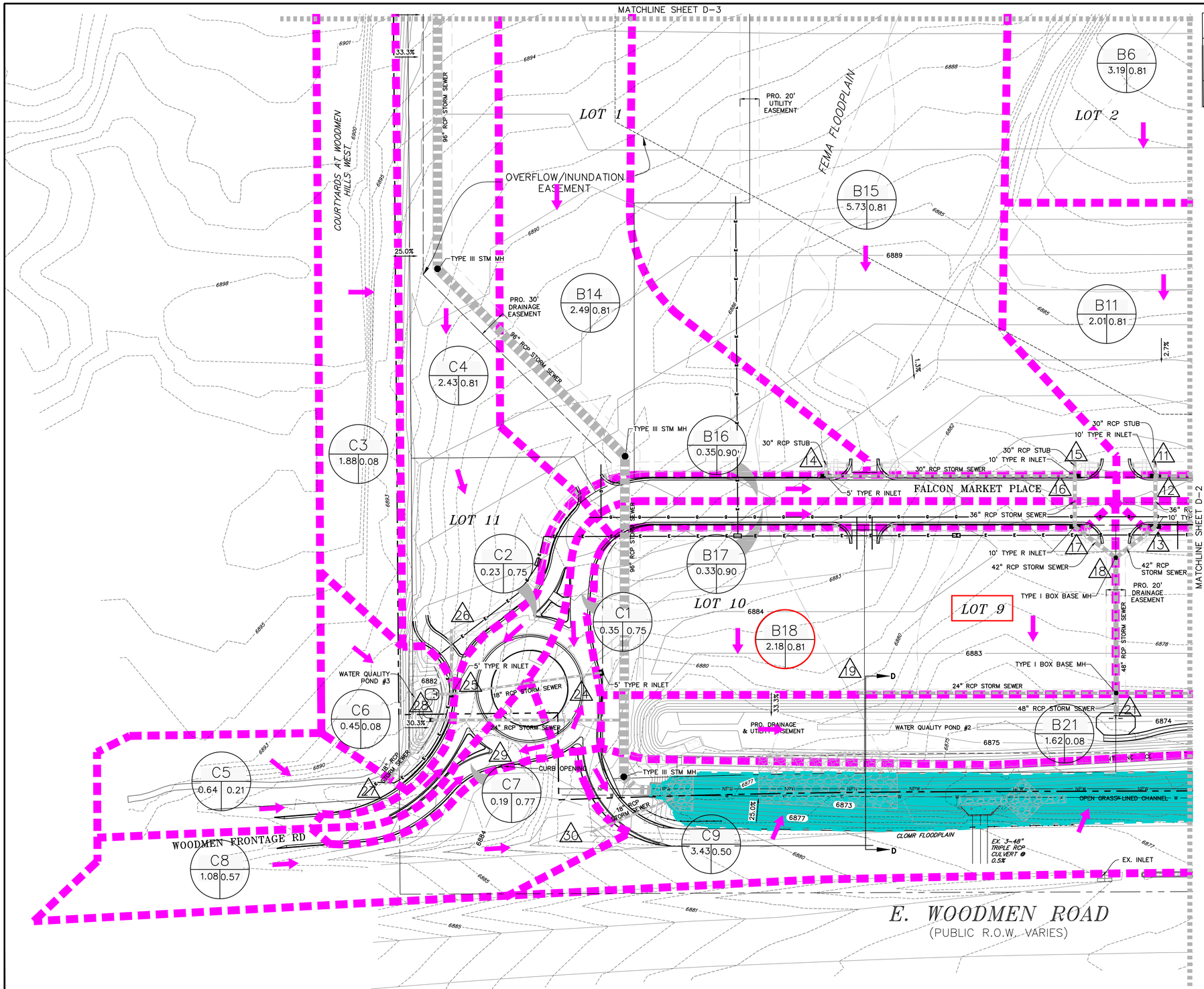
MHFD-Inlet, Version 5.01 (April 2021)

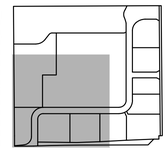


CDOT Type R Curb Opening

Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	☐ Override
Water Depth at Flowline (outside of local depression)	Ponding Depth =	6.0	6.0	
Grate Information		MINOR	MAJOR	
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	1.00	1.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.42	0.42	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.77	0.77	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**5.9**	**5.9**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	1.0	1.9	cfs

FINAL DRAINAGE REPORT EXCERPT
1 OF 2





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
	DP01	32.50	10.3	30.2

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DRAINAGE PLAN FOR FALCON MARKETPLACE

FALCON, COLORADO

ISSUE	DATE
INITIAL ISSUE	6-28-19
REVISED	7-19-19

DESIGNED BY:	TDM
DRAWN BY:	KGV
CHECKED BY:	TDM
FILE NAME:	

PREPARED UNDER MY DIRECT SUPERVISION FOR AND ON BEHALF OF DREXEL, BARRELL & CO.

DRAWING SCALE:
HORIZONTAL: 1"=50'
VERTICAL: N/A

PROPOSED DRAINAGE CONDITIONS

PROJECT NO. 20988-00CSCV

DRAWING NO.

D-1

SHEET: 1 OF 5

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

For Colorado Springs and much of the Fountain Creek watershed, the 1-hour depths are fairly uniform and are summarized in Table 6-2. Depending on the location of the project, rainfall depths may be calculated using the described method and the NOAA Atlas maps shown in Figures 6-6 through 6-17.

Table 6-2. Rainfall Depths for Colorado Springs

Return Period	1-Hour Depth	6-Hour Depth	24-Hour Depth
2	1.19	1.70	2.10
5	1.50	2.10	2.70
10	1.75	2.40	3.20
25	2.00	2.90	3.60
50	2.25	3.20	4.20
100	2.52	3.50	4.60

Where Z= 6,840 ft/100

These depths can be applied to the design storms or converted to intensities (inches/hour) for the Rational Method as described below. However, as the basin area increases, it is unlikely that the reported point rainfalls will occur uniformly over the entire basin. To account for this characteristic of rain storms an adjustment factor, the Depth Area Reduction Factor (DARF) is applied. This adjustment to rainfall depth and its effect on design storms is also described below. The UDFCD UD-Rain spreadsheet, available on UDFCD's website, also provides tools to calculate point rainfall depths and Intensity-Duration-Frequency curves[2] and should produce similar depth calculation results.

2.2 Design Storms

Design storms are used as input into rainfall/runoff models and provide a representation of the typical temporal distribution of rainfall events when the creation or routing of runoff hydrographs is required. It has long been observed that rainstorms in the Front Range of Colorado tend to occur as either short-duration, high-intensity, localized, convective thunderstorms (cloud bursts) or longer-duration, lower-intensity, broader, frontal (general) storms. The significance of these two types of events is primarily determined by the size of the drainage basin being studied. Thunderstorms can create high rates of runoff within a relatively small area, quickly, but their influence may not be significant very far downstream. Frontal storms may not create high rates of runoff within smaller drainage basins due to their lower intensity, but tend to produce larger flood flows that can be hazardous over a broader area and extend further downstream.

- **Thunderstorms**: Based on the extensive evaluation of rain storms completed in the Carlton study (Carlton 2011), it was determined that typical thunderstorms have a duration of about 2 hours. The study evaluated over 300,000 storm cells using gage-adjusted NEXRAD data, collected over a 14-year period (1994 to 2008). Storms lasting longer than 3 hours were rarely found. Therefore, the results of the Carlton study have been used to define the shorter duration design storms.

  To determine the temporal distribution of thunderstorms, 22 gage-adjusted NEXRAD storm cells were studied in detail. Through a process described in a technical memorandum prepared by the City of Colorado Springs (City of Colorado Springs 2012), the results of this analysis were interpreted and normalized to the 1-hour rainfall depth to create the distribution shown in Table 6-3 with a 5 minute time interval for drainage basins up to 1 square mile in size. This distribution represents the rainfall

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

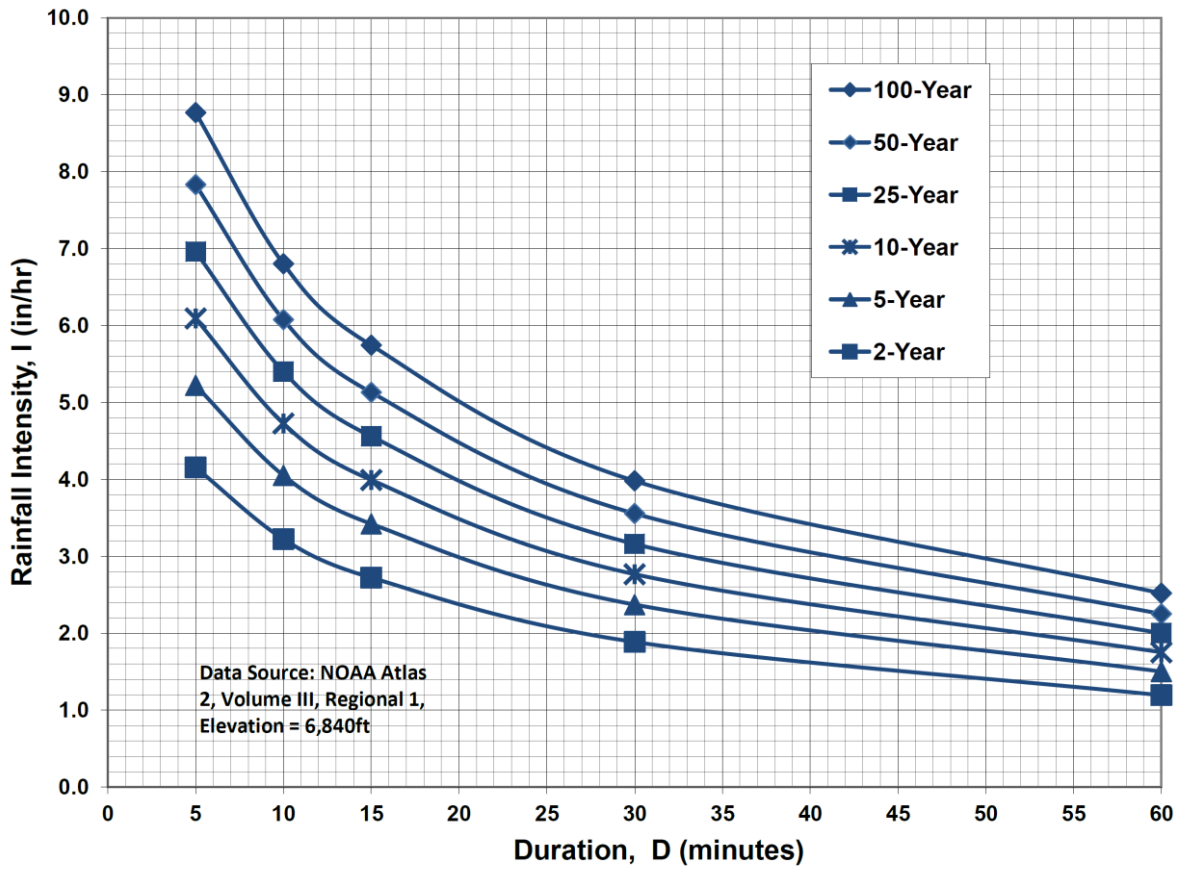
Land Use or Surface Characteristics	Percent Impervious	Runoff Coefficients											
		2-year		5-year		10-year		25-year		50-year		100-year	
		HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D
Business													
Commercial Areas	95	0.79	0.80	0.81	0.82	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.

Figure 6-5. Colorado Springs Rainfall Intensity Duration Frequency



IDF Equations

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

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

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

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

$I_{5} = -1.50 \ln(D) + 7.583$

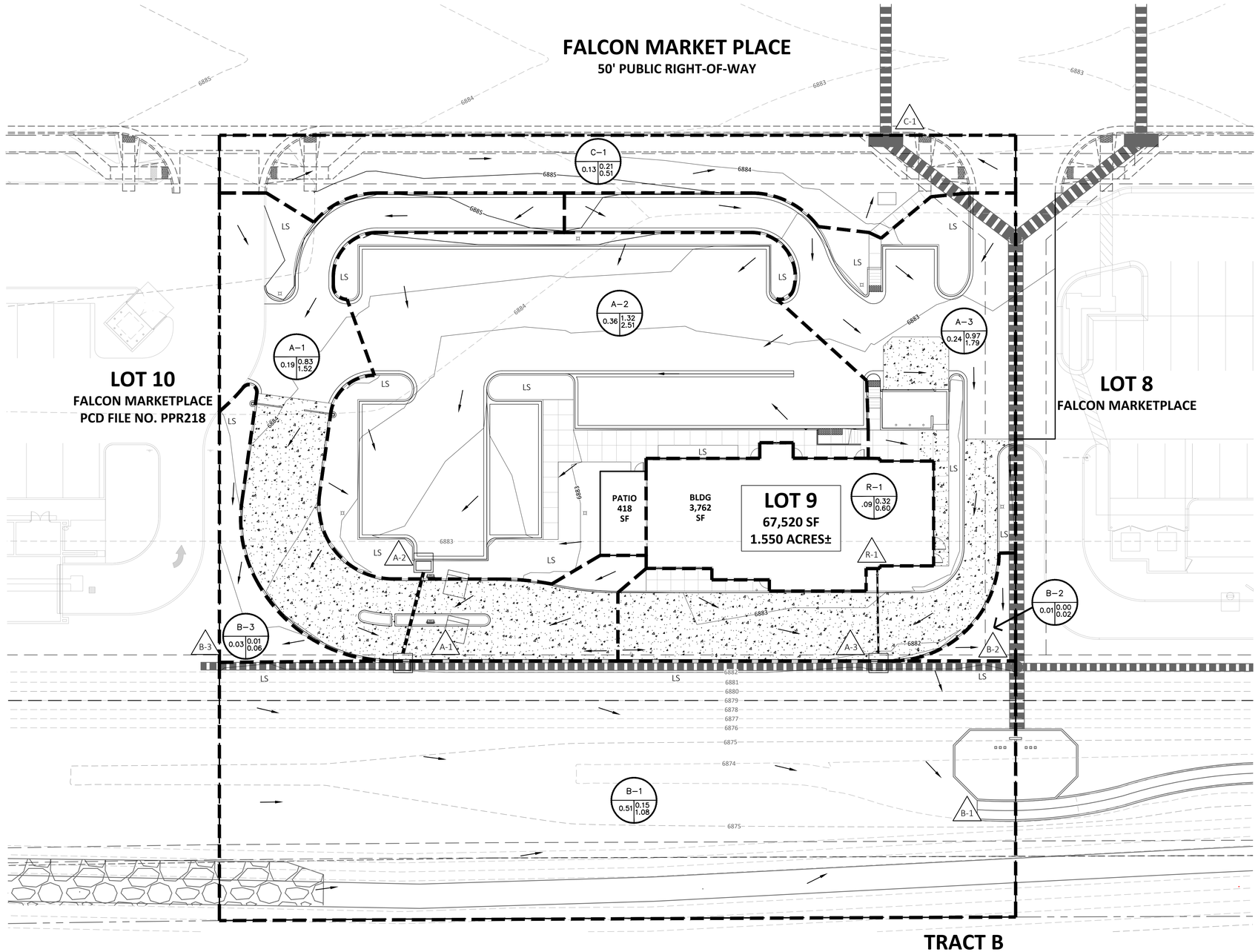
$I_{2} = -1.19 \ln(D) + 6.035$

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

SLIM CHICKEN'S - FALCON

DRAINAGE LETTER

A PARCEL OF LAND LOCATED IN THE SE QUARTER OF SECTION 1, TOWNSHIP 13 SOUTH, RANGE 65 WEST OF THE SIXTH PRINCIPAL MERIDIAN, CITY OF FALCON, COUNTY OF EL PASO, STATE OF COLORADO



LEGEND

- PROPERTY LINE
- EXISTING CURB AND GUTTER
- PROPOSED CURB AND GUTTER
- PROPOSED STORM SEWER PIPE
- PROPOSED STORM SEWER INLET
- 5280 — PROPOSED CONTOUR
- 5280 — EXISTING CONTOUR
- LS — LANDSCAPE AREA
- BASIN BOUNDARY
- DRAINAGE ARROW
- A-1 — PROPOSED DESIGN POINT

A-0 — BASIN
AREA IN ACRES: 0.00
5-YEAR RUNOFF COEFFICIENT: 0.00
100-YEAR RUNOFF COEFFICIENT: 0.00

SUMMARY RUNOFF TABLE

BASIN	AREA (ACRES)	Q 5-YR (CFS)	Q 100-YR (CFS)
A-1	0.19	0.83	1.52
A-2	0.36	1.32	2.51
A-3	0.24	0.97	1.79
R-1	0.09	0.32	0.60
*B-1	0.51	0.15	1.08
B-2	0.01	0.00	0.02
B-3	0.03	0.01	0.06
C-1	0.13	0.21	0.51

BASIS OF BEARING:

THE BEARINGS AS SHOWN HEREON AND IN THE RECOREDED PLAT ARE BASED UPON THE THE CONSIDERATION THAT THE NORTH LINE OF THE SE 1/4 OF THE SE 1/4 OF SECTION 1, TOWNSHIP 13 SOUTH, RANGE 65 WEST OF THE SIXTH P.M. IS ASSUMED TO BEAR SOUTH 89°44'22" WEST. SAID LINE IS DOCUMENTED IN THE RECORDED PLAT, DATED 12-19-19.

BENCHMARK:

ELEVATIONS ARE BASED UPON THE COLORADO SPRINGS UTILITIES FACILITIES INFORMATION MANAGEMENT SYSTEM (FIMS) MONUMENT BLT167 (ELEVATION = 6873.18 NVGD29)

GENERAL NOTES

1. *BASIN B-1 IS NOT USED IN ANY CALCULATIONS AND IS TO REMAIN UNTOUCHED.
2. THE HYDROLOGICAL SOIL GROUP PRESENT IN THIS PROJECT SITE IS BLAKELAND-FLUVAQUENTIC HAPLAQUOLLS. SEE ATTACHED SOILS REPORT FOR FULL SOIL ANALYSIS.

N
20 10 0 20
SCALE 1"=20'

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DRAINAGE LETTER

SLIM CHICKEN'S - FALCON

FALCON, COLORADO

JOB NO. 21.030

DESCRIPTION	DATE
1ST DRAINAGE LETTER SUBMITTAL	06.14.2021
2ND DRAINAGE LETTER SUBMITTAL	08.26.2021
3RD DRAINAGE LETTER SUBMITTAL	11.16.2021
FINAL DRAINAGE LETTER SUBMITTAL	01.25.2022

PROPOSED DRAINAGE MAP

SHEET 1/1