MVE, INC.
ENGINEERS SURVEYORS
1903 lelaray street, suite 200
colorado springs, co 80909
719.635.5736

Final Drainage Report

Lot 1, Wolf Business Park Filing No. 2

Project No. 61156

June 21, 2021

PCD File No.

Final Drainage Report

for

Lot 1, Wolf Business Park Filing No. 2

Project No. 61156

June 21, 2021

prepared for

Riviera Electric, LLC
18985 Base Camp Road, Suite B-6
Monument, CO 80132

prepared by

MVE, Inc.
1903 Lelaray Street, Suite 200
Colorado Springs, CO 80909
719.635.5736

Statements and Acknowledgments

Engineer's Statement

This report and plan for the drainage design of Lot 1, Wolf Business Park Filing No. 2 was prepared by me (or under my direct supervision) and is correct to the best of my knowledge and belief. Said report and plan has been prepared in accordance with the City / County Drainage Report Criteria and is in conformity with the master plan of the drainage basin. I accept responsibility for any liability caused by any negligent acts, errors or omissions on my part in preparing this report.

_____ _____

Charles C. Crum, P.E. Colorado No. 13348 Date
For and on Behalf of MVE, Inc.

Developer's Statement

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

_____ _____

Riviera Electric LLC Date
18985 Base Camp Road, Suite B-6
Monument, CO 80132

Town of Monument Statement

Filed in accordance with the Code of the Town of Monument.

_____ _____

Director of Development Services Date
Town of Monument

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Final Drainage Report

The purpose of this Final Drainage Report is to identify drainage patterns and quantities within and affecting the proposed Lot 1, Wolf Business Park Filing No. 2 site. The report will identify specific solutions to problems on-site and off-site resulting from the proposed project. The report and included maps present results of hydrologic and drainage facilities analyses. The report will discuss the recommended drainage improvements to the site and identify drainage requirements relative to the proposed project. This report has been prepared and submitted in accordance with the requirements of the El Paso County development approval process. An Appendix is included with this report with pertinent calculations and graphs used in the drainage analyses and design.

1 General Location and Description

1.1 Location

The proposed Lot 1, Wolf Business Park Filing No. 2 site is located within the east one-half of the southwest one-quarter of Section 11, Township 11 South, Range 67 west of the 6th Principal Meridian in El Paso County, Colorado. The 1.17± acre site is situated on the east side of Beacon Light Road, north of 8th street, east of interstate 25. The site contains is currently a vacant lot, and is surrounded by vacant lots on all sides. The El Paso County Assessor's Schedule Number for the site is 7111306006. The site was originally platted with Wolf Business Park Filing No. 1, and was later included in the replat of wolf business park filing No. 2. A **Vicinity Map** is included in the **Appendix**. The site is located in the Crystal Creek Major Drainage Basin.

1.2 Description of Property

Wolf Business Park Filing No. 2 is a platted commercial subdivision in the Town of Monument, Colorado. The original subdivision plat consisted of four lots comprising approximately 10 acres on the east side of Beacon Lite Road. The subdivision included platting of Wolf Court as a public road extending east from Beacon Lite Road to a cul-de-sac. Preliminary site development activities included construction of the Wolf Court roadway and utilities, construction of a storm water detention pond on the un-platted property southwest of the site, and construction of a 48-inch storm sewer along the west boundary of the subdivision. The development of Lot 7, Wolf Business Park Filing No. 2 has occurred.

Wolf Business Park Filing No. 2 reconfigured the original platted lot lines, and includes an additional area of approximately 5 acres adjoining the south boundary of the original subdivision. The re-plat created a total of 7 commercial lots, along with a tract to encompass the existing storm water detention pond at the southwest corner of the subdivision.

Riviera Electric, LLC is planning to construct a commercial building on Lot 1, Wolf Business Park Filing No. 2. The site has an El Paso County Tax Schedule No. of 7113-06-006. The re-plat of Wolf Business Park Filing No. 2 includes the subject Lot 1.

The proposed site development plan for Lot 1 consists of a new 7,000 square-foot office / warehouse building with asphalt parking areas, landscaping, and related site improvements. Access to the new commercial lot will be provided by two connections to Wolf Court on the south side of the site.

The Lot 1 site is surrounded by vacant properties on all sides. The existing storm water detention pond that was sized and constructed to accommodate storm water flows from Lot 1 is located south of the site.

This report is intended to meet the Town of Monument requirements for a Final Drainage Report in support of the proposed Development Plan for Riviera Electric, LLC on Lot 1. A Preliminary Drainage Report in support of the Wolf Business Park Filing No. 2 re-plat has been accepted by the Town of Monument.

The ground cover is in fair to good condition and consists of native grasses, sparse brush and sparse coniferous trees.

The existing site topography generally slopes to the south with grades of about 8% to 15%.

There is an existing 48" RCP that runs along the west side of the site. All storm runoff flows drain to an existing storm drain system through an inlet on Wolf Court. The storm drain system drains to an existing Extended Detention Basin (EDB) located south of the subdivision. All flows from the site eventually enter Crystal Creek.

The developed drainage plan for Wolf Business Park Filing No. 1 was designed to convey on-site developed drainage into the existing storm water detention pond located at the southwest corner of the subdivision. Based on review of the previous subdivision drainage report and the proposed re-plat, the existing pond has sufficient capacity to accept developed flows from the full extents of the re-platted subdivision.

The existing detention pond has a capacity of approximately 4.4 acre-feet.

Pond sizing calculation per the previous drainage reports were performed using the Denver Urban Drainage "UD-Detention_v3.07" software. As such, the existing pond has sufficient capacity to accept developed flows from the replatted subdivision, and the existing pond is the optimal outfall location for developed drainage from the site.

According to the National Resource Conservation Service, there is one (1) soil type in the Lot 1, Wolf Business Park Filing No. 2 site. Tomah-Crowfoot Complex (map unit 93) makes up 100% of the soil on the site. The soil is deep and well drained. Permeability is moderately rapid, surface runoff is slow, and the hazard of erosion is slight to moderate. Tomah-Crowfoot Complex is classified as being part of Hydrologic Soil Group B. A portion of the Soil Map and data tables from the National Cooperative Soil Survey and relevant Official Soil Series Descriptions (OSD) are included in the **Appendix**.[1] [2]

2 Drainage Basins and Sub-Basins

2.1 Major Basin Descriptions

The Lot 1, Wolf Business Park Filing No. 2 site is located within the Crystal Creek Drainage Basin (FOMO5300). The Crystal Creek Drainage Basin Covers an area of approximately 19 square miles and drains to Monument Creek. The *Dirty Woman Creek and Crystal Creek Drainage Basin Planning Study* provides development recommendations and requirements for drainage development in the Crystal Creek Drainage Basin (DBPS).[3] The Crystal Creek Drainage Basin encompasses a small portion of northern El Paso County. The drainage basin drains southwesterly into Monument Creek. The Lot 1, Wolf Business Park Filing No. 2 site is located north of Monument Creek. The site is located in sub-basin CC167 upstream of Design Point 167 of the Drainage Basin Planning Study. No improvements are recommended on or near the project site. The proposed Lot 1, Wolf Business Park Filing No. 2 project is in conformance with the DBPS.

1 WSS
2 OSD
3 DBPS

The current Flood Insurance Study of the region includes Flood Insurance Rate Maps (FIRM), effective on December 7, 2018.[4] The proposed subdivision is included in the Community Panel Numbered 08041C0276 G of the Flood Insurance Rate Maps for the El Paso County. No part of the site is shown to be included in a 100-year flood hazard area as determined by FEMA. A portion of the current FEMA Flood Insurance Rate Maps with the site delineated is included in the **Appendix**.

2.2 Sub-Basin Description

The existing drainage patterns of the Lot 1, Wolf Business Park Filing No. 2 project are described by two (2) on-site drainage basins, and two (2) off-site drainage basins. All of these basins are previously undisturbed or developed to a degree as described below. All existing basin delineations and data are depicted on the attached **Existing Drainage Map**.

The approved Preliminary Drainage Report for Wolf Business Park Filing No. 2[5] states that the storm water detention pond at the south end of the property will mitigate developed flow impacts from the Wolf Business Park development, and further states that should the vacant lot to the north of the site ever be developed, any flows leaving that site should be restricted to historical rates so as not to overburden any system located within this project.

2.2.1 Existing Drainage Patterns (Off-Site)

The Lot 1, Wolf Business Park Filing No. 2 site receives drainage flows from two off-site sub-basins. Sub-basin CC167 was identified in the Drainage Basin Planning Study for Dirty Woman Creek and Crystal Creek. This sub-basin is located north of the site and drains into the existing 48” RCP located in the northwestern corner of the site.

Sub-basin OS1 is located east of the site and contains pasture/meadow. This sub-basin drains west onto the site and continues through the site to an existing inlet located on Wolf Court.

2.2.2 Existing Drainage Patterns (On-Site)

Existing sub-basin EX-A, located in the northern portion of the site, containing a pasture/meadow area, drains north into the 48” RCP located in the northwestern corner of the site. These flows continue flowing south through the 48” RCP and eventually enter the Extended Detention Basin located south of the site.

Existing sub-basin EX-B makes up the majority of the site. The sub-basin contains pasture/meadow areas. All flows from sub-basin B exit the site to the southwest into the inlet located on Wolf Court. These flows continue south through the drainage pipe until they reach the Extended Detention Basin located south of the site.

3 Drainage Design Criteria

3.1 Development Criteria Reference

This Final Drainage Report for Lot 1, Wolf Business Park Filing No. 2 has been prepared according to the report guidelines presented in the latest edition of *El Paso County Drainage Criteria Manual* (DCM)[6]. The County has also adopted portions of the City of Colorado Springs Drainage Criteria Manual Volumes 1 and 2, especially concerning the calculation of rainfall runoff flow rates.[7] [8] The hydrologic analysis is based on a collection of data from the DCM, the NRCS Web Soil Survey[9], and existing topographic data by Polaris Surveying, Inc.

4 FIRM
5 FDR
6 DCM Section 4.3 and Section 4.4
7 CS DCM Vol 1
8 CS DCM Vol 2
9 WSS

3.2 Previous Drainage Studies

The *Preliminary Drainage Report Wolf Business Park Filing No. 2 and Final Drainage Report Lot 7, Wolf Business Park Filing No. 2*[10] was referenced in preparation of this Final Drainage Report.

3.3 Hydrologic Criteria

For this Final Drainage Report, the Rational Method as described in the *Drainage Criteria Manual* has been used for all Storm Runoff calculations, as the development and all sub-basins are less than 130 acres in area. "Colorado Springs Rainfall Intensity Duration Frequency" curves, Figure 6-5 in the DCM, was used to obtain the design rainfall values; a copy is included in the **Appendix**. The "Overland (Initial) Flow Equation" (Eq. 6-8) in the DCM, and Manning's equation with estimated depths were used in time of concentration calculations. "Runoff Coefficients for Rational Method", Table 6-6 in the DCM, was utilized as a guide in estimating runoff coefficient and Percent Impervious values; a copy is included in the **Appendix**. Peak runoff discharges were calculated for each drainage sub-basin for both the 5-year storm event and the 100-year storm event with the Rational Method formula, (Eq. 6-5) in the DCM.[11]

In the case of any required stormwater quality treatment and/or stormwater detention requirements, the "Water Quality Control Volume procedure, Section 3.2.3 of the *Urban Drainage and Flood Control District Drainage Criteria Manual, Volume 3* (UDFCD)[12] [13]method was used for water quality volume calculations with the aid of the "UD-BMP_v3.06" spreadsheet developed by the Urban Drainage and Flood Control District. Storm routing calculation through the proposed water quality basin was performed using triangular hydrographs based on the rational method peak discharges and times of concentrations with the aid of the detention design spreadsheet, "UD-Detention_v3.07", developed by the Urban Drainage and Flood Control District.[14]

4 Drainage Facility Design

4.1 General Concept

The intent of the drainage concept presented in this Final Drainage Report is to allow for the development of a 7,000 square foot commercial building while maintaining the existing drainage patterns on the site. The site will be in compliance with the County's Stormwater Management regulations. Permanent water quality treatment will be provided by an existing EDB that was sized to treat the water from the entire subdivision. Major and minor storm flows will continue to be safely conveyed through the site and downstream.

The existing and proposed drainage hydrologic conditions are described in more detail below. Input data and results for all calculations are included in the **Appendix**. Drainage maps for the hydrology are also included in the **Appendix**.

4.2 Specific Details

4.2.1 Existing Hydrologic Conditions

As shown on the enclosed Existing Drainage Plan, the existing site has been delineated with two (2) on-site sub-basins (EX-A, and EX-B), and two (2) off-site sub-basins (CC167, and OS1) flowing towards the southern side of the property. Sub-basin CC167 was identified in the Drainage Basin Planning Study for Dirty Woman Creek and Crystal Creek. The DBPS calculates the flows of the sub-basin at design point CC167 as Q_{10} = 49 cfs and Q_{100} = 116 cfs.

Storm water flows from sub-basins CC167, and EX-A drain to an inlet on the northern side of the site at Existing Design Point 1 (EX-DP1) then flows south through an existing 48 inch pipe that runs along the western border of the site. Sub-basin EX-A generates peak flows of Q_5 = 0.0 cfs and Q_{100} =

10 DBPS
11 DCM
12 UDFCD V.2
13 UDFCDV.3
14 UDFCD

0.3 cfs (proposed flows). The accumulated flows from Basins EX-A & OSA1 are Q_{10} = 49.1 cfs and Q_{100} = 116.3 cfs at EX-DP1.

Flows from sub-basins OS1, and EX-B flow overland through the site towards wolf Court where it drains into an inlet on the street at Existing Design Point 2 (EX-DP2). The accumulated flows from Basins EX-B & OSB1 are Q_5 = 0.5 cfs and Q_{100} = 3.5 cfs at EX-DP2.

4.2.2 Proposed Hydrologic Conditions

As shown on the enclosed Developed Drainage Plan, the developed site has been delineated as on-site Basins A, B, C, D, E, and F, and off site Basins CC167 (identified in the DBPS for Dirty Woman Creek and Crystal Creek[15]), and OS1 flowing towards the southern side of the property. Storm water flows from sub-basin A drains to an inlet on the northern side of the site then flows south through a 48 inch pipe that runs along the western border of the site. Flows from sub-basin D flow through a pipe located at the base of the loading area and enters previously mentioned pipe on the west side of the site. All other storm water flows will flow overland to be routed by Wolf Court and collected in the existing inlet, carried by storm water piping, and ultimately flowing into the detention pond.

Lot 1 has been delineated with one (1) on-site, and one (1) off-site drainage basin flowing towards Design Point 1 (DP1) at the northwest corner of the property, as well as one (1) off-site, and four (4) on-site sub-basins that all drain to Design Point 2 (DP2) at the southwestern corner of the site.

Basin A will flow overland to and be collected by an existing 48" RCP at DP1. Sub-basin A generates peak flows of Q_5 = 1.0 cfs and Q_{100} = 1.9 cfs (proposed flows) an increase of Q_5 = 1.0 cfs and Q_{100} = 1.6 cfs. Basin CC167 will also flow overland to said inlet at DP1. The accumulated flows from Basins A & CC167 are Q_{10} = 50.2 cfs and Q_{100} = 117.9 cfs at DP1 an increase of Q_{10} = 1.1 cfs and Q_{100} = 1.6 cfs from the existing conditions. These flows are collected by the existing 48" RCP which drains south along the west side of the site to the existing storm water detention pond immediately south of the property.

Off-site sub-basin OS1 will flow southeast overland into sub-basin E. Sub-basins B, C, E, & F will all drain south through the site to Wolf Court. The flows will converge at DP2 (an inlet south of the site located on Wolf Court) with flows of Q_5 = 2.1 cfs and Q_{100} = 5.0 cfs an increase of Q_5 = 1.6 cfs and Q_{100} = 1.5 cfs from the existing conditions.

Sub-basin D is located on the western side of the site and contains the loading dock area. Sub-basin D generates peak flows of Q_5 = 0.1 cfs and Q_{100} = 0.1 cfs (proposed flows), which drain through an 8" drain pipe located at the base of the loading dock. The drain pipe flows west and outlets into the existing 48" RCP that runs along the western side of the property.

There are no public roadway or drainage infrastructure improvements required for the proposed site development. The existing storm water detention pond south of this site provides an adequate outfall for developed drainage from this site. As such, the proposed project is not anticipated to have any significant drainage impact on downstream drainage facilities or adjacent properties.

4.3 Four Step Process

The El Paso County Engineering Criteria Manual (Appendix I, Section I.7.2) requires the consideration of a "Four Step Process for receiving water protection that focuses on reducing runoff volumes, treating the water quality capture volume (WQCV), stabilizing drainageways, and implementing long term source controls".

1) Runoff Reduction Practices are employed in this project. Impervious surfaces have been reduced as much as practically possible. There is only minimal concrete or other hard surfaces proposed.

2) There are no drainage paths on the site that are required to be stabilized as they are well vegetated with no visual erosion.

3) The project contains no potentially hazardous uses. WQCV will be treated in the existing EDB located south of the subdivision. This EDB was initially sized to handle developed flows from the

15 DBPS

entire subdivision based on the approved Preliminary Drainage Report for Wolf Business Park Filing No. 2

4) The rural residential site is not anticipated to contain storage of potentially harmful substances or use of potentially harmful substances. No site specific or other source control BMPs are required.

5 Drainage and Bridge Fees

Drainage fees were paid at the time of the initial plat, and are therefore not due at this time.

6 Conclusion

This Final Drainage Report presents existing and proposed drainage conditions for the proposed Lot 1, Wolf Business Park Filing No. 2 project. The development will have negligible and inconsequential effects on the existing site drainage and drainage conditions downstream. The proposed project will not, with respect to stormwater runoff, negatively impact the adjacent properties and downstream properties.

References

NRCS Web Soil Survey. United States Department of Agriculture, Natural Resources Conservation Service ("http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx", accessed March, 2018).

NRCS Official Soil Series Descriptions. United States Department of Agriculture, Natural Resources Conservation Service ("http://soils.usda.gov/technical/classification/osd/index.html", accessed March, 2018).

Drainage Basin Planning Study Dirty Woman Creek and Crystal Creek. Kiowa Engineering (Colorado Springs: El Paso County, September 1993).

Flood Insurance Rate Map. Federal Emergency Management Agency, National Flood Insurance Program (Washingon D.C.: FEMA, December 7, 2018).

Preliminary drainage Report Wolf Business Park Filing No. 2 and Final Drainage Report Lot 7, Wolf Business Park Filing No. 2. Hammers Construction, Inc. (: El Paso County, 2017).

NCSS Web Soil Survey. United States Department of Agriculture, Natural Resources Conservation Service ("http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx", accessed May, 2017).

Drainage Criteria Manual Volume 2, Stormwater Quality Policies, Procedures and Best Management Practices (BMPs). City of Colorado Spring Engineering Division (Colorado Springs: , May 2014).

City of Colorado Springs Drainage Criterial Manual, Volume 1. City of Colorado Springs Engineering Division Staff, Matrix Desgin Group/Wright Water Engineers (Colorado Springs: , May 2014).

City of Colorado Springs/El Paso County Drainage Criteria Manual. City of Colorado Springs, Department of Public Works, Engineering Division; HDR Infrastructure, Inc.; El Paso County, Department of Public Works, Engineering Division (Colorado Springs: City of Colorado Springs, Revised November 1991).

City of Colorado Springs Drainage Criteria Manual Volume 1. City of Colorado Springs Engineering Division with Matrix Design Group and Wright Water Engineers (Colorado Springs, Colorado: , May 2014).

Detention Design Spreadsheet. Urban Drainage and Flood Control District ("http://www.udfcd.org/downloads/software/UD-Detention_v2.2.xls", accessed January 2010).

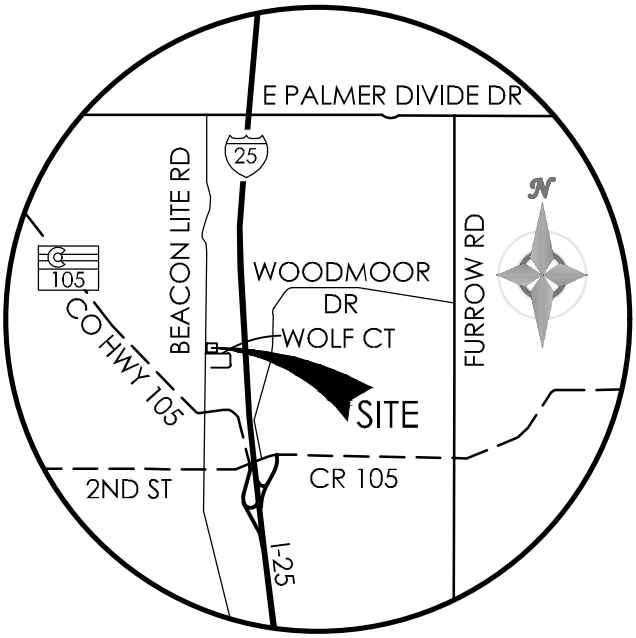
Urban Storm Drainage Criteria Manual Volume 3. Urban Drainage and Flood Control District (Denver, Colorado: , August, 2011).

Drainage Criteria Manual (Volume 2). Urban Drainage and Flood Control District (Denver, Colorado: Urban Drainage and Flood Control District, Rev. April, 2008).

Appendices

7 General Maps and Supporting Data

Vicinity Map
Portions of Flood Insurance Rate Map
Portion of Drainage Area Identification Study Map
NRCS Soil Map and Tables
SCS Soil Type Descriptions
Hydrologic Soil Group Map and Tables



VICINITY MAP

NOT TO SCALE

National Flood Hazard Layer FIRMette

FEMA

104°52'21"W 39°6'34"N

104°51'43"W 39°6'6"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

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*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- B 20.2 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
- 8 Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

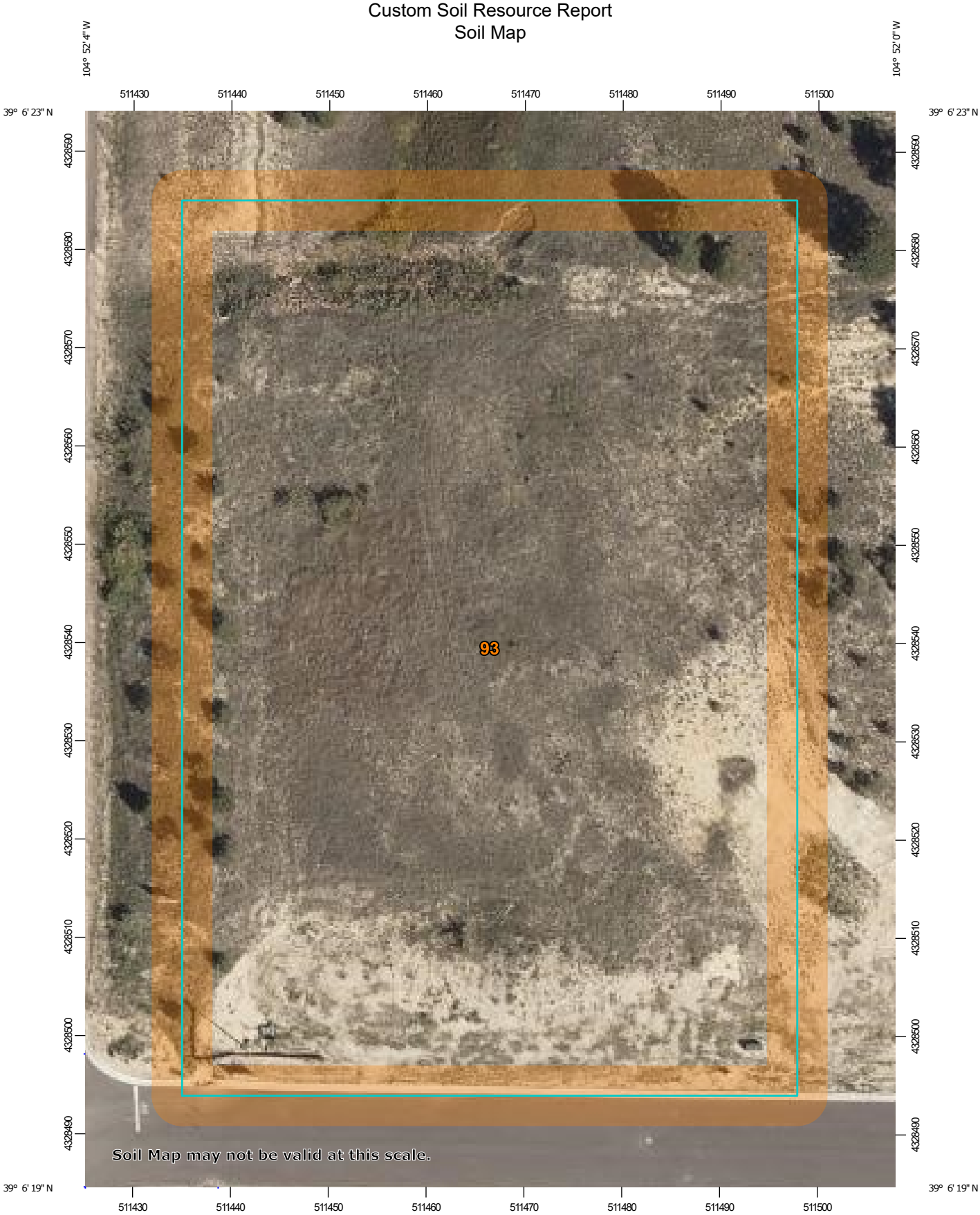
The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 5/20/2021 at 4:32 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Custom Soil Resource Report
Soil Map



Map Scale: 1:534 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 5 10 20 30

Feet: 0 25 50 100 150

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: Aug 19, 2018—Sep 23, 2018

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

strength. Special designs for buildings and roads are required to offset these limitations. Methods of sewage disposal other than septic tank absorption fields are needed because of the limited depth to bedrock. Capability subclass VIe.

92—Tomah-Crowfoot loamy sands, 3 to 8 percent slopes. These gently sloping to moderately sloping soils are on alluvial fans, hills, and ridges in the uplands. Elevation ranges from about 7,300 to 7,600 feet. The average annual precipitation is about 17 inches, the average annual air temperature is about 42 degrees F, and the average frost-free period is about 120 days.

The Tomah soil makes up about 50 percent of the complex, the Crowfoot soil about 30 percent, and other soils about 20 percent.

Included with these soils in mapping are areas of Elbeth sandy loam, 3 to 8 percent slopes; Kettle gravelly loamy sand, 3 to 8 percent slopes; and Pring coarse sandy loam, 3 to 8 percent slopes.

The Tomah soil is deep and well drained. It formed in alluvium or residuum derived from arkose beds. Typically, the surface layer is dark grayish brown loamy sand about 10 inches thick. The subsurface layer is very pale brown coarse sand about 12 inches thick. The subsoil, about 26 inches thick, is a matrix of very pale brown coarse sand in which are embedded many thin bands and lamellae of pale brown coarse sandy clay loam. The substratum is very pale brown coarse sand to a depth of 60 inches or more.

Permeability of the Tomah soil is moderately rapid. Effective rooting depth is 60 inches or more. Available water capacity is moderate. Surface runoff is slow, and the hazard of erosion is slight to moderate.

The Crowfoot soil is deep and well drained. It formed in sediment weathered from arkosic sandstone. Typically, the surface layer is grayish brown loamy sand about 12 inches thick. The subsurface layer is very pale brown sand about 11 inches thick. The subsoil is light yellowish brown sandy clay loam about 13 inches thick. The substratum is very pale brown coarse sand to a depth of about 68 inches.

Permeability of the Crowfoot soil is moderate. Effective rooting depth is 60 inches or more. Available water capacity is moderate. Surface runoff is slow, and the hazard of erosion is slight to moderate.

This complex is used as rangeland, for wildlife habitat, and as homesites.

Native vegetation is mainly mountain muhly, bluestem, mountain brome, needleandthread, and blue grama. These soils are subject to invasion by Kentucky bluegrass and Gambel oak. Noticeable forbs are hairy goldenrod, geranium, milkvetch, low larkspur, fringed sage, and buckwheat.

Properly locating livestock watering facilities helps to control grazing. Timely deferment of grazing is needed to protect the plant cover.

Windbreaks and environmental plantings are fairly well suited to these soils. Blowing sand and moderate available water capacity are the principal limitations for the establishment of trees and shrubs. The soils are so loose that trees need to be planted in shallow furrows and plant cover needs to be maintained between the rows. Supplemental irrigation may be needed to insure survival. Trees that are best suited and have good survival are Rocky Mountain juniper, eastern redcedar, ponderosa pine, and Siberian elm. Shrubs that are best suited are skunkbush sumac, lilac, and Siberian peashrub.

These soils are best suited to habitat for openland wildlife such as pronghorn antelope and sharp-tailed grouse. Although sharp-tailed grouse are not plentiful, they could be encouraged on these soils, especially where brush species are interspersed with grasses and forbs. If these soils are used as rangeland, wildlife production can be increased by managing livestock grazing to preclude overuse of the more desirable grass species and depletion of the various brush species.

These soils have good potential for use as homesites. The main limitation of the Crowfoot soil is frost-action potential. Roads and streets need to be designed to minimize frost-heave damage. Maintaining the existing vegetation on building sites during construction helps to control erosion. Capability subclass IVe.

93—Tomah-Crowfoot loamy sands, 8 to 15 percent slopes. These moderately sloping to strongly sloping soils are on alluvial fans, hills, and ridges in the uplands. Elevation ranges from about 7,300 to 7,600 feet. The average annual precipitation is about 17 inches, the average annual air temperature is about 42 degrees F, and the average frost-free period is about 120 days.

The Tomah soil makes up about 50 percent of the complex, the Crowfoot soil about 30 percent, and other soils about 20 percent.

Included with these soils in mapping are areas of Elbeth sandy loam, 8 to 15 percent slopes; Peyton-Pring complex, 8 to 15 percent slopes; and Kettle gravelly loamy sand, 8 to 40 percent slopes.

The Tomah soil is deep and well drained. It formed in alluvium or residuum derived from arkose beds. Typically, the surface layer is dark grayish brown loamy sand about 10 inches thick. The subsurface layer is very pale brown coarse sand about 12 inches thick. The subsoil, about 26 inches thick, consists of a matrix of very pale brown coarse sandy clay loam. The substratum is very pale brown coarse sand to a depth of 60 inches or more.

Permeability of the Tomah soil is moderately rapid. Effective rooting depth is 60 inches or more. Available water capacity is moderate. Surface runoff is medium, and the hazard of erosion is moderate. Some gullies are present in some drainageways and along stock trails.

The Crowfoot soil is deep and well drained. It formed in sediment weathered from arkosic sandstone. Typically, the surface layer is grayish brown loamy sand about 12 inches thick. The subsurface layer is very pale brown sand about 11 inches thick. The subsoil is light yellowish brown sandy clay loam about 13 inches thick. The substratum is very pale brown coarse sand to a depth of about 68 inches.

Permeability of the Crowfoot soil is moderate. Effective rooting depth is 60 inches or more. Available water capacity is moderate. Surface runoff is medium, and the hazard of erosion is moderate. Some gullies are present in some drainageways and along stock trails.

The soils in this complex are used as rangeland, for recreation and wildlife habitat, and as homesites.

Native vegetation is mainly mountain muhly, bluestem, mountain brome, needleandthread, and blue grama. These soils are subject to invasion by Kentucky bluegrass and Gambel oak. Noticeable forbs are hairy goldenrod, geranium, milkvetch, low larkspur, fringed sage, and buckwheat.

Proper location of livestock watering facilities helps to control grazing. Timely deferment of grazing is needed to protect the plant cover.

Windbreaks and environmental plantings are fairly well suited to these soils. Blowing sand and moderate available water capacity are the main limitations for the establishment of trees and shrubs. The soils are so loose that trees need to be planted in shallow furrows and plant cover needs to be maintained between the rows. Supplemental irrigation may be needed to insure survival. Trees that are best suited and have good survival are Rocky Mountain juniper, eastern redcedar, ponderosa pine, and Siberian elm. Shrubs that are best suited are skunkbush sumac, lilac, and Siberian peashrub.

These soils are best suited to habitat for openland wildlife species, such as pronghorn antelope and sharp-tailed grouse. Although sharp-tailed grouse are not plentiful, they could be encouraged on these soils, especially where brush species are interspersed with grasses and forbs. If these soils are used as rangeland, wildlife production can be increased by managing livestock grazing to preclude overuse of the more desirable grass species and depletion of the various brush species.

The main limitations for urban uses are frost-action potential and slope on the Crowfoot soil and slope on the Tomah soil. Buildings and roads must be designed to overcome these limitations. Access roads must have adequate cut-slope grade and be provided with drains to control surface runoff. Maintaining the existing vegetation on building sites during construction helps to control erosion. Capability subclass VIe.

94—Travessilla-Rock outcrop complex, 8 to 90 percent slopes. This moderately sloping to extremely steep complex is mostly on rocky uplands (fig. 5). Elevation ranges from 6,200 to 6,700 feet. The average annual precipitation is about 15 inches, the average annual air temperature is about 47 degrees F, and the average frost-free period is about 140 days.

The Travessilla soil makes up about 45 percent of the complex, Rock outcrop about 30 percent, and included areas about 25 percent.

Included with this complex in mapping are areas of Bresser sandy loam, 5 to 9 percent slopes, Elbeth sandy loam, 8 to 15 percent slopes, Kettle gravelly loamy sand, 8 to 40 percent slopes, and Louviers silty clay loam, 3 to 18 percent slopes. The Elbeth and Kettle soils commonly are on the north-facing slopes.

The Travessilla soil is shallow and well drained. It formed in residuum derived from sandstone. Typically, the surface layer is light brownish gray sandy loam about 3 inches thick. The underlying material is pale brown sandy loam about 8 inches thick. Hard arkosic sandstone that has some fractures is at a depth of about 11 inches.

Permeability of the Travessilla soil is moderately rapid. Effective rooting depth is 6 to 20 inches. Available water capacity is low. Surface runoff is medium to rapid, and the hazard of erosion is high. Gullies are common along drainageways and trails.

Rock outcrop occurs mostly as ledges on cliffs.

This complex is used for urban development, as homesites, and for recreation and wildlife habitat.

This complex is suited to the production of ponderosa pine. The main limitations are the presence of stones and rock outcrop on the surface and a high hazard of erosion. Stones on the surface can hinder felling, yarding, and other operations involving the use of equipment. Practices must be used to minimize soil erosion when harvesting timber. The low available water capacity can influence seedling survival.

Wildlife on these soils is limited mostly to small animals such as cottontail, squirrel, and birds because of the extent of urban development. Ponderosa pine, mountain-mahogany, Gambel oak, and various grasses provide food, cover, and nesting areas.

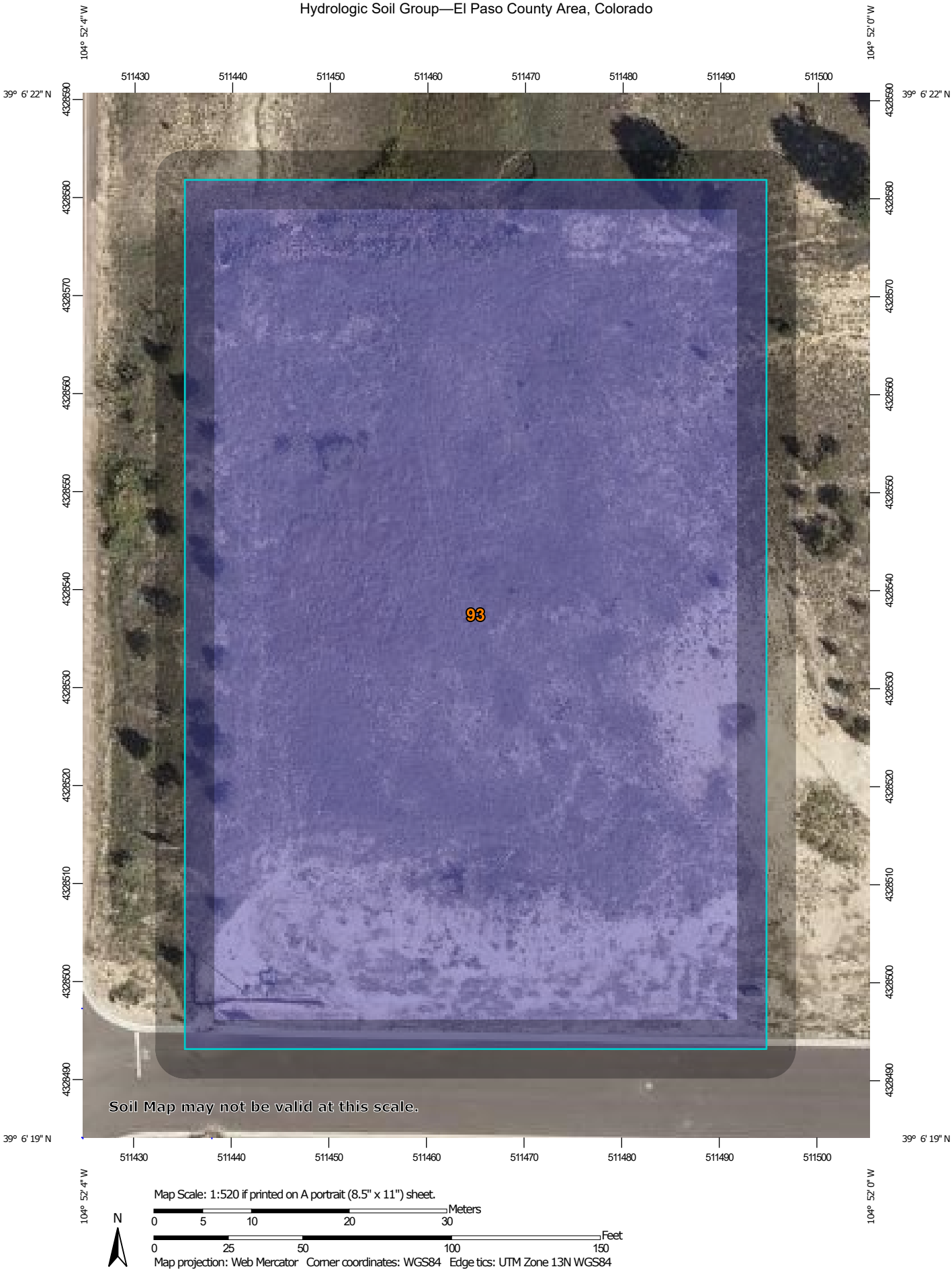
This complex is extensively used for urban development and as homesites (fig. 6). The main limitations for these uses are depth to bedrock, rock outcrop, and steep slopes. Septic tank absorption fields do not function properly because of the depth to bedrock. Special designs for buildings and roads and streets are needed to overcome the limitations. Plans for homesite development should provide for the preservation of as many trees as possible because of their esthetic value. Capability subclass VIIe.

95—Truckton loamy sand, 1 to 9 percent slopes. This deep, well drained soil formed in alluvium and residuum derived from arkosic sedimentary rock on uplands. Elevation ranges from 6,000 to 7,000 feet. The average annual precipitation is about 15 inches, the average annual air temperature is about 47 degrees F, and the average frost-free period is about 135 days.

Typically, the surface layer is grayish brown loamy sand about 8 inches thick. The subsoil is brown sandy loam about 18 inches thick. The substratum is light yellowish brown coarse sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Blakeland loamy sand, 1 to 9 percent slopes; Bresser sandy loam, 3 to 5 percent sloeps; Bresser sandy loam, 5 to 9 percent slopes; Truckton sandy loam, 0 to 3 percent slopes; and Truckton sandy loam, 3 to 9 percent slopes.

Permeability of this Truckton soil is moderately rapid. Effective rooting depth is 60 inches or more. Available water capacity is moderate. Surface runoff is slow, and the hazard of erosion is moderate to high.


104° 52' 4" W
104° 52' 0" W
39° 6' 22" N
39° 6' 19" N
511430
511440
511450
511460
511470
511480
511490
511500
4328590
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4328510
4328500
4328490
93
Soil Map may not be valid at this scale.
Map Scale: 1:520 if printed on A portrait (8.5" x 11") sheet.
N
Meters
0 5 10 20 30
Feet
0 25 50 100 150
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.

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

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

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

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

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

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

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

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

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
93	Tomah-Crowfoot complex, 8 to 15 percent slopes	B	1.3	100.0%
Totals for Area of Interest			**1.3**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

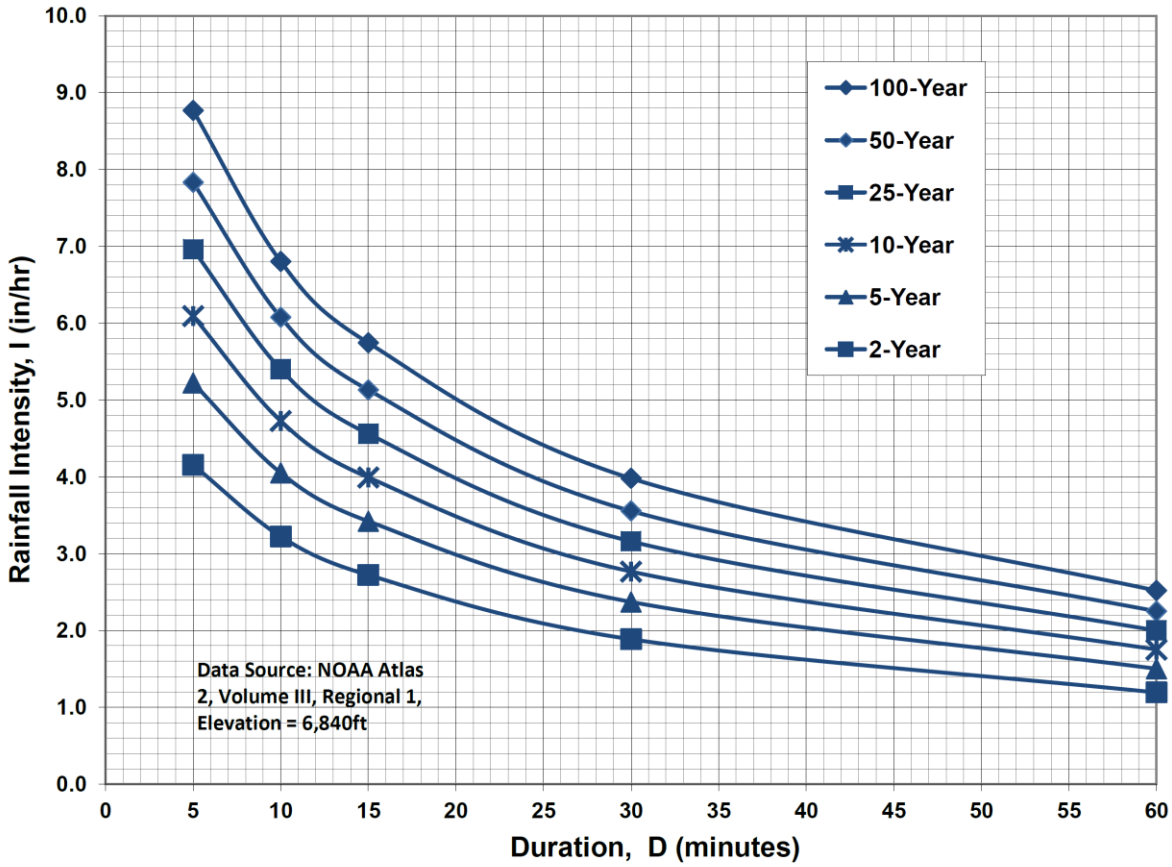
Component Percent Cutoff: None Specified

Tie-break Rule: Higher

8 Hydrologic Calculations

Runoff Coefficients and Percent Imperviousness Table 6-6
Colorado Springs Rainfall Intensity Duration Frequency Figure 6-5
Hydrologic Calculations Summary Form SF-1 for Existing & Developed Conditions
Hydrologic Calculations Summary 5-yr Form SF-2 for Existing & Developed Conditions
Hydrologic Calculations Summary 100-yr Form SF-2 for Existing & Developed Conditions

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.

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

Job No.: **61156**

Project: **Lot 1, Wolf Business Park Filing No. 2**

Date: **7/2/2021 9:59**

Calcs By: **WCG**

Checked By:

Time of Concentration (Modified from Standard Form SF-1)

Sub-Basin	Sub-Basin Data				Overland			Shallow Channel				Channelized				t_c Check		
	Area (Acres)	C_5	C_{100}/CN	% Imp.	L_0 (ft)	S_0 (%)	t_i (min)	L_{0t} (ft)	S_{0t} (ft/ft)	v_{0sc} (ft/s)	t_t (min)	L_{0c} (ft)	S_{0c} (ft/ft)	v_{0c} (ft/s)	t_c (min)	L (min)	$t_{c,alt}$ (min)	t_c (min)
OS1	0.46	0.08	0.35	0%	100	9%	8.9	69	0.087	2.1	0.6	0	0.000	0.0	0.0	169	10.9	9.5
EX-A	0.10	0.08	0.35	0%	100	9%	8.9	0	0.000	0.0	0.0	0	0.000	0.0	0.0	100	10.6	8.9
EX-B	1.07	0.08	0.35	0%	100	13%	7.9	230	0.061	1.7	2.2	0	0.000	0.0	0.0	330	11.8	10.1
A	0.36	0.63	0.76	67%	100	2%	6.8	122	0.016	0.9	2.3	0	0.000	0.0	0.0	222	11.2	9.0
B	0.23	0.59	0.73	62%	100	2%	7.4	115	0.035	1.3	1.5	0	0.000	0.0	0.0	215	11.2	8.8
C	0.44	0.83	0.90	95%	100	2%	3.9	120	0.017	0.9	2.2	0	0.000	0.0	0.0	220	11.2	6.1
D	0.02	0.90	0.96	100%	55	7%	1.4	0	0.000	0.0	0.0	0	0.000	0.0	0.0	55	10.3	5.0
E	0.06	0.08	0.35	0%	100	3%	12.8	147	0.048	1.5	1.6	0	0.000	0.0	0.0	247	11.4	11.4
F	0.05	0.14	0.40	8%	11	18%	2.2	0	0.000	0.0	0.0	0	0.000	0.0	0.0	11	10.1	5.0

Job No.: **61156**
Project: **Lot 1, Wolf Business Park Filing No. 2**
Design Storm: **5-Year Storm** *(20% Probability)*
Jurisdiction: **UDFCD**

Date: **7/2/2021 9:59**
Calcs By: **WCG**
Checked By:

Sub-Basin and Combined Flows (Modified from Standard Form SF-2)

				Direct Runoff				Combined Runoff				Streetflow			Pipe Flow					Travel Time		
DP	Sub-Basin	Area (Acres)	C5	t_c (min)	CA (Acres)	I5 (in/hr)	Q5 (cfs)	t_c (min)	CA (Acres)	I5 (in/hr)	Q5 (cfs)	Slope (%)	Length (ft)	Q (cfs)	Q (cfs)	Slope (%)	Mnngs n	Length (ft)	D_{Pipe} (in)	Length (ft)	v_{0sc} (ft/s)	t_t (min)
	EX-A	0.10	0.08	8.9	0.01	4.24	0.03															
	OS1	0.46	0.08	9.5	0.04	4.14	0.15															
	EX-B	1.07	0.08	10.1	0.09	4.04	0.34															
EX-DP2		1.52	0.08					11.2	0.12	3.88	0.5											
	A	0.36	0.63	9.0	0.23	4.22	0.95															
	OS1	0.46	0.08	9.5	0.04	4.14	0.15															
	B	0.23	0.59	8.8	0.14	4.25	0.58															
	C	0.44	0.83	6.1	0.37	4.81	1.77															
	EX-B	1.07	0.08	10.1	0.09	4.04	0.34															
	F	0.05	0.14	5.0	0.01	5.09	0.04															
DP2		1.25	0.44					11.5	0.55	3.84	2.1											
	D	0.02	0.90	5.0	0.02	5.09	0.08															

Rainfall Intensity: I = (28.5 * P1) / (10 + tc)^0.786
P1: 1.5

Job No.: **61156**
Project: **Lot 1, Wolf Business Park Filing No. 2**
Design Storm: **100-Year Storm** *(1% Probability)*
Jurisdiction: **UDFCD**

Date: **7/2/2021 9:59**
Calcs By: **WCG**
Checked By:

Sub-Basin and Combined Flows (Modified from Standard Form SF-2)

				Direct Runoff				Combined Runoff				Streetflow			Pipe Flow					Travel Time		
DP	Sub-Basin	Area (Acres)	C100	t_c (min)	CA (Acres)	I100 (in/hr)	Q100 (cfs)	t_c (min)	CA (Acres)	I100 (in/hr)	Q100 (cfs)	Slope (%)	Length (ft)	Q (cfs)	Q (cfs)	Slope (%)	Mnngs n	Length (ft)	D_{Pipe} (in)	Length (ft)	v_{0sc} (ft/s)	t_t (min)
	EX-A	0.10	0.35	8.9	0.04	7.12	0.25															
	OS1	0.46	0.35	9.5	0.16	6.96	1.11															
	EX-B	1.07	0.35	10.1	0.37	6.79	2.54															
EX-DP2		1.52	0.35					11.2	0.53	6.52	3.5											
	A	0.36	0.76	9.0	0.27	7.08	1.93															
	OS1	0.46	0.35	9.5	0.16	6.96	1.11															
	B	0.23	0.73	8.8	0.17	7.15	1.21															
	C	0.44	0.90	6.1	0.40	8.08	3.23															
	EX-B	1.07	0.35	10.1	0.37	6.79	2.54															
	F	0.05	0.40	5.0	0.02	8.55	0.18															
DP2		1.25	0.62					11.5	0.77	6.45	5.0											
	D	0.02	0.96	5.0	0.02	8.55	0.14															

Rainfall Intensity: I = (28.5 * P1) / (10 + tc)^0.786
P1: 2.52

Sub-Basin OS1 Runoff Calculations

Job No.:	**61156**	Date:	**7/2/2021 9:59**
Project:	**Lot 1, Wolf Business Park Filing No. 2**	Calcs by:	**WCG**
		Checked by:	
Jurisdiction	**UDFCD**	Soil Type	**B**
Runoff Coefficient	**Surface Type**	Urbanization	**Urban**

Basin Land Use Characteristics

Surface	Area (SF)	Area (Acres)	Runoff Coefficient C2	C5	C10	C25	C50	C100	% Imperv.
Pasture/Meadow	19,902	0.46	0.02	0.08	0.15	0.25	0.3	0.35	0%
Combined	**19,902**	**0.46**	**0.02**	**0.08**	**0.15**	**0.25**	**0.30**	**0.35**	**0.0%**

19902

Basin Travel Time

-

Shallow Channel Ground Cover Short Pasture/Lawns

$L_{max,Overland}$ 300 ft C_v 7

	L (ft)	ΔZ_0 (ft)	S_0 (ft/ft)	v (ft/s)	t (min)	t_{Alt} (min)	
Total	169	15	-	-	-	-	
Initial Time	100	9	0.090	-	8.9	10.9	UDFCD Formula RO-3
Shallow Channel	69	6	0.087	2.1	0.6	-	UDFCD Formula RO-4
Channelized			0.000	0.0	0.0	-	V-Ditch
				t_c	**9.5 min.**		

Rainfall Intensity & Runoff

	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Intensity (in/hr)	3.29	4.14	4.83	5.53	6.22	6.96
Runoff (cfs)	0.0	**0.2**	0.3	0.6	0.9	**1.1**
Release Rates (cfs/ac)	-	-	-	-	-	-
Allowed Release (cfs)	0.0	**0.2**	0.3	0.6	0.9	**1.1**

UDFCD: I = (28.5 * P1) / (10 + tc)^0.786

PI	1.19	1.5	1.75	2	2.25	2.52

Notes

Sub-Basin Ex-A Runoff Calculations

Job No.:	**61156**	Date:	**7/2/2021 9:59**
Project:	**Lot 1, Wolf Business Park Filing No. 2**	Calcs by:	**WCG**
		Checked by:	
Jurisdiction	**UDFCD**	Soil Type	**B**
Runoff Coefficient	**Surface Type**	Urbanization	**Urban**

Basin Land Use Characteristics

Surface	Area (SF)	Area (Acres)	Runoff Coefficient C2	C5	C10	C25	C50	C100	% Imperv.
Pasture/Meadow	4,391	0.10	0.02	0.08	0.15	0.25	0.3	0.35	0%
Combined	**4,391**	**0.10**	**0.02**	**0.08**	**0.15**	**0.25**	**0.30**	**0.35**	**0.0%**
	4391								

Basin Travel Time

-

Shallow Channel Ground Cover: Short Pasture/Lawns

$L_{max,Overland}$: 300 ft C_v: 7

	L (ft)	ΔZ_0 (ft)	S_0 (ft/ft)	v (ft/s)	t (min)	t_{Alt} (min)	
Total	100	9	-	-	-	-	
Initial Time	100	9	0.090	-	8.9	10.6	UDFCD Formula RO-3
Shallow Channel			0.000	0.0	0.0	-	UDFCD Formula RO-4
Channelized			0.000	0.0	0.0	-	V-Ditch
				t_c	**8.9**	**min.**	

Rainfall Intensity & Runoff

	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Intensity (in/hr)	3.36	4.24	4.95	5.65	6.36	7.12
Runoff (cfs)	0.0	**0.0**	0.1	0.1	0.2	**0.3**
Release Rates (cfs/ac)	-	-	-	-	-	-
Allowed Release (cfs)	0.0	**0.0**	0.1	0.1	0.2	**0.3**

UDFCD: I = (28.5 * P1) / (10 + tc)^0.786

PI	1.19	1.5	1.75	2	2.25	2.52

Notes

Sub-Basin Ex-B Runoff Calculations

Job No.:	**61156**	Date:	**7/2/2021 9:59**
Project:	**Lot 1, Wolf Business Park Filing No. 2**	Calcs by:	**WCG**
		Checked by:	
Jurisdiction	**UDFCD**	Soil Type	**B**
Runoff Coefficient	**Surface Type**	Urbanization	**Urban**

Basin Land Use Characteristics

Surface	Area (SF)	Area (Acres)	Runoff Coefficient C2	C5	C10	C25	C50	C100	% Imperv.
Pasture/Meadow	46,504	1.07	0.02	0.08	0.15	0.25	0.3	0.35	0%
Combined	**46,504**	**1.07**	**0.02**	**0.08**	**0.15**	**0.25**	**0.30**	**0.35**	**0.0%**
	4000								

Basin Travel Time

Shallow Channel Ground Cover: Short Pasture/Lawns

$L_{max,Overland}$: 300 ft C_v: 7

	L (ft)	ΔZ_0 (ft)	S_0 (ft/ft)	v (ft/s)	t (min)	t_{Alt} (min)	
Total	330	27	-	-	-	-	
Initial Time	100	13	0.130	-	7.9	11.8	UDFCD Formula RO-3
Shallow Channel	230	14	0.061	1.7	2.2	-	UDFCD Formula RO-4
Channelized			0.000	0.0	0.0	-	V-Ditch
				t_c	**10.1**	**min.**	

Rainfall Intensity & Runoff

	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Intensity (in/hr)	3.20	4.04	4.71	5.39	6.06	6.79
Runoff (cfs)	0.1	**0.3**	0.8	1.4	1.9	**2.5**
Release Rates (cfs/ac)	-	-	-	-	-	-
Allowed Release (cfs)	0.1	**0.3**	0.8	1.4	1.9	**2.5**

UDFCD: I = (28.5 * P1) / (10 + tc)^0.786

PI	1.19	1.5	1.75	2	2.25	2.52

Notes

Sub-Basin A Runoff Calculations

Job No.:	**61156**	Date:	**7/2/2021 9:59**
Project:	**Lot 1, Wolf Business Park Filing No. 2**	Calcs by:	**WCG**
		Checked by:	
Jurisdiction	**UDFCD**	Soil Type	**B**
Runoff Coefficient	**Surface Type**	Urbanization	**Urban**

Basin Land Use Characteristics

Surface	Area (SF)	Area (Acres)	Runoff Coefficient C2	C5	C10	C25	C50	C100	% Imperv.
Pasture/Meadow	5,185	0.12	0.02	0.08	0.15	0.25	0.3	0.35	0%
Paved	10,452	0.24	0.89	0.9	0.92	0.94	0.95	0.96	100%
Combined	**15,637**	**0.36**	**0.60**	**0.63**	**0.66**	**0.71**	**0.73**	**0.76**	**66.8%**
	15637								

Basin Travel Time

-

Shallow Channel Ground Cover: Short Pasture/Lawns

$L_{max,Overland}$: 300 ft C_v: 7

	L (ft)	ΔZ_0 (ft)	S_0 (ft/ft)	v (ft/s)	t (min)	t_{Alt} (min)	
Total	222	4	-	-	-	-	
Initial Time	100	2	0.020	-	6.8	11.2	UDFCD Formula RO-3
Shallow Channel	122	2	0.016	0.9	2.3	-	UDFCD Formula RO-4
Channelized			0.000	0.0	0.0	-	C&G
				t_c	**9.0**	**min.**	

Rainfall Intensity & Runoff

	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Intensity (in/hr)	3.35	4.22	4.92	5.62	6.33	7.08
Runoff (cfs)	0.7	**1.0**	1.2	1.4	1.7	**1.9**
Release Rates (cfs/ac)	-	-	-	-	-	-
Allowed Release (cfs)	0.7	**1.0**	1.2	1.4	1.7	**1.9**

UDFCD: I = (28.5 * P1) / (10 + tc)^0.786

PI	1.19	1.5	1.75	2	2.25	2.52

Notes

Sub-Basin B Runoff Calculations

Job No.:	**61156**	Date:	**7/2/2021 9:59**
Project:	**Lot 1, Wolf Business Park Filing No. 2**	Calcs by:	**WCG**
		Checked by:	
Jurisdiction	**UDFCD**	Soil Type	**B**
Runoff Coefficient	**Surface Type**	Urbanization	**Urban**

Basin Land Use Characteristics

	Area		Runoff Coefficient						%
Surface	**(SF)**	**(Acres)**	**C2**	**C5**	**C10**	**C25**	**C50**	**C100**	**Imperv.**
Pasture/Meadow	3,863	0.09	0.02	0.08	0.15	0.25	0.3	0.35	0%
Paved	6,259	0.14	0.89	0.9	0.92	0.94	0.95	0.96	100%
Combined	**10,122**	**0.23**	**0.56**	**0.59**	**0.63**	**0.68**	**0.70**	**0.73**	**61.8%**

10122

Basin Travel Time

-

Shallow Channel Ground Cover Short Pasture/Lawns

$L_{max,Overland}$ 300 ft C_v 7

	L (ft)	ΔZ_0 (ft)	S_0 (ft/ft)	v (ft/s)	t (min)	t_{Alt} (min)	
Total	215	6	-	-	-	-	
Initial Time	100	2	0.020	-	7.4	11.2	UDFCD Formula RO-3
Shallow Channel	115	4	0.035	1.3	1.5	-	UDFCD Formula RO-4
Channelized			0.000	0.0	0.0	-	C&G
				t_c	**8.8**	**min.**	

Rainfall Intensity & Runoff

	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Intensity (in/hr)	3.37	4.25	4.96	5.67	6.38	7.15
Runoff (cfs)	0.4	**0.6**	0.7	0.9	1.0	**1.2**
Release Rates (cfs/ac)	-	-	-	-	-	-
Allowed Release (cfs)	0.4	**0.6**	0.7	0.9	1.0	**1.2**

UDFCD: I = (28.5 * P1) / (10 + tc)^0.786

PI	1.19	1.5	1.75	2	2.25	2.52

Notes

Sub-Basin C Runoff Calculations

Job No.:	**61156**	Date:	**7/2/2021 9:59**
Project:	**Lot 1, Wolf Business Park Filing No. 2**	Calcs by:	**WCG**
		Checked by:	
Jurisdiction	**UDFCD**	Soil Type	**B**
Runoff Coefficient	**Surface Type**	Urbanization	**Urban**

Basin Land Use Characteristics

Surface	Area (SF)	Area (Acres)	Runoff Coefficient C2	C5	C10	C25	C50	C100	% Imperv.
Pasture/Meadow	233	0.01	0.02	0.08	0.15	0.25	0.3	0.35	0%
Paved	12,131	0.28	0.89	0.9	0.92	0.94	0.95	0.96	100%
Roofs	7,000	0.16	0.71	0.73	0.75	0.78	0.8	0.81	90%
Combined	**19,364**	**0.44**	**0.81**	**0.83**	**0.85**	**0.87**	**0.89**	**0.90**	**95.2%**
	19364								

Basin Travel Time

-

Shallow Channel Ground Cover: Short Pasture/Lawns

$L_{max,Overland}$: 300 ft C_v: 7

	L (ft)	ΔZ_0 (ft)	S_0 (ft/ft)	v (ft/s)	t (min)	t_{Alt} (min)	
Total	220	4	-	-	-	-	
Initial Time	100	2	0.020	-	3.9	11.2	UDFCD Formula RO-3
Shallow Channel	120	2	0.017	0.9	2.2	-	UDFCD Formula RO-4
Channelized			0.000	0.0	0.0	-	C&G
				t_c	**6.1**	**min.**	

Rainfall Intensity & Runoff

	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Intensity (in/hr)	3.82	4.81	5.61	6.41	7.22	8.08
Runoff (cfs)	1.4	**1.8**	2.1	2.5	2.8	**3.2**
Release Rates (cfs/ac)	-	-	-	-	-	-
Allowed Release (cfs)	1.4	**1.8**	2.1	2.5	2.8	**3.2**

UDFCD: I = (28.5 * P1) / (10 + tc)^0.786

PI	1.19	1.5	1.75	2	2.25	2.52

Notes

Sub-Basin Ex-A1 Runoff Calculations

Job No.:	**61156**	Date:	**7/2/2021 9:59**
Project:	**Lot 1, Wolf Business Park Filing No. 2**	Calcs by:	**WCG**
		Checked by:	
Jurisdiction	**UDFCD**	Soil Type	**B**
Runoff Coefficient	**Surface Type**	Urbanization	**Urban**

Basin Land Use Characteristics

Surface	Area (SF)	Area (Acres)	Runoff Coefficient C2	C5	C10	C25	C50	C100	% Imperv.
Paved	765	0.02	0.89	0.9	0.92	0.94	0.95	0.96	100%
Combined	**765**	**0.02**	**0.89**	**0.90**	**0.92**	**0.94**	**0.95**	**0.96**	**100.0%**
	765								

Basin Travel Time

-

Shallow Channel Ground Cover: Short Pasture/Lawns

$L_{max,Overland}$: 300 ft C_v: 7

	L (ft)	ΔZ_0 (ft)	S_0 (ft/ft)	v (ft/s)	t (min)	t_{Alt} (min)	
Total	55	4	-	-	-	-	
Initial Time	55	4	0.073	-	1.4	10.3	UDFCD Formula RO-3
Shallow Channel			0.000	0.0	0.0	-	UDFCD Formula RO-4
Channelized			0.000	0.0	0.0	-	C&G
				t_c	**5.0**	**min.**	

Rainfall Intensity & Runoff

	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Intensity (in/hr)	4.04	5.09	5.94	6.78	7.63	8.55
Runoff (cfs)	0.1	**0.1**	0.1	0.1	0.1	**0.1**
Release Rates (cfs/ac)	-	-	-	-	-	-
Allowed Release (cfs)	0.1	**0.1**	0.1	0.1	0.1	**0.1**

UDFCD: I = (28.5 * P1) / (10 + tc)^0.786

PI	1.19	1.5	1.75	2	2.25	2.52

Notes

Sub-Basin E Runoff Calculations

Job No.:	**61156**	Date:	**7/2/2021 9:59**
Project:	**Lot 1, Wolf Business Park Filing No. 2**	Calcs by:	**WCG**
		Checked by:	
Jurisdiction	**UDFCD**	Soil Type	**B**
Runoff Coefficient	**Surface Type**	Urbanization	**Urban**

Basin Land Use Characteristics

Surface	Area (SF)	Area (Acres)	Runoff Coefficient C2	C5	C10	C25	C50	C100	% Imperv.
Pasture/Meadow	2,672	0.06	0.02	0.08	0.15	0.25	0.3	0.35	0%
Combined	**2,672**	**0.06**	**0.02**	**0.08**	**0.15**	**0.25**	**0.30**	**0.35**	**0.0%**

2672

Basin Travel Time

-

Shallow Channel Ground Cover Short Pasture/Lawns

$L_{max,Overland}$ 300 ft C_v 7

	L (ft)	ΔZ_0 (ft)	S_0 (ft/ft)	v (ft/s)	t (min)	t_{Alt} (min)	
Total	247	10	-	-	-	-	
Initial Time	100	3	0.030	-	12.8	11.4	UDFCD Formula RO-3
Shallow Channel	147	7	0.048	1.5	1.6	-	UDFCD Formula RO-4
Channelized			0.000	0.0	0.0	-	V-Ditch
				t_c	**11.4 min.**		

Rainfall Intensity & Runoff

	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Intensity (in/hr)	3.06	3.85	4.49	5.14	5.78	6.47
Runoff (cfs)	0.0	**0.0**	0.0	0.1	0.1	**0.1**
Release Rates (cfs/ac)	-	-	-	-	-	-
Allowed Release (cfs)	0.0	**0.0**	0.0	0.1	0.1	**0.1**

UDFCD: I = (28.5 * P1) / (10 + tc)^0.786

PI	1.19	1.5	1.75	2	2.25	2.52

Notes

Sub-Basin F Runoff Calculations

Job No.:	**61156**	Date:	**7/2/2021 9:59**
Project:	**Lot 1, Wolf Business Park Filing No. 2**	Calcs by:	**WCG**
		Checked by:	
Jurisdiction	**UDFCD**	Soil Type	**B**
Runoff Coefficient	**Surface Type**	Urbanization	**Urban**

Basin Land Use Characteristics

Surface	Area (SF)	Area (Acres)	Runoff Coefficient C2	C5	C10	C25	C50	C100	% Imperv.
Pasture/Meadow	2,132	0.05	0.02	0.08	0.15	0.25	0.3	0.35	0%
Paved	183	0.00	0.89	0.9	0.92	0.94	0.95	0.96	100%
Combined	**2,315**	**0.05**	**0.09**	**0.14**	**0.21**	**0.30**	**0.35**	**0.40**	**7.9%**
	2315								

Basin Travel Time

-

Shallow Channel Ground Cover: Short Pasture/Lawns

$L_{max,Overland}$: 300 ft C_v: 7

	L (ft)	ΔZ_0 (ft)	S_0 (ft/ft)	v (ft/s)	t (min)	t_{Alt} (min)	
Total	11	2	-	-	-	-	
Initial Time	11	2	0.182	-	2.2	10.1	UDFCD Formula RO-3
Shallow Channel			0.000	0.0	0.0	-	UDFCD Formula RO-4
Channelized			0.000	0.0	0.0	-	V-Ditch
				t_c	**5.0**	**min.**	

Rainfall Intensity & Runoff

	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Intensity (in/hr)	4.04	5.09	5.94	6.78	7.63	8.55
Runoff (cfs)	0.0	**0.0**	0.1	0.1	0.1	**0.2**
Release Rates (cfs/ac)	-	-	-	-	-	-
Allowed Release (cfs)	0.0	**0.0**	0.1	0.1	0.1	**0.2**

UDFCD: I = (28.5 * P1) / (10 + tc)^0.786

PI	1.19	1.5	1.75	2	2.25	2.52

Notes

Combined Sub-Basin Runoff Calculations

Includes Basins OS1 EX-B

Job No.:	**61156**	Date:	**7/2/2021 9:59**
Project:	**Lot 1, Wolf Business Park Filing No. 2**	Calcs by:	**WCG**
		Checked by:	
Jurisdiction	**UDFCD**	Soil Type	**B**
Runoff Coefficient	**Surface Type**	Urbanization	**Urban**

Basin Land Use Characteristics

Surface	Area (SF)	Area (Acres)	Runoff Coefficient C2	C5	C10	C25	C50	C100	% Imperv.
Pasture/Meadow	66,406	1.52	0.02	0.08	0.15	0.25	0.3	0.35	0%
Combined	**66,406**	**1.52**	**0.02**	**0.08**	**0.15**	**0.25**	**0.30**	**0.35**	**0.0%**

Basin Travel Time

	Sub-basin or Channel Type	Material Type	L (ft)	Elev. ΔZ_0 (ft)	Q_i (cfs)	Base or Dia (ft)	Sides z:1 (ft/ft)	v (ft/s)	t (min)
Furthest Reach	OS1	-	169	15	-	-	-	-	9.5
Channelized-1	V-Ditch	2	330	27	1	0	2		1.7
Channelized-2									
Channelized-3									
Total			499	42					

2 = Natural, Winding, minimal vegetation/shallow grass

t_c (min) **11.2**

Contributing Offsite Flows (Added to Runoff and Allowed Release, below.)

Contributing Basins/Areas

Q_{Minor} (cfs) - 5-year Storm

Q_{Major} (cfs) - 100-year Storm

Rainfall Intensity & Runoff

	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Intensity (in/hr)	3.08	3.88	4.53	5.17	5.82	6.52
Site Runoff (cfs)	0.09	**0.47**	1.04	1.97	2.66	**3.48**
OffSite Runoff (cfs)	-	**0.00**	-	-	-	**0.00**
Release Rates (cfs/ac)	-	-	-	-	-	-
Allowed Release (cfs)	-	**0.5**	-	-	-	**3.5**

UDFCD: I = (28.5 * P1) / (10 + tc)^0.786

PI	1.19	1.5	1.75	2	2.25	2.52

Notes

Runoff from Offsite basins have been assumed constant, despite additional times of concentration.

Combined Sub-Basin Runoff Calculations

Includes Basins OS1 B C E F

Job No.:	**61156**	Date:	**7/2/2021 9:59**
Project:	**Lot 1, Wolf Business Park Filing No. 2**	Calcs by:	**WCG**
		Checked by:	
Jurisdiction	**UDFCD**	Soil Type	**B**
Runoff Coefficient	**Surface Type**	Urbanization	**Urban**

Basin Land Use Characteristics

Surface	Area (SF)	Area (Acres)	Runoff Coefficient C2	C5	C10	C25	C50	C100	% Imperv.
Pasture/Meadow	28,802	0.66	0.02	0.08	0.15	0.25	0.3	0.35	0%
Roofs	7,000	0.16	0.71	0.73	0.75	0.78	0.8	0.81	90%
Paved	18,573	0.43	0.89	0.9	0.92	0.94	0.95	0.96	100%
Combined	**54,375**	**1.25**	**0.41**	**0.44**	**0.49**	**0.55**	**0.59**	**0.62**	**45.7%**

Basin Travel Time

	Sub-basin or Channel Type	Material Type	L (ft)	Elev. ΔZ_0 (ft)	Q_i (cfs)	Base or Dia (ft)	Sides z:1 (ft/ft)	v (ft/s)	t (min)
Furthest Reach	OS1	-	169	15	-	-	-	-	9.5
Channelized-1	C&G	Concrete	220	4	1	0	0		2.0
Channelized-2									
Channelized-3									
Total			389	19					
								t_c (min)	**11.5**

Contributing Offsite Flows (Added to Runoff and Allowed Release, below.)

Contributing Basins/Areas		
Q_{Minor}		(cfs) - 5-year Storm
Q_{Major}		(cfs) - 100-year Storm

Rainfall Intensity & Runoff

	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Intensity (in/hr)	3.04	3.84	4.48	5.12	5.76	6.45
Site Runoff (cfs)	1.54	**2.13**	2.74	3.54	4.21	**4.97**
OffSite Runoff (cfs)	-	**0.00**	-	-	-	**0.00**
Release Rates (cfs/ac)	-	-	-	-	-	-
Allowed Release (cfs)	-	**2.1**	-	-	-	**5.0**

UDFCD: I = (28.5 * P1) / (10 + tc)^0.786

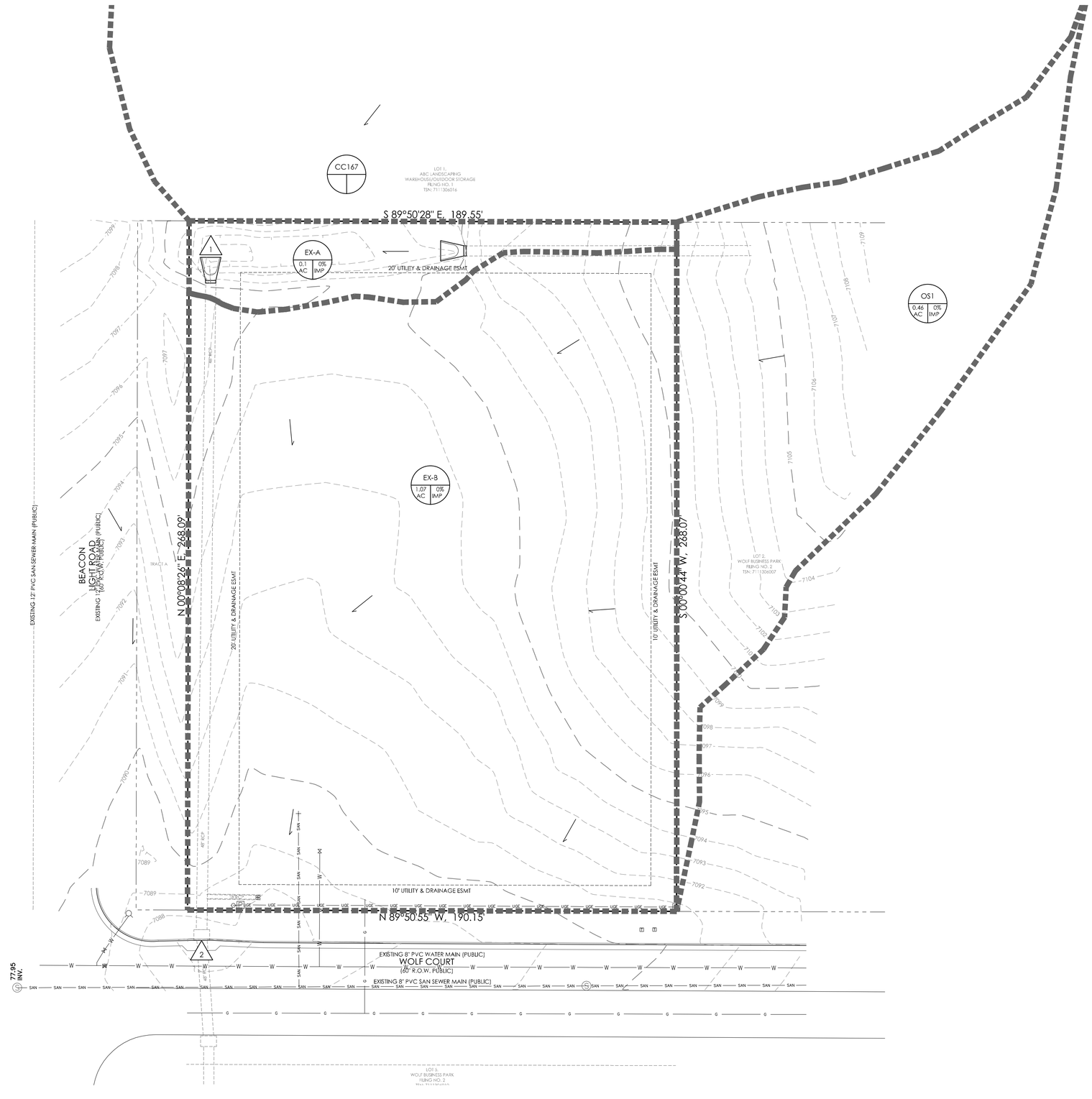
PI	1.19	1.5	1.75	2	2.25	2.52

Notes

Runoff from Offsite basins have been assumed constant, despite additional times of concentration.

9 Report Maps

Existing Condition Hydraulic Analysis Map
Proposed Condition Hydraulic Analysis Map



LEGEND

- PROPERTY LINE
- EASEMENT LINE
- LOT LINE

EXISTING

- 5985 — INDEX CONTOUR
- 84 — INTERMEDIATE CONTOUR

PROPOSED

- 5985 — INDEX CONTOUR
- 84 — INTERMEDIATE CONTOUR
- BASIN BOUNDARY
- Q = 19.0 cfs, Q_{100} = 40.0 cfs — GENERAL FLOW/DIRECTION
- 1.5% — SLOPE DIRECTION AND GRADE
- A1 — 1.0 AC, 90% IMP — BASIN LABEL: AREA IN ACRES, PERCENT IMPERVIOUS
- 1 — DESIGN POINT

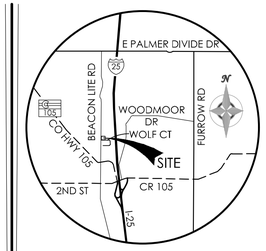
DEVELOPED DRAINAGE SUMMARY TABLE

DESIGN POINTS/ BASINS		AREA (AC)	Tc (MIN.)	RUNOFF Q5 (CFS)	RUNOFF Q100 (CFS)
	CC167				116.0
	OS1	0.46	9.5	0.2	1.1
	EX-A	0.10	8.9	0.0	0.3
	EX-B	1.07	10.1	0.3	2.5
DP-1	(CC167,EX-A)				116.3
DP-2	(OS1,EX-B)	1.52	11.2	0.5	3.5

FLOODPLAIN STATEMENT

NO PORTION OF THE SUBJECT PROPERTY IS LOCATED WITHIN A FEMA DESIGNATED SPECIAL FLOOD HAZARD AREA (SFHA) AS INDICATED ON THE FLOOD INSURANCE RATE MAP (FIRM) FOR EL PASO COUNTY, COLORADO AND INCORPORATED AREAS - MAP NUMBER 08041C0276 G, EFFECTIVE DECEMBER 7, 2018.

NOTE: SEE BASIN MAP FOR OFFSITE BASIN DETAILS



VICINITY MAP

NOT TO SCALE

BENCHMARK

N

5 0 10 20 40

1" = 20' 1:240

MVE INC. ENGINEERS / SURVEYORS

1903 lelaray street, suite 200 colorado springs co 80909 719.635.5736

REVISIONS

DESIGNED BY
DRAWN BY
CHECKED BY
AS-BUILTS BY
CHECKED BY

LOT 1, WOLF BUSINESS PARK FILING NO. 2

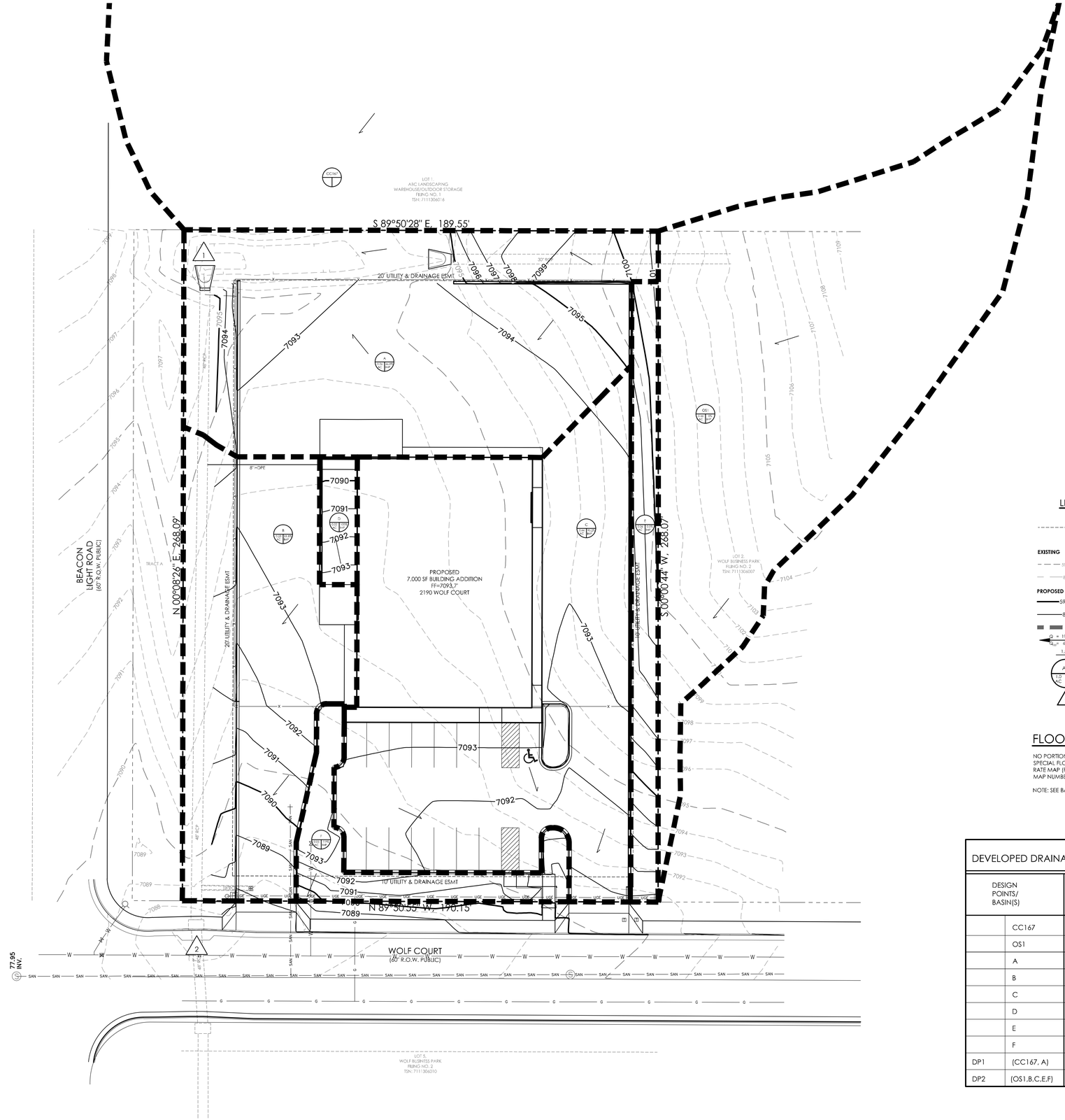
EXISTING DRAINAGE MAP

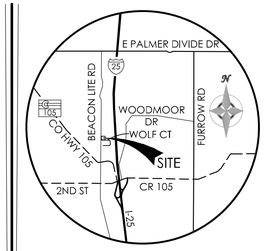
MVE PROJECT **61156**

MVE DRAWING **EX-DRN**

JUNE 26, 2021

SHEET 1 OF 1





VICINITY MAP

NOT TO SCALE

BENCHMARK

N

5 0 10 20 40

1" = 20' 1:240

LEGEND

PROPERTY LINE
EASEMENT LINE
LOT LINE

EXISTING

5985 INDEX CONTOUR
84 INTERMEDIATE CONTOUR

PROPOSED

5985 INDEX CONTOUR
84 INTERMEDIATE CONTOUR
BASIN BOUNDARY
Q = 19.0 cfs, Q_{100} = 60.0 cfs GENERAL FLOW/DIRECTION
1.5% SLOPE DIRECTION AND GRADE
A1 1.2 AC 30% IMP BASIN LABEL, AREA IN ACRES, PERCENT IMPERVIOUS
1 POINT OF INTEREST

FLOODPLAIN STATEMENT

NO PORTION OF THE SUBJECT PROPERTY IS LOCATED WITHIN A FEMA DESIGNATED SPECIAL FLOOD HAZARD AREA (SFHA) AS INDICATED ON THE FLOOD INSURANCE RATE MAP (FIRM) FOR EL PASO COUNTY, COLORADO AND INCORPORATED AREAS - MAP NUMBER 08041C0276 G, EFFECTIVE DECEMBER 7, 2018.

NOTE: SEE BASIN MAP FOR OFFSITE BASIN DETAILS

DEVELOPED DRAINAGE SUMMARY TABLE

DESIGN POINTS/ BASIN(S)		AREA (AC)	Tc (MIN.)	RUNOFF Q5 (CFS)	RUNOFF Q100 (CFS)
	CC167				116.0
	OS1	0.46	9.5	0.2	1.1
	A	0.36	9.0	1.0	1.9
	B	0.23	8.8	0.6	1.2
	C	0.44	6.1	1.8	3.2
	D	0.02	5.0	0.1	0.1
	E	0.06	11.4	0.0	0.1
	F	0.05	5.0	0.0	0.2
DP1	(CC167, A)				117.9
DP2	(OS1,B,C,E,F)	1.25	11.5	2.1	5.0

MVE, INC. ENGINEERS SURVEYORS
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PROPOSED DRAINAGE MAP

MVE PROJECT **61156**
MVE DRAWING **PP-DRN**

JUNE 26, 2021
SHEET 1 OF 1