MVE, INC.
ENGINEERS SURVEYORS
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colorado springs, co 80909
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Drainage Letter

Tract 5, Valley Gardens

Replat of a Portion of Lot 104, Peyton Ranches

Project No. 61195

April 2, 2024

PCD File No. VR235

Add PCD File No. PPR2417

Drainage Letter

for

Tract 5, Valley Gardens

Project No. 61195

April 2, 2024

prepared for

Sombers Investments LLC
5565 Piedra Vista
Colorado Springs, CO 80908
719.491.0466

prepared by

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

61195 Drainage Letter Report.odt

Statements and Acknowledgments

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 letter 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.

Charles C. Crum, P.E. Colorado No. 13348 — 05-08-24 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.

Date

Jerry Sombers
5565 Piedra Vista
Colorado Springs, CO 80908

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.

Joshua Palmer, P.E.,
County Engineer / ECM Administrator

Date

Drainage Letter

This Drainage Letter Report for Tract 5, Valley Gardens has been prepared in accordance with Section 4.5 Small Subdivision Drainage Report Format of the Drainage Criteria Manual for the City of Colorado Springs & El Paso County, Colorado. Said Report is in support of the proposed Site Development Plan on Tract 5 Valley Gardens, El Paso County Assessor's schedule number 64283-01-005, El Paso County, Colorado. The letter and enclosed hydrologic calculations are concerned with the existing and developed storm water runoff from the site which will remain relatively unchanged.

A **Vicinity Map** has been included for readers reference. The site borders Janitell Road on the northwest, Tract 4, Valley Gardens on the southwest, Tract 11, Valley Gardens, on the northeast, and an unplatted Tract of land on the southeast. Said Tract 5 is located about 300' to the southwest of East Las Vegas Street and contains 5.35 acres. The property is zoned M1 (General Industrial and Manufacturing Activities) which is an obsolete Zone.

Tract 5, Valley Gardens is situate in the Spring Creek Drainage Basin.

The site generally slopes from northeast to southwest about 1 to 3 percent (%). The site area has one building (13,200 SF), entrance drives, parking & sidewalks, along with a concrete storage area slab (19,200. The remainder of the site consists of sandy/gravel surface with no native grasses and is used for general industrial and manufacturing activities.

General existing drainage characteristics of the site will not change due to the construction of the 22,500 SF Office Warehouse. The minor increases in storm runoff from the site negligible and will nave no discernible effect on the property or adjacent properties. Offsite flows entering said Tract 5 are from the adjacent Tract 4. Reference is made to the Drainage Letter for Janitell RV Storage, Tract 4, Valley Gardens, dated September 17, 2014 by Oliver Watts, Consulting Engineer, Inc. M.V.E., Inc. calculated stormwater flows are a little less then than the stormwater projected flows from said Tract 4 in the 'Watts' Drainage Letter.

The current Flood Insurance Study of the region includes the Flood Insurance Rate Map (FIRM), effective December 7, 2018. The project site is included in Map Number 08041C0375 G of the FIRM for El Paso County, Colorado. According to the FIRM, the subject site is not included in a FEMA designated Special Flood Hazard Area (SFHA). A portion of the current FIRM (Flood Insurance Rate Map) with the site delineated is included with this report.

According to the Soil Survey of El Paso County Area, Colorado by the United States Natural Resource Conservation Service, the soil of the site is Blakeland loamy sand (map unit 8), which is part of hydrologic soil group A. The Blakeland loamy sand soil is Sandy and Sandy Loam and somewhat excessively drained. A portion of the **Soil Survey Map** is included with this report.

Hydrologic analysis for both existing and developed conditions of the site were performed according to the Rational Method. Q = CAi where:

Q = Peak runoff rate in cubic feet per second (cfs)

C = Runoff coefficient

i = average rainfall intensity in inches per hour

A = drainage area in acres

Analysis was completed in accordance with said Drainage Criteria Manual for the City of Colorado Springs & El Paso County, Colorado. Peak runoff flow rates were calculated for the 5-year and 100-year rainfall recurrence intervals for both existing and future developed conditions.

EXISTING CONDITIONS

Basin OS-A, situated in Tract 5, Valley Gardens having an area of 1.30 acres and 69.3% imperviousness drains southwesterly as overland flow onto the Tract 4, Valley Gardens from the northeast, will remain the same as existing conditions because no construction is likely in that basin it being a developed Industrial Tract. Runoff discharges from Basin OS-A at **Design Point 1 (DP1)** will remain unchanged at Q_5 = 3.0 cfs and Q_{100} = 6.1 cfs.

Basin EX-A, situated in the western 2/3 of said Tract 4 having an area of 4.03 acres and 81.9% imperviousness drains southwesterly as overland flow onto Tract 11, Valley Gardens from the northeast, with existing conditions of being developed as an Industrial use with an Office/warehouse and paved drives & parking. The existing developed runoff is Q_5 = 9.6 cfs and Q_{100} = 18.7 cfs. Basin OS-A combines with Basin EX-A (conservatively added together) and the combined flows at **Design Point 2 (DP2)** will be Q_5 = 12.6 cfs and Q_{100} = 24.8 cfs.

Basin OS-BC, situated in Tract 5, Valley Gardens having an area of 3.80 acres and 82.6% imperviousness drains southwesterly as overland flow onto the Tract 4, Valley Gardens from the northeast, will remain the same as existing conditions because no construction is likely in that basin it being a developed Industrial Tract. Runoff discharges from Basin OS-A at **Design Point 3 (DP3)** will remain unchanged at Q_5 = 9.2 cfs and Q_{100} = 18.0 cfs.

Basin EX-B, situated in the eastern 1/3 of said Tract 4 having an area of 1.34 acres and 64.8% imperviousness drains southwesterly as overland flow onto Tract 11, Valley Gardens from the northeast, with existing conditions of being developed as an Industrial storage area use. The existing developed runoff is Q_5 = 2.8 cfs and Q_{100} = 6.0 cfs. Basin OS-BC combines with Basin EX-B (conservatively added together) and the combined flows at **Design Point 4 (DP4)** will be Q_5 = 12.0 cfs and Q_{100} = 24.0 cfs.

DEVELOPED CONDITIONS

Basin OS-A, situated in Tract 5, Valley Gardens having an area of 1.30 acres and 69.3% imperviousness drains southwesterly as overland flow onto the Tract 4, Valley Gardens from the northeast, will remain the same as existing conditions because no construction is likely in that basin it being a developed Industrial Tract. Runoff discharges from Basin OS-A at **Design Point 1 (DP1)** will remain unchanged at Q_5 = 3.0 cfs and Q_{100} = 6.1 cfs.

Basin PP-A, situated in the western 2/3 of said Tract 4 having an area of 3.88 acres and 82.0% imperviousness drains southwesterly as overland flow onto Tract 11, Valley Gardens from the northeast, with proposed conditions of being developed as an Industrial use with an additional Office/warehouse and paved drives. The proposed developed runoff is Q_5 =

9.6 cfs and Q_{100} = 18.7 cfs. Basin OS-A combines with Basin EX-A (conservatively added together) and the combined flows at **Design Point 2 (DP2)** will be Q_5 = 12.6 cfs and Q_{100} = 24.8 cfs.

Basin OS-BC, situated in Tract 5, Valley Gardens having an area of 3.80 acres and 82.6% imperviousness drains southwesterly as overland flow onto the Tract 4, Valley Gardens from the northeast, will remain the same as existing conditions because no construction is likely in that basin it being a developed Industrial Tract. Runoff discharges from Basin OS-A at **Design Point 3 (DP3)** will remain unchanged at Q_5 = 9.2 cfs and Q_{100} = 18.0 cfs.

Basin PP-B, situated in the eastern 1/3 of said Tract 4 having an area of 1.49 acres and 83.3% imperviousness drains southwesterly as overland flow onto Tract 11, Valley Gardens from the northeast, with existing conditions of being developed as an Industrial use with an additional Office/warehouse and paved parking. The existing developed runoff is Q_5 = 3.5 cfs and Q_{100} = 6.8 cfs. Basin OS-BC combines with Basin EX-B (conservatively added together) and the combined flows at **Design Point 4 (DP4)** will be Q_5 = 16.1 cfs and Q_{100} = 24.8 cfs.

which is an increase od Q_5 = 0.3 cfs and Q_{100} = 0.4 cfs being negligible an of no effect.

According to the Peyton Ranches Drainage Plan prepared by Colorado Engineers, Inc, prepared April 1972, the site is located in Drainage Area C-7. This site is 8.59 acers of the total 154.8 acres. The Drainage Basin generally drains from north to south and consist of thirteen 5.0 plus acre residential lots. Runoff from the Drainage Area drains to an existing 42" CMP culvert under Chaparral Loop and enters a tributary of Brackett Creek. The Drainage Plan indicated the C-7 Drainage Area to discharge 108.1 cfs, the increase of 0.4 cfs leaving the proposed developed site is a negligible 0.4%. Assuming the existing 42" CMP is built to County Standards, the pipe has a capacity of 79.5 cfs. The increase of 0.4 cfs has negligible impact on the existing conditions.

Because of the large lot rural residential density of Peyton Ranches, the increase in developed flows due to the subdivision of Lot 104 are insignificant at 0.4 cfs. Storm detention of these flows not required. Development of this lot will have no adverse impact of the adjacent downstream lots. In the development of the lot (residential structures, accessory buildings, driveways, landscaping), storm runoff flows shall be directed in such a way that no adverse impacts will occur to adjacent downstream lots or properties.

The site is situated in the Upper Bracket Creek Drainage Basin, El Paso Basin Number CHBR0600 and is unstudied. No Drainage or Bridge Fees are assessed for this basin.

This Drainage Report Letter is prepared in accordance with the requirements of El Paso County for the approval of the proposed Peyton Ranches Filing No. 1C. The are no proposed public improvements and with the future addition of a single family residence there is only minimal increase in storm water peak flow with all drainage patterns remaining the substantially the same as existing conditions. The development of the proposed use will cause no adverse impacts to adjacent properties or downstream drainage ways.

Please discuss water quality. State the total proposed soil <u>disturbance</u> (not imperviousness) needed for the new building, gravel access, parking, and storage areas. If this is >1ac, a PBMP will be required.

You will need to show drainage maps for 1) existing conditions and 2) the proposed conditions.

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).

Flood Insurance Rate Map. Federal Emergency Management Agency, National Flood Insurance Program (Washingon D.C.: FEMA, March 17, 1997).

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).

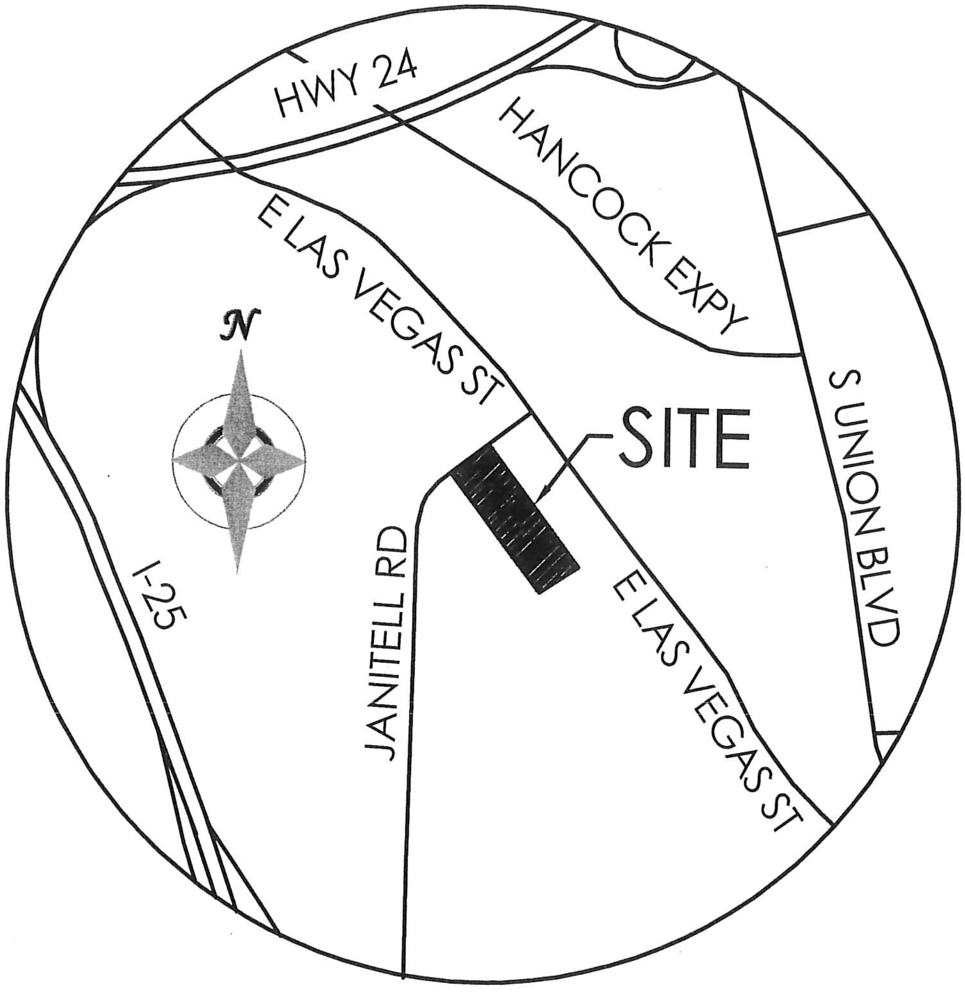
Urban Drainage Criteria Manual: Volume 3, Best Management Practices. Urban Drainage and Flood Control District (Denver, Colorado: , November 2010).

Urban Storm Drainage Criteria Manual: Volume 2, Structures, Storage, and Recreation. Urban Drainage and Flood Control District (Denver, Colorado : , January 2016).

Appendices

General Maps and Supporting Data

Vicinity Map
Portion of Flood Insurance Rate Map
Soil Type map and Tables
Official Soil Series Descriptions
Hydrologic Soil Group Map and Tables



VICINITY MAP

NOT TO SCALE

National Flood Hazard Layer FIRMette

FEMA

104°47'58"W 38°48'26"N

104°47'21"W 38°47'58"N

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

1:6,000

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
- 20.2 / 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
- 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 4/4/2024 at 10:48 AM 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.

USDA United States Department of Agriculture

NRCS 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

April 4, 2024

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.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

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 (2217 Janitell Road)

Map Scale: 1:1,730 if printed on A portrait (8.5" x 11") sheet.

Meters: 0, 25, 50, 100, 150

Feet: 0, 50, 100, 200, 300

N

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 21, Aug 24, 2023

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

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

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

Map Unit Legend (2217 Janitell Road)

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
101	Ustic Torrifluvents, loamy	5.3	100.0%
Totals for Area of Interest		**5.3**	**100.0%**

Map Unit Descriptions (2217 Janitell Road)

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

101—Ustic Torrifluvents, loamy

Map Unit Setting

National map unit symbol: 3673
Elevation: 5,500 to 7,000 feet
Mean annual precipitation: 13 to 16 inches
Mean annual air temperature: 47 to 52 degrees F
Frost-free period: 125 to 155 days
Farmland classification: Not prime farmland

Map Unit Composition

Ustic torrifluvents and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ustic Torrifluvents

Setting

Landform: Flood plains, stream terraces
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy, clayey, stratified loamy

Typical profile

A - 0 to 6 inches: variable
C - 6 to 60 inches: stratified loamy sand to clay loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.6 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: R069XY037CO - Saline Overflow
Other vegetative classification: OVERFLOW (069BY036CO)
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit: 4 percent
Hydric soil rating: No

Pleasant

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

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rapid, and the hazard of erosion is high. Gullies 1 foot to 3 feet deep are common.

The Bresser soil is deep and well drained. It formed in alluvium and residuum derived from arkosic sedimentary rock. Typically, the grayish brown sandy loam surface layer is very thin or has been entirely removed by erosion. The subsoil is brown sandy clay loam about 31 inches thick. The substratum is light yellowish brown loamy coarse sand to a depth of 60 inches or more.

Permeability of the Bresser soil is moderate. Effective rooting depth is 60 inches or more. Available water capacity is moderate. Surface runoff is medium to rapid, and the hazard of erosion is high. Gullies 1 foot to 3 feet deep are common.

These soils are commonly used for grazing livestock and for wildlife habitat. Most areas of these soils are fields that were previously cropped but have either been abandoned or reseeded to grass.

These soils are suited to deep-rooted grasses. Native vegetation is dominantly western wheatgrass, side-oats grama, and needleandthread.

Proper range management is needed to prevent excessive removal of the plant cover from these soils. Interseeding improves the existing vegetation. Deferment of grazing in spring increases plant vigor and soil stability. Properly locating livestock watering facilities helps to control grazing.

Windbreaks and environmental plantings generally are suited to these soils. Soil blowing is the main limitation for establishing trees and shrubs. This limitation can be overcome by cultivating only in the tree rows and leaving a strip of vegetation between the rows. Supplemental irrigation may be needed when planting and during dry periods. Trees that are best suited and have good survival are Rocky Mountain juniper, eastern redcedar, ponderosa pine, Siberian elm, Russian-olive, and hackberry. Shrubs that are best suited are skunkbush sumac, lilac, and Siberian peashrub.

These soils are suited to wildlife habitat. They are best suited to habitat for openland and rangeland wildlife. Rangeland wildlife, such as pronghorn antelope, can be encouraged by developing livestock watering facilities, properly managing livestock grazing, and reseeding range where needed.

The main limitation of these soils for homesites is frost-action potential, especially in areas of the Truckton soil. Special practices are needed to reduce the hazard of erosion in areas of construction where vegetation has been removed from the soils. Access roads must be designed to minimize frost-heave damage in areas of the Truckton soil. Capability subclass VIe.

101—Ustic Torrifluvents, loamy. These deep, well drained soils are on terraces and flood plains along the major drainageways. Some of the larger areas of these soils are in the Jimmy Creek Camp and Black Squirrel Creek drainageways and in the Ellicott area. Slope is 0 to 3 percent. The average annual precipitation is about 15 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 135 days.

Typically, the surface layer is grayish brown to very dark grayish brown gravelly sandy loam to clay loam 6 to 18 inches thick. The stratified underlying material, to a depth of 60 inches, ranges from heavy clay loam to sand.

Included with these soils in mapping are small areas of Blendon sandy loam, 0 to 3 percent slopes; Bresser sandy loam, 0 to 3 percent slopes; Nunn clay loam, 0 to 3 percent slopes; and Sampson loam, 0 to 3 percent slopes.

Permeability of Ustic Torrifluvents, loamy, is moderate. Effective rooting depth is 60 inches or more. Available water capacity is moderate to high. Surface runoff is slow, and the hazard of erosion is moderate to high. These soils are occasionally flooded. The hazard of soil blowing is moderate to high.

About half of the acreage of these soils is used for irrigated corn, bluegrass sod, and alfalfa and for dryfarmed wheat. The slow surface runoff reduces the need for intensive conservation measures. Most irrigated areas are in the Ellicott area and the Jimmy Camp Creek area. The rest of the acreage is used as rangeland.

These soils are suited to the production of native vegetation suitable for grazing. The soils favor tall grasses. The native vegetation is mainly big bluestem, switchgrass, junegrass, western wheatgrass, and blue grama.

To achieve needed grazing management, including periodic deferment, fences are generally arranged in such a way that access to these soils can be controlled. Reseeding on these soils is needed if the vegetation is depleted or destroyed by plowing. Water spreading is highly beneficial in suitable areas of these soils.

Windbreaks and environmental plantings generally are suited to these soils. Soil blowing is the main limitation for the establishment of trees and shrubs. This limitation can be overcome by cultivating only in the tree rows and leaving a strip of vegetation between the rows. Supplemental irrigation may be needed when planting and during dry periods. Trees that are best suited and have good survival are Rocky Mountain juniper, eastern redcedar, ponderosa pine, Siberian elm, Russian-olive, and hackberry. Shrubs that are best suited are skunkbush sumac, lilac, and Siberian peashrub.

These soils are suited to wildlife habitat. They are best suited to habitat for openland and rangeland wildlife. In cropland areas, habitat favorable for ring-necked pheasant, mourning dove, and many nongame species can be developed by establishing areas for nesting and escape cover. For pheasant, undisturbed nesting cover is vital and should be provided for in plans for habitat development. This is especially true in areas of intensive farming. Rangeland wildlife, such as pronghorn antelope, can be encouraged by developing livestock watering facilities, properly managing livestock grazing, and reseeding range where needed.

The main limitation of these soils for urban use is the hazard of flooding. Buildings and roads should not be built along drainageways and on flood plains. Access roads must be designed to minimize frost-heave damage. Capability subclasses IIIe, nonirrigated, and IIe, irrigated.

102—Valent sand, 1 to 9 percent slopes. This deep, nearly level to gently rolling, excessively drained soil formed in sandy eolian material on uplands. Elevation ranges from 5,100 to 5,600 feet. The average annual precipitation is about 13 inches, the average annual air temperature is about 49 degrees F, and the average frost-free period is about 145 days.

Typically, the surface layer is light brownish gray sand about 6 inches thick. The next layer is brown sand about 6 inches thick. The substratum is pale brown sand to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Bijou loamy sand, 1 to 8 percent slopes, and Wigton loamy sand, 1 to 8 percent slopes.

Permeability of this Valent soil is rapid. Effective rooting depth is 60 inches or more. Available water capacity is low to moderate. Surface runoff is slow, and the hazards of erosion and soil blowing are high.

This soil is used as rangeland and for wildlife habitat.

The native vegetation is mainly sand reedgrass, sand bluestem, blue grama, little bluestem, and needleandthread. Sand sagebrush is in the stand, but it makes up only a small part of the total ground cover. Large amounts of yucca are present in some places.

Mechanical and chemical control of sagebrush may be needed in overgrazed areas of this soil. The soil is highly susceptible to soil blowing, and water erosion occurs when the plant cover is inadequate. Interseeding is a good practice in overgrazed areas. Properly locating livestock watering facilities helps to control grazing.

Windbreaks and environmental plantings are fairly well suited to this soil. Blowing sand and low available water capacity are the main limitations for the establishment of trees and shrubs. The soil is 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.

This soil is suited to wildlife habitat. It is best suited to habitat for openland and rangeland wildlife. Rangeland wildlife, such as pronghorn antelope, can be encouraged by developing livestock watering facilities, properly managing livestock grazing, and reseeding range where needed.

The main limitation of this soil for homesites is the sandy nature of the soil, which makes excavation difficult. Special erosion control practices are needed during construction. Because of the rapid permeability of this soil, there is a hazard of pollution if it is used for septic tank absorption fields. Capability subclass VIe.

103—Valent sand, 9 to 20 percent slopes. This deep, excessively drained, rolling to hilly soil formed in sandy eolian material on uplands. Elevation ranges from 5,100 to 5,600 feet. The average annual precipitation is about 13 inches, the average annual air temperature is about 49 degrees F, and the average frost-free period is about 145 days.

Typically, the surface layer is light brownish gray sand about 6 inches thick. The next layer is brown sand about 6 inches thick. The underlying material is pale brown sand to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Bijou loamy sand, 1 to 8 percent slopes; Wigton loamy sand, 1 to 8 percent slopes; and Valent sand, 1 to 9 percent slopes.

Permeability of this Valent soil is rapid. Effective rooting depth is 60 inches or more. Available water capacity is low to moderate. Surface runoff is slow, and the hazard of erosion is high. Blowouts are common in all areas of this soil.

This soil is used as rangeland and for wildlife habitat.

The native vegetation is mainly prairie sandreed, sand bluestem, needleandthread, and sand dropseed.

Careful grazing management is essential on this soil to prevent overgrazing, because the hazard of soil blowing is high when the protective plant cover is destroyed. Livestock watering facilities should not be located on this soil, because they cause concentrations of animals that deplete the rangeland cover. No mechanical type of conservation treatment is practical on this soil.

Windbreaks and environmental plantings are fairly well suited to this soil. Blowing sand and low available water capacity are the main limitations for the establishment of trees and shrubs. The soil is so loose that trees need to be planted in shallow furrows and the plant cover should 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.

This soil is suited to wildlife habitat. It is best suited to habitat for openland and rangeland wildlife. Rangeland wildlife, such as pronghorn antelope, can be encouraged by developing livestock watering facilities, properly managing livestock grazing, and reseeding range where needed.

The main limitations of this soil for urban use are slope and the sandy texture of the soil. Special designs are needed for buildings and roads to overcome these limitations. The sandy texture of the soil causes excavation problems, mostly the caving in of cut banks. Practices are needed to control soil blowing. Because of the rapid permeability of this soil, there is a hazard of pollution if it is used for septic tank absoption fields. Capability subclass VIe.

104—Vona sandy loam, 1 to 3 percent slopes. This deep, well drained soil formed in sandy, calcareous eolian

Hydrologic Calculations

City of Colorado Springs DCM Runoff Coefficients – Table 6-6
Colorado Springs DCM Rainfall Intensity Duration Frequency – Figure 6-5
Sub-Basin Time of Concentration – Form SF-1
5-yr Sub-Basin and Combined Flows – Form SF-2
100-yr Sub-Basin and Combined Flows – Form SF-2
Sub-Basin Calculations

Job No.: **61195**

Project: **High County Crane**

Date: **5/8/2024 10:00**

Calcs By: **TJW**

Checked By:

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

Sub-Basin	Sub-Basin Data				Overland			Shallow Channel				Channelized				t_c Check		t_c
	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)	(min)
OS-A	1.30	0.60	0.73	69%	300	2%	11.9	0	0.000	0.0	0.0	0	0.000	0.0	0.0	300	N/A	11.9
OS-BC	3.84	0.64	0.75	83%	200	2%	9.3	620	0.019	2.8	3.7	0	0.000	0.0	0.0	820	N/A	13.0
EX-A	4.03	0.64	0.75	82%	300	3%	10.3	430	0.014	2.4	3.0	0	0.000	0.0	0.0	730	N/A	13.4
EX-B	1.34	0.49	0.63	65%	117	3%	7.9	260	0.015	2.5	1.7	0	0.000	0.0	0.0	377	N/A	9.7
PP-A	3.88	0.65	0.75	82%	300	3%	10.3	318	0.019	2.7	1.9	0	0.000	0.0	0.0	618	N/A	12.2
PP-B	1.49	0.64	0.74	83%	300	1%	13.0	168	0.024	3.1	0.9	0	0.000	0.0	0.0	468	N/A	13.9

Job No.: **61195**
Project: **High County Crane**
Design Storm: **5-Year Storm** *(20% Probability)*
Jurisdiction: **DCM**

Date: **5/8/2024 10:00**
Calcs By: **TJW**
Checked By:

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

				Direct Runoff				Combined Runoff				Streetflow			Pipe Flow					Travel Time		
	Sub-	Area		t_c	CA	I5	Q5	t_c	CA	I5	Q5	Slope	Length	Q	Q	Slope	Mnngs	Length	D_{Pipe}	Length	v_{Osc}	t_t
DP	Basin	(Acres)	C5	(min)	(Acres)	(in/hr)	(cfs)	(min)	(Acres)	(in/hr)	(cfs)	(%)	(ft)	(cfs)	(cfs)	(%)	n	(ft)	(in)	(ft)	(ft/s)	(min)
	OS-A	1.30	0.60	11.9	0.78	3.87	3.01															
	OS-BC	3.84	0.64	13.0	2.47	3.74	9.24															
	EX-A	4.03	0.64	13.4	2.59	3.70	9.58															
	EX-B	1.34	0.49	9.7	0.66	4.18	2.76															
	PP-A	3.88	0.65	12.2	2.51	3.83	9.60															
	PP-B	1.49	0.64	13.9	0.96	3.64	3.48															

DCM: I = C1 * ln (tc) + C2
C1: 1.5
C1: 7.583

Job No.: **61195**
Project: **High County Crane**
Design Storm: **100-Year Storm** *(1% Probability)*
Jurisdiction: **DCM**

Date: **5/8/2024 10:00**
Calcs By: **TJW**
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_{Osc} (ft/s)	t_t (min)
	OS-A	1.30	0.73	11.9	0.94	6.50	6.14															
	OS-BC	3.84	0.75	13.0	2.87	6.28	17.99															
	EX-A	4.03	0.75	13.4	3.01	6.20	18.67															
	EX-B	1.34	0.63	9.7	0.85	7.02	5.97															
	PP-A	3.88	0.75	12.2	2.91	6.43	18.70															
	PP-B	1.49	0.74	13.9	1.11	6.10	6.75															

DCM: I = C1 * ln (tc) + C2
C1: 2.52
C1: 12.735

Sub-Basin OS-A Runoff Calculations

Job No.:	**61195**	Date:	**5/8/2024 10:00**
Project:	**High County Crane**	Calcs by:	**TJW**
		Checked by:	
Jurisdiction	**DCM**	Soil Type	**B**
Runoff Coefficient	**Surface Type**	Urbanization	**Non-Urban**

Basin Land Use Characteristics

Surface	Area (SF)	Area (Acres)	C2	C5	C10	C25	C50	C100	% Imperv.
Paved	23,958	0.55	0.89	0.9	0.92	0.94	0.95	0.96	100%
Gravel	18,731	0.43	0.57	0.59	0.63	0.66	0.68	0.7	80%
Landscaping	13,939	0.32	0.03	0.09	0.17	0.26	0.31	0.36	2%
Combined	**56,628**	**1.30**	**0.57**	**0.60**	**0.64**	**0.68**	**0.70**	**0.73**	**69.3%**
	56628								

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	300	7	-	-	-	-	
Initial Time	300	7	0.023	-	11.9	N/A	DCM Eq. 6-8
Shallow Channel			0.000	0.0	0.0	-	DCM Eq. 6-9
Channelized			0.000	0.0	0.0	-	V-Ditch
				t_c	**11.9**	**min.**	

Rainfall Intensity & Runoff

	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Intensity (in/hr)	3.09	3.87	4.52	5.16	5.81	6.50
Runoff (cfs)	2.3	**3.0**	3.8	4.6	5.3	**6.1**
Release Rates (cfs/ac)	-	-	-	-	-	-
Allowed Release (cfs)	2.3	**3.0**	3.8	4.6	5.3	**6.1**
DCM: I = C1 * ln (tc) + C2						
C1	1.19	1.5	1.75	2	2.25	2.52
C2	6.035	7.583	8.847	10.111	11.375	12.735

Notes

Sub-Basin OS-BC Runoff Calculations

Job No.:	**61195**	Date:	**5/8/2024 10:00**
Project:	**High County Crane**	Calcs by:	**TJW**
		Checked by:	
Jurisdiction	**DCM**	Soil Type	**B**
Runoff Coefficient	**Surface Type**	Urbanization	**Non-Urban**

Basin Land Use Characteristics

Surface	Area (SF)	Area (Acres)	Runoff Coefficient C2	C5	C10	C25	C50	C100	% Imperv.
Paved	33,977	0.78	0.89	0.9	0.92	0.94	0.95	0.96	100%
Gravel	130,244	2.99	0.57	0.59	0.63	0.66	0.68	0.7	80%
Landscaping	3,049	0.07	0.03	0.09	0.17	0.26	0.31	0.36	2%
Combined	**167,270**	**3.84**	**0.63**	**0.64**	**0.68**	**0.71**	**0.73**	**0.75**	**82.6%**
	167270								

Basin Travel Time

Shallow Channel Ground Cover: Paved areas/shallow paved swales

$L_{max,Overland}$ 300 ft — C_v 20

	L (ft)	ΔZ_0 (ft)	S_0 (ft/ft)	v (ft/s)	t (min)	t_{Alt} (min)	
Total	820	16	-	-	-	-	
Initial Time	200	4	0.020	-	9.3	N/A	DCM Eq. 6-8
Shallow Channel	620	12	0.019	2.8	3.7	-	DCM Eq. 6-9
Channelized			0.000	0.0	0.0	-	V-Ditch
				t_c	**13.0 min.**		

Rainfall Intensity & Runoff

	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Intensity (in/hr)	2.98	3.74	4.36	4.98	5.61	6.28
Runoff (cfs)	7.2	**9.2**	11.4	13.6	15.7	**18.0**
Release Rates (cfs/ac)	-	-	-	-	-	-
Allowed Release (cfs)	7.2	**9.2**	11.4	13.6	15.7	**18.0**

DCM: I = C1 * ln (tc) + C2

C1	1.19	1.5	1.75	2	2.25	2.52
C2	6.035	7.583	8.847	10.111	11.375	12.735

Notes

Sub-Basin EX-A Runoff Calculations

Job No.:	**61195**	Date:	**5/8/2024 10:00**
Project:	**High County Crane**	Calcs by:	**CCC**
		Checked by:	
Jurisdiction	**DCM**	Soil Type	**B**
Runoff Coefficient	**Surface Type**	Urbanization	**Non-Urban**

Basin Land Use Characteristics

	Area		Runoff Coefficient						%
Surface	**(SF)**	**(Acres)**	**C2**	**C5**	**C10**	**C25**	**C50**	**C100**	**Imperv.**
Roofs	13,432	0.31	0.71	0.73	0.75	0.78	0.8	0.81	90%
Paved	34,737	0.80	0.89	0.9	0.92	0.94	0.95	0.96	100%
Gravel	120,841	2.77	0.57	0.59	0.63	0.66	0.68	0.7	80%
Landscaping	6,375	0.15	0.03	0.09	0.17	0.26	0.31	0.36	2%
Combined	**175,385**	**4.03**	**0.62**	**0.64**	**0.68**	**0.71**	**0.73**	**0.75**	**81.9%**
	175385								

Basin Travel Time

Shallow Channel Ground Cover: Paved areas/shallow paved swales

$L_{max,Overland}$ 300 ft C_v 20

	L (ft)	ΔZ_0 (ft)	S_0 (ft/ft)	v (ft/s)	t (min)	t_{Alt} (min)	
Total	730	14	-	-	-	-	
Initial Time	300	8	0.027	-	10.3	N/A	DCM Eq. 6-8
Shallow Channel	430	6	0.014	2.4	3.0	-	DCM Eq. 6-9
Channelized			0.000	0.0	0.0	-	V-Ditch
				t_c	**13.4**	**min.**	

Rainfall Intensity & Runoff

	2-Yr	**5-Yr**	**10-Yr**	**25-Yr**	**50-Yr**	**100-Yr**
Intensity (in/hr)	2.95	3.70	4.31	4.93	5.54	6.20
Runoff (cfs)	7.4	**9.6**	11.8	14.1	16.3	**18.7**
Release Rates (cfs/ac)	-	-	-	-	-	-
Allowed Release (cfs)	7.4	**9.6**	11.8	14.1	16.3	**18.7**
DCM: I = C1 * ln (tc) + C2						
C1	1.19	1.5	1.75	2	2.25	2.52
C2	6.035	7.583	8.847	10.111	11.375	12.735

Notes

Z:\61195\Documents\Drainage\Calcs\Hydrology\61195-Runoff Spreadsheet.xlsm
EX-A

Sub-Basin EX-B Runoff Calculations

Job No.:	**61195**	Date:	**5/8/2024 10:00**
Project:	**High County Crane**	Calcs by:	**TJW**
		Checked by:	
Jurisdiction	**DCM**	Soil Type	**B**
Runoff Coefficient	**Surface Type**	Urbanization	**Non-Urban**

Basin Land Use Characteristics

Surface	Area (SF)	Area (Acres)	Runoff Coefficient C2	C5	C10	C25	C50	C100	% Imperv.
Roofs			0.71	0.73	0.75	0.78	0.8	0.81	90%
Paved			0.89	0.9	0.92	0.94	0.95	0.96	100%
Gravel	47,043	1.08	0.57	0.59	0.63	0.66	0.68	0.7	80%
Landscaping	11,374	0.26	0.03	0.09	0.17	0.26	0.31	0.36	2%
Combined	**58,417**	**1.34**	**0.46**	**0.49**	**0.54**	**0.58**	**0.61**	**0.63**	**64.8%**
	58417								

Basin Travel Time

Shallow Channel Ground Cover: Paved areas/shallow paved swales

$L_{max,Overland}$ 300 ft — C_v 20

	L (ft)	ΔZ_0 (ft)	S_0 (ft/ft)	v (ft/s)	t (min)	t_{Alt} (min)	
Total	377	8	-	-	-	-	
Initial Time	117	4	0.034	-	7.9	N/A	DCM Eq. 6-8
Shallow Channel	260	4	0.015	2.5	1.7	-	DCM Eq. 6-9
Channelized			0.000	0.0	0.0	-	V-Ditch
				t_c	**9.7**	**min.**	

Rainfall Intensity & Runoff

	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Intensity (in/hr)	3.34	4.18	4.88	5.58	6.27	7.02
Runoff (cfs)	2.1	**2.8**	3.5	4.4	5.1	**6.0**
Release Rates (cfs/ac)	-	-	-	-	-	-
Allowed Release (cfs)	2.1	**2.8**	3.5	4.4	5.1	**6.0**

DCM: I = C1 * ln (tc) + C2

C1	1.19	1.5	1.75	2	2.25	2.52
C2	6.035	7.583	8.847	10.111	11.375	12.735

Notes

Sub-Basin PP-A Runoff Calculations

Job No.:	**61195**	Date:	**5/8/2024 10:00**
Project:	**High County Crane**	Calcs by:	**CCC**
		Checked by:	
Jurisdiction	**DCM**	Soil Type	**B**
Runoff Coefficient	**Surface Type**	Urbanization	**Non-Urban**

Basin Land Use Characteristics

Surface	Area		Runoff Coefficient						%
	(SF)	(Acres)	C2	C5	C10	C25	C50	C100	Imperv.
Roofs	13,348	0.31	0.71	0.73	0.75	0.78	0.8	0.81	90%
Paved	34,737	0.80	0.89	0.9	0.92	0.94	0.95	0.96	100%
Gravel	114,536	2.63	0.57	0.59	0.63	0.66	0.68	0.7	80%
Landscaping	6,375	0.15	0.03	0.09	0.17	0.26	0.31	0.36	2%
Combined	**168,996**	**3.88**	**0.63**	**0.65**	**0.68**	**0.71**	**0.73**	**0.75**	**82.0%**
	168996								

Basin Travel Time

Shallow Channel Ground Cover: Paved areas/shallow paved swales

$L_{max,Overland}$ 300 ft; C_v 20

	L (ft)	ΔZ_0 (ft)	S_0 (ft/ft)	v (ft/s)	t (min)	t_{Alt} (min)	
Total	618	14	-	-	-	-	
Initial Time	300	8	0.027	-	10.3	N/A	DCM Eq. 6-8
Shallow Channel	318	6	0.019	2.7	1.9	-	DCM Eq. 6-9
Channelized			0.000	0.0	0.0	-	V-Ditch
				t_c	**12.2 min.**		

Rainfall Intensity & Runoff

	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Intensity (in/hr)	3.06	3.83	4.47	5.11	5.75	6.43
Runoff (cfs)	7.4	**9.6**	11.8	14.1	16.3	**18.7**
Release Rates (cfs/ac)	-	-	-	-	-	-
Allowed Release (cfs)	7.4	**9.6**	11.8	14.1	16.3	**18.7**

DCM: I = C1 * ln (tc) + C2

C1	1.19	1.5	1.75	2	2.25	2.52
C2	6.035	7.583	8.847	10.111	11.375	12.735

Notes

Sub-Basin PP-B Runoff Calculations

Job No.:	**61195**	Date:	**5/8/2024 10:00**
Project:	**High County Crane**	Calcs by:	**CCC**
		Checked by:	
Jurisdiction	**DCM**	Soil Type	**B**
Runoff Coefficient	**Surface Type**	Urbanization	**Non-Urban**

Basin Land Use Characteristics

	Area		Runoff Coefficient						%
Surface	**(SF)**	**(Acres)**	**C2**	**C5**	**C10**	**C25**	**C50**	**C100**	**Imperv.**
Roofs	12,202	0.28	0.71	0.73	0.75	0.78	0.8	0.81	90%
Paved	6,341	0.15	0.89	0.9	0.92	0.94	0.95	0.96	100%
Gravel	45,809	1.05	0.57	0.59	0.63	0.66	0.68	0.7	80%
Landscaping	454	0.01	0.03	0.09	0.17	0.26	0.31	0.36	2%
Combined	**64,806**	**1.49**	**0.62**	**0.64**	**0.68**	**0.71**	**0.73**	**0.74**	**83.3%**
	64806								

Basin Travel Time

Shallow Channel Ground Cover: Paved areas/shallow paved swales

$L_{max,Overland}$ 300 ft C_v 20

	L (ft)	ΔZ_0 (ft)	S_0 (ft/ft)	v (ft/s)	t (min)	t_{Alt} (min)	
Total	468	8	-	-	-	-	
Initial Time	300	4	0.013	-	13.0	N/A	DCM Eq. 6-8
Shallow Channel	168	4	0.024	3.1	0.9	-	DCM Eq. 6-9
Channelized			0.000	0.0	0.0	-	V-Ditch
				t_c	**13.9 min.**		

Rainfall Intensity & Runoff

	2-Yr	**5-Yr**	**10-Yr**	**25-Yr**	**50-Yr**	**100-Yr**
Intensity (in/hr)	2.90	3.64	4.24	4.85	5.45	6.10
Runoff (cfs)	2.7	**3.5**	4.3	5.1	5.9	**6.8**
Release Rates (cfs/ac)	-	-	-	-	-	-
Allowed Release (cfs)	2.7	**3.5**	4.3	5.1	5.9	**6.8**

DCM: $I = C1 * \ln(tc) + C2$

C1	1.19	1.5	1.75	2	2.25	2.52
C2	6.035	7.583	8.847	10.111	11.375	12.735

Notes

Z:\61195\Documents\Drainage\Calcs\Hydrology\61195-Runoff Spreadsheet.xlsm
PP-B

Drainage Maps