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Final Drainage Report

Tract 11, Valley Gardens

2217 Janitell Road

Project No. 61243

September 25, 2026

EDARP File No.:

Final Drainage Report

for

Tract 11, Valley Gardens

Project No. 61243

September 25, 2026

prepared for

Sombers Investement LLC
5565 Piedra Vista
Colorado Springs, CO 80908
719.491-0466

prepared by

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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 report has been prepared according to the criteria established by El Paso 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.

David R. Gorman, P.E.
Colorado No. 31672
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

Sombers Investement LLC
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 J. Palmer, P.E. Date
County Engineer / ECM Administrator

Conditions:

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Final Drainage Report

This Final Drainage Report for Tract 11, Valley Gardens, has been prepared in accordance with the Drainage Report Format and criteria outlined in the Drainage Criteria Manual for the City of Colorado Springs and El Paso County, Colorado. This report supports the proposed Site Development Plan for Tract 11, Valley Gardens, located in the southwest quarter of Section 28, Township 14 South, Range 66 West of the 6th Principal Meridian in El Paso County, Colorado. The project site consists of a single platted parcel identified by El Paso County assessor schedule No. 64283 01 004, and addressed as 2217 Janitell Road, El Paso County, Colorado. Tract 11, Valley Gardens, including the associated easements, encompasses a total site area of approximately 4.86± acres. This report has been prepared and submitted in accordance with the requirements of the El Paso County development approval process.

1 General Location and Description

1.1 Location

Tract 11, Valley Gardens, is bordered by Janitell Road along the northwestern and western property boundaries, the Colorado Aggregate Recycling property (El Paso County Assessor Schedule No. 6428300043) along the southwestern to southeastern boundary, and Tract 5, Valley Gardens, along the northeastern boundary. The site is located approximately 0.11 miles southwest of the intersection of Janitell Road and E. Las Vegas Street within an established industrial area of Colorado Springs. Fountain Creek traverses the southwestern portion of the site and serves as a prominent natural drainage feature within the project area. The property is zoned M (Industrial/Manufacturing), consistent with surrounding land uses and development patterns. Primary site access to Tract 11 is provided from Janitell Road via an existing 22-foot-wide gravel driveway located along the northeastern boundary of the site.

The project site is located within the Spring Creek Drainage Basin and ultimately contributes runoff to Fountain Creek. Fountain Creek flows south through the Fountain Creek watershed and discharges to the Arkansas River near Pueblo. Drainage fees are not required for a Site Development Plan.

This report and included maps present the results of hydrologic and drainage facility analyses performed for the project site. This report evaluates existing and proposed drainage conditions, identifies applicable drainage requirements associated with the proposed development, and presents recommended drainage improvements necessary to support the proposed project in accordance with the City of Colorado Springs, and El Paso County drainage criteria.

The Vicinity Map is included in the **Appendix**.

1.2 Description of Property

The site generally slopes from the northwest toward the southeast at mild slopes ranging between 2 to 4 percent (%). The existing ground cover on the site consists primarily of undisturbed land with a mixture of sparse to moderate grasses, weedy vegetation, and areas of exposed soil with denser vegetation concentrated near the southern boundary adjacent to Fountain Creek. Based on visual observation overall vegetative cover is estimated to be approximately 50-60% of the site area.

The proposed development will result in modifications to existing onsite drainage patterns through site grading and the construction of a recycled asphalt parking pad, and a Full Spectrum – Full Infiltration – Sand Filter Basin (FS-FI-SFB) with the existing native soils utilized as the filter material . Under existing conditions, onsite runoff generally flows toward the southwestern portion of the site and ultimately outfalls to the Fountain Creek corridor. Under proposed conditions, runoff generated within the developed area will be redirected through controlled drainage patterns toward the proposed FS-FI-EDB located at the southern side of the site, where stormwater will be detained and fully infiltrated. While existing drainage patterns will be modified to accommodate the proposed site improvements, the development is not anticipated to create significant offsite drainage impacts, or adversely affect downstream properties or receiving waters.

2 Drainage Basins and Sub-Basins

2.1 Major Basin Descriptions

Tract 11, Valley Gardens contains 4.86± acres, and is located within the Spring Creek Drainage Basin (FOFO4200).

The current Flood Insurance Study (FIS) for the region includes the Flood Insurance Rate Map (FIRM) effective December 7, 2018. The project site is located within Map Panel Number 08041C0741G of the FEMA Flood Insurance Rate Map for El Paso County, Colorado. According to the current FIRM, a portion of the subject site is located within a FEMA-designated Special Flood Hazard Area (SFHA). The applicable FEMA Flood Insurance Rate Map, with the project site delineated, is included in the Appendix of this report.

According to the soil survey prepared by the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS), the site is primarily comprised of two soil types: Ustic Torrifluvents, loamy, (Map Unit 101), and Ellicott loamy coarse sand, (Map Unit 28).

Ustic Torrifluvents, loamy (Map Unit 101), is classified within Hydrologic Soil Group B and is characterized as well drained with moderate permeability, low surface runoff, and a low hazard of erosion. Ellicott loamy coarse sand (Map Unit 28) is classified within Hydrologic Soil Group A and is described as deep and well drained with rapid permeability, slow surface runoff, and a high hazard of erosion. A Soil Survey Map depicting the site soils is included in the Appendix of this report.

3 Drainage Design Criteria

3.1 Development Criteria Reference

This Final Drainage Report for Tract 11, Valley Gardens has been prepared according to the report guidelines presented in the latest edition of *El Paso County Drainage Criteria Manual* (DCM)[1]. 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.[2] [3] The hydrologic analysis is based on a collection of data from the DCM, the NRCS Web Soil Survey[4], and existing topographic data.

3.2 Hydrologic Criteria

For this Final Drainage Report, the Rational Method as described in the D*rainage 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

1 DCM Section 4.3 and Section 4.4
2 CS DCM Vol 1
3 CS DCM Vol 2
4 WSS

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.[5]

4 Drainage Facility Design

4.1 General Concept

The project site consists of an undeveloped industrial tract located within the Valley Gardens area adjacent to Janitell Road and the Fountain Creek corridor. There are two onsite drainage basins and two offsite drainage basin that will be discussed further within this report. Under proposed conditions, runoff generated within the developed portions of the site will be collected and directed toward a proposed Full Spectrum – Full Infiltration – Sand Filter Basin (FS-FI-SFB) located at the southern side of the site, where stormwater will be detained and fully infiltrated into the ground. The newly constructed FS-FI-SFB will be conjoined to an adjacent FS-FI-SFB located southeast of the current project site on adjacent property 2165 Janitell Rd. (El Paso County Assessor Schedule No. 6428301005). The proposed drainage concept is intended to provide controlled stormwater management, maintain compatibility with existing drainage patterns, and minimize potential offsite impacts.

4.2 Existing / Developed Hydrologic Conditions

4.2.1 Existing Conditions

Offsite existing basin OS-1 originates at the northeastern boundary of Tract 4, extends through the northern portion of Tract 5, and terminates near the eastern central boundary of Tract 11, Valley Gardens. Basin OS-1 encompasses approximately 3.49 acres and is characterized by an existing imperviousness of 78.3%. Runoff from OS-1 generally flows in a southwesterly direction as overland flow onto adjacent Tract 11, with existing peak discharges identified as Q_5 = 8.3 cfs and Q_{100} = 16.1 cfs.

Offsite existing basin OS-2 is located along the eastern portion of Tract 11, Valley Gardens, and encompasses approximately 3.20 acres. OS-2 is characterized by an existing imperviousness of approximately 50.6%. Runoff from OS-2 generally flows in a southwesterly direction as overland flow and discharges into the existing FS-FI-SFB located on and in the southern portion of the property known as 2165 Janitell Rd. Existing peak discharges for Basin OS-2 are identified as Q_5 = 5.0 cfs and Q_{100}= 11.6 cfs.

Onsite existing basin EX-A is located within Tract 11, Valley Gardens and encompasses approximately 2.86 acres. The basin is currently undeveloped and characterized by 0% imperviousness under existing conditions. Runoff from EX-A generally flows south as shallow channel flow along the eastern property boundary, and discharges onto the Colorado Aggregate Recycling property (El Paso County Assessor Schedule No. 6428300043). Existing peak runoff discharges for basin EX-A are identified as Q_5 = 0.8 cfs and Q_{100}= 6.0 cfs. Basin OS-1 combines with Basin EX-A, and the combined flows at existing Design Point 2 (EX-DP2), located along the southern property line, are Q_5 = 8.0 cfs and Q_{100}= 19.6 cfs

Onsite existing basin EX-B is located within Tract 11, Valley Gardens and encompasses approximately 1.99 acres. The basin is currently undeveloped and characterized by 0% imperviousness under existing conditions. Runoff from EX-B generally flows in a southwesterly direction as overland flow and discharges into the Fountain Creek corridor. Existing peak runoff for basin EX-B are identified as Q_5 = 0.6 cfs and Q_{100}= 4.4 cfs at existing Design Point 1 (DP1).

5 DCM

The Existing Drainage Map illustrates the existing topography, drainage basin delineations, drainage patterns, and associated runoff quantities. A supporting data table summarizing drainage areas and peak flow rates is included with the map and attached for reference. References from the existing drainage report are included in the **Appendix.**

4.2.2 Developed Conditions

The developed conditions presented in this report represent the proposed development scenario for Tract 11, Valley Gardens. The analyses reflect the anticipated site improvements and associated drainage characteristics resulting from the proposed development and site grading.

Offsite Basin OS-1 originates at the northeastern boundary of Tract 4, extends through the northern portion of Tract 5, and terminates near the eastern central boundary of Tract 11, Valley Gardens. Basin OS-1 encompasses approximately 3.49 acres and is characterized by an existing imperviousness of 78.3%. Runoff from OS-1 generally flows in a southwesterly direction as overland flow onto adjacent Tract 11, with existing peak discharges identified as Q_5 = 8.3 cfs and Q_{100} = 16.1 cfs. There are no proposed modifications to the existing drainage patterns associated with OS-1 as part of the proposed development, OS-1 will remain unchanged.

Offsite Basin OS-2 is located along the eastern portion of Tract 11, Valley Gardens, and encompasses approximately 3.20 acres. OS-2 is characterized by an existing imperviousness of approximately 50.6%. Runoff from OS-2 generally flows in a southwesterly direction as overland flow and discharges into a FS-SFB located on and to the south of property 2165 Janitell Rd. Existing peak discharges for Basin OS-2 are identified as Q_5 = 5.0 cfs and Q_{100}= 11.6 cfs. There are no proposed modifications to the existing drainage patterns associated with OS-2 as part of the proposed development, OS-2 will remain unchanged.

Onsite Basin PP-A is located within Tract 11, Valley Gardens and encompasses approximately 3.54 acres. Under developed conditions, Basin PP-A is characterized by approximately 71.9% imperviousness associated with proposed site improvements and grading. Runoff from PP-A generally flows in a southerly and southeasterly direction through the site, and is conveyed toward the proposed FS-FI-SFB located along the southern boundary of the property (2217 Janitell Rd). Developed peak runoff discharges for Basin PP-A are identified as Q_5 = 7.0 cfs and Q_{100} = 14.6 cfs. Basin OS-1 and OS-2 combine with Basin PP-A, and generate developed combined flows at proposed Design Point 2 (PP-DP2) of Q_5 = 19.5 cfs and Q_{100}= 40.7 cfs. All of said flows enter the new FS-FI-EDB conjoined with the aforementioned existing FS-FI-EDB situated along along the southern portion of the Tract 5 property.

Onsite Basin PP-B is located within the southwestern portion of Tract 11, Valley Gardens and encompasses approximately 1.31 acres. Basin PP-B is characterized by 0.0% imperviousness under developed conditions. Runoff from PP-B generally flows in a southwesterly direction toward Fountain Creek corridor. Developed peak runoff discharges for Basin PP-B are identified as Q_5 = 0.4 cfs and Q_{100} = 2.9 cfs at Design Point 1 (DP1)

The proposed development results in changes to site imperviousness and corresponding runoff characteristics within the drainage areas. The proposed FS-FI-SFB will be conjoined with the adjacent existing FS-FI-SFB to function as a combined detention facility serving both properties. The combined facility will provide the storage and conveyance capacity necessary to accommodate developed runoff generated by the project, while generally maintaining the current drainage pattern of the property. Supporting detention and drainage analyses, relevant worksheet references, and updated hydrologic calculations reflecting revised basin areas and imperviousness are included in the Appendix for reference.

4.2.3 Flow Comparison

The proposed development results in an increase in peak runoff at Design Point DP-2. The 5-year peak discharge increases from 8.0 cfs under existing conditions to 19.5 cfs under proposed conditions, representing an increase of 11.5 cfs, or approximately 143.8%. The 100-year peak discharge increases from 19.6 cfs to 40.7 cfs, representing an increase of 21.1 cfs, or approximately 107.7%. These increased flows are directed to the combined detention facility, which will provide the adequate storage for the proposed development. Since this detention facility is a full infiltration facility, runoff from the site draining to the south will ultimately be reduced from the historic conditions to zero outflows from this site.

Flows exiting the site to the west into Fountain Creek will be reduced from Q_5 = 0.6 cfs and Q_{100}= 4.4 cfs at existing Design Point 1 (DP1) to Q_5 = 0.4 cfs and Q_{100} = 2.9 cfs, a reduction of Q_5 = 0.2 cfs and Q_{100} = 1.5 cfs.

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4.3 Water Quality and Detention

Runoff from the contributing drainage areas, including Basins PP-A, OS-1, and OS-2, is conveyed to the proposed conjoined FS-FI-SFB located along the southern portion of the Tract 11. The proposed detention pond will be conjoined with the adjacent existing detention basin on Tract 5 to function as a combined detention facility serving the contributing drainage areas.

The detention analysis indicates a required storage volume of 1.147 acre-feet, while the proposed facility provides a design storage volume of 1.672 acre-feet. The maximum storage volume utilized during the 100-year storm event is approximately 1.442 acre-feet, corresponding to a maximum 100-year ponding depth of approximately 4.67 feet. The spillway elevation corresponds to a pond depth of approximately 5.40 feet, providing additional depth above the calculated 100-year water surface.

The detention facility has a calculated drain time of approximately 8.50 hours. Based on the detention analysis, the proposed combined facility provides adequate storage capacity for the developed runoff generated.

4.4 Erosion Control

The existing site consists primarily of undeveloped pasture and meadow areas. Proposed improvements include site grading, construction of the approximately recycled asphalt parking area, construction of the proposed detention facility, and associated site improvements. The total anticipated construction disturbance is approximately 3.77 acres.

Erosion and sediment control measures will be implemented in accordance with the approved Grading and Erosion Control Plan prepared for the project. Initial control measures will be installed prior to commencement of major construction activities. A Vehicle Tracking Control (VTC) and Concrete Washout Area (CWA) will be installed at the construction entrance from Jantell Road to minimize the tracking of sediment onto adjacent paved surfaces. A Stabilized Staging Area (SSA) will also be provided near the construction entrance for construction-related staging and material handling.

Silt Fence (SF) will be installed along the downstream limits of disturbance where indicated on the plans to intercept sediment-laden runoff, and minimize sediment transport from disturbed portions of the site. Additional erosion and sediment control measures will be installed and maintained throughout construction as shown on the approved plans and may be modified or supplemented as necessary in response to changing field conditions per the designated GEC Administrator, Contractor, or Engineer.

All control measures will be inspected and maintained throughout construction to minimize erosion and sediment transport, protect adjacent properties and drainage facilities, and reduce potential impacts to downstream receiving waters, including Fountain Creek.

4.5 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". The Four Step Process is incorporated in this project and the elements are discussed below.

The entire site consists of undeveloped area. There is no public roadway being dedicated or constructed as part of this project. The site has met the Post Construction Stormwater Treatment requirements in the previous development.

Step 1: Employ Runoff Reduction Practices: 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. Minimized Directly Connected Impervious Areas (MDCIA) is employed on the project because runoff passes through an open space meadow area before leaving the site.

Step 2: Stabilize Drainageways: There are no drainage paths on the site that are required to be stabilized. There is no visual erosion occurring in the area being developed.

Step 3: Provide Water Quality Capture Volume (WQCV): The existing / expanded detention pond provides the necessary WQCV as discussed above.

Step 4: Consider Need for Industrial and Commercial CMs: The site is not anticipated to contain storage of potentially harmful substances or use of potentially harmful substances. No site specific or other source control CMs are required.

5 Drainage and Bridge Fees

The Tract 11, Valley Gardens contains 4.84± acres and is located within the Spring Creek Drainage Basin, El Paso Basin Number FOFO4200, which was last studied in 1977. The present zone is M (Industrial). Since this Lot was previously platted, and the Final Drainage Plan is being prepared for a Site Development Plan, no Drainage or Bridge Fees are due.

6 Conclusion

This Final Drainage Report presents existing and proposed drainage conditions for the proposed Tract 11, Valley Gardens project. The development presents a drainage concept that includes recommendations for proposed site improvements that will direct, control, and treat stormwater runoff. The proposed development of said project, and this Final Drainage Report is in general conformance with all previously filed drainage reports which include this area. Site runoff from this project will not negatively impact the adjacent properties, or receiving waters within the surrounding area.

References

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).

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).

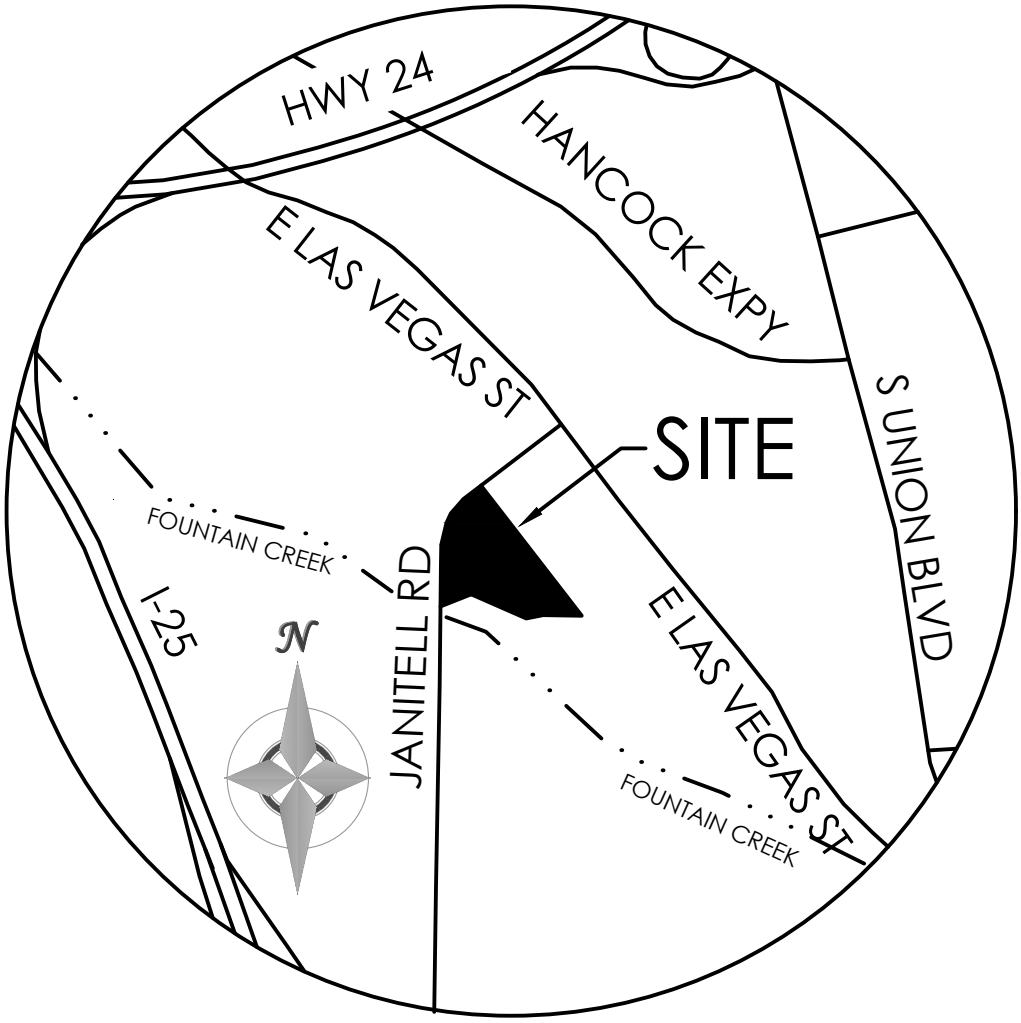
City of Colorado Springs Drainage Criterial Manual, Volume 1. City of Colorado Springs Engineering Division Staff, Matrix Desgin Group/Wright Water Engineers (Colorado Springs: , May 2014).

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

Appendices

1 General Maps and Supporting Data

Vicinity Map
Portions of Flood Insurance Rate Map
NRCS Soil Map and Tables
SCS Soil Type Descriptions
Hydrologic Soil Group Map and Tables



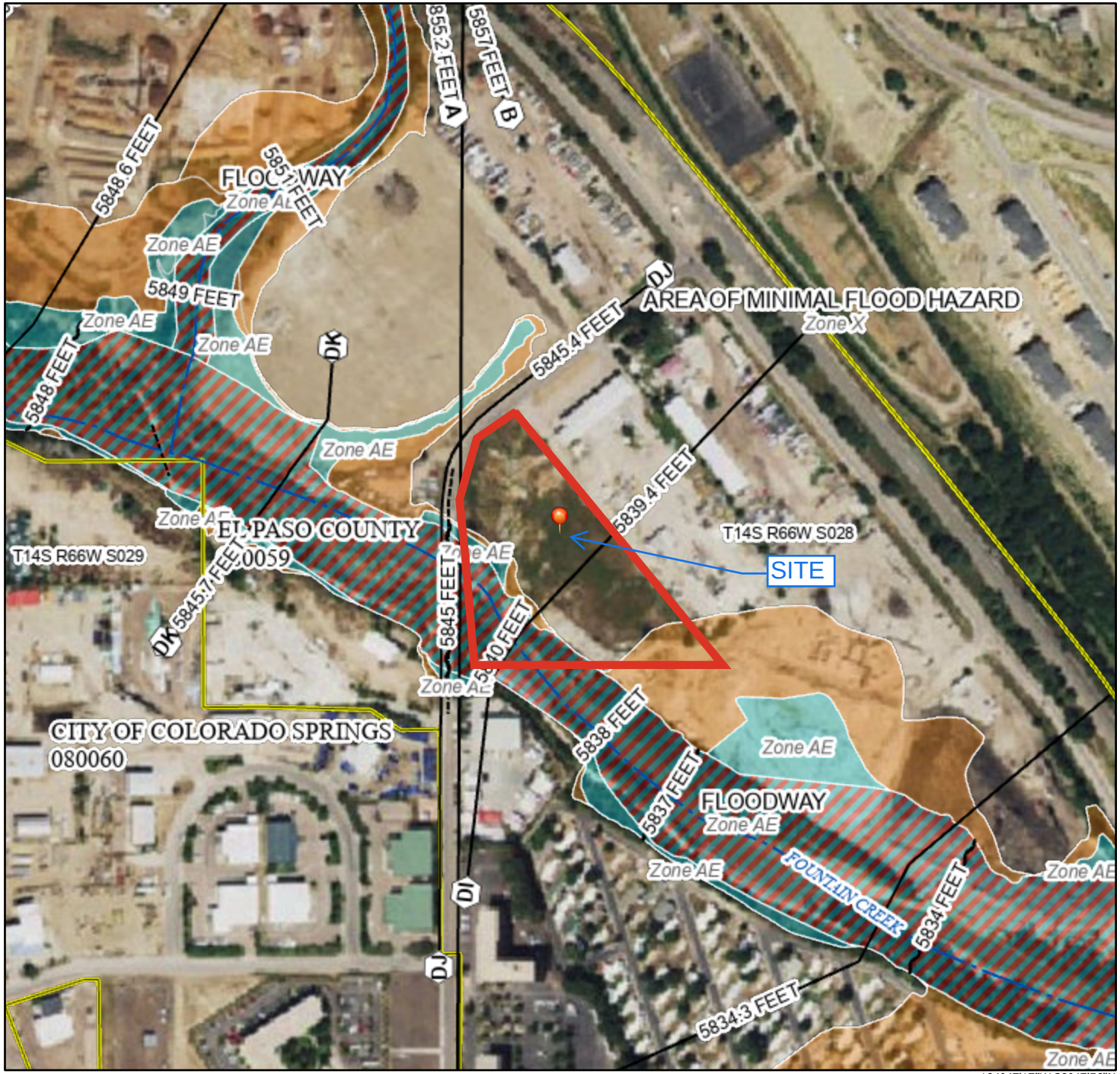
VICINITY MAP

NOT TO SCALE

National Flood Hazard Layer FIRMette

FEMA

104°47'55"W 38°48'24"N



104°47'17"W 38°47'56"N

Feet

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

1:6,000

Basemap Imagery Source: USGS National Map 2023

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
- 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 4/1/2026 at 7:24 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.

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 1, 2026

Preface

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

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

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

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

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

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

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How Soil Surveys Are Made

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

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

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

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

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

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

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

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

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

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

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

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

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

Soil Map

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

Custom Soil Resource Report
Soil Map



Map Scale: 1:1,650 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 20 40 80 120

Feet: 0 50 100 200 300

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 23, Aug 29, 2025

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

Date(s) aerial images were photographed: Jul 23, 2024—Aug 4, 2024

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
28	Ellicott loamy coarse sand, 0 to 5 percent slopes	1.7	33.5%
101	Ustic Torrifluvents, loamy	3.4	66.5%
Totals for Area of Interest		**5.1**	**100.0%**

Map Unit Descriptions

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

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

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

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

onsite investigation is needed to define and locate the soils and miscellaneous areas.

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

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

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

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

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

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

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

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

El Paso County Area, Colorado

28—Ellicott loamy coarse sand, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 3680
Elevation: 5,500 to 6,500 feet
Mean annual precipitation: 13 to 15 inches
Mean annual air temperature: 47 to 50 degrees F
Frost-free period: 125 to 145 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Ellicott

Setting

Landform: Stream terraces, Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy alluvium

Typical profile

A - 0 to 4 inches: loamy coarse sand
C - 4 to 60 inches: stratified coarse sand to sandy loam

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A
Ecological site: R069XY031CO - Sandy Bottomland
Other vegetative classification: SANDY BOTTOMLAND (069AY031CO)
Hydric soil rating: No

Minor Components

Fluvaquentic haplaquoll

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

Other soils

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

Pleasant

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

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: Prime farmland if irrigated

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: Stream terraces, Flood plains
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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2 Hydrologic Calculations

Runoff Coefficients and Percent Imperviousness Table 6-6
Colorado Springs Rainfall Intensity Duration Frequency Table 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

NOAA Atlas 14, Volume 8, Version 2
Location name: Colorado Springs, Colorado, USA*
Latitude: 38.8028°, Longitude: -104.7935°
Elevation: 5847 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.239 (0.196-0.293)	0.287 (0.236-0.353)	0.372 (0.305-0.459)	0.448 (0.365-0.555)	0.560 (0.442-0.730)	0.653 (0.501-0.862)	0.751 (0.555-1.02)	0.856 (0.604-1.20)	1.00 (0.678-1.45)	1.12 (0.733-1.64)
10-min	0.349 (0.287-0.429)	0.421 (0.346-0.517)	0.545 (0.446-0.672)	0.656 (0.534-0.813)	0.821 (0.648-1.07)	0.956 (0.734-1.26)	1.10 (0.812-1.49)	1.25 (0.884-1.76)	1.47 (0.992-2.12)	1.64 (1.07-2.40)
15-min	0.426 (0.350-0.523)	0.513 (0.421-0.630)	0.665 (0.544-0.819)	0.801 (0.651-0.992)	1.00 (0.790-1.30)	1.17 (0.895-1.54)	1.34 (0.990-1.82)	1.53 (1.08-2.14)	1.79 (1.21-2.59)	2.00 (1.31-2.92)
30-min	0.627 (0.515-0.769)	0.755 (0.620-0.927)	0.980 (0.802-1.21)	1.18 (0.961-1.46)	1.48 (1.17-1.93)	1.72 (1.32-2.28)	1.99 (1.47-2.70)	2.26 (1.60-3.17)	2.66 (1.80-3.84)	2.97 (1.94-4.34)
60-min	0.816 (0.671-1.00)	0.962 (0.790-1.18)	1.23 (1.01-1.52)	1.49 (1.21-1.84)	1.88 (1.50-2.48)	2.23 (1.72-2.96)	2.60 (1.93-3.55)	3.01 (2.13-4.24)	3.60 (2.44-5.23)	4.08 (2.68-5.97)
2-hr	1.01 (0.832-1.23)	1.17 (0.966-1.43)	1.48 (1.22-1.82)	1.79 (1.47-2.21)	2.29 (1.84-3.01)	2.73 (2.12-3.62)	3.21 (2.40-4.38)	3.75 (2.68-5.27)	4.54 (3.11-6.57)	5.20 (3.43-7.56)
3-hr	1.11 (0.918-1.34)	1.26 (1.05-1.54)	1.59 (1.31-1.94)	1.92 (1.58-2.36)	2.47 (2.01-3.27)	2.97 (2.33-3.96)	3.54 (2.67-4.83)	4.18 (3.01-5.87)	5.12 (3.53-7.41)	5.92 (3.92-8.57)
6-hr	1.27 (1.06-1.53)	1.44 (1.20-1.74)	1.80 (1.49-2.18)	2.18 (1.80-2.65)	2.82 (2.31-3.72)	3.41 (2.70-4.52)	4.09 (3.11-5.56)	4.86 (3.53-6.80)	6.01 (4.18-8.65)	6.98 (4.67-10.0)
12-hr	1.44 (1.21-1.72)	1.64 (1.38-1.97)	2.07 (1.74-2.50)	2.51 (2.09-3.04)	3.24 (2.66-4.22)	3.89 (3.09-5.11)	4.63 (3.54-6.24)	5.47 (3.99-7.58)	6.70 (4.69-9.56)	7.74 (5.22-11.1)
24-hr	1.62 (1.37-1.93)	1.89 (1.60-2.25)	2.40 (2.03-2.88)	2.90 (2.43-3.49)	3.70 (3.04-4.75)	4.40 (3.50-5.70)	5.16 (3.96-6.88)	6.02 (4.42-8.26)	7.27 (5.12-10.3)	8.30 (5.64-11.8)
2-day	1.86 (1.58-2.20)	2.18 (1.86-2.58)	2.78 (2.35-3.30)	3.33 (2.81-3.98)	4.20 (3.46-5.31)	4.94 (3.95-6.32)	5.74 (4.43-7.56)	6.62 (4.89-8.99)	7.89 (5.59-11.0)	8.93 (6.12-12.6)
3-day	2.04 (1.74-2.40)	2.39 (2.04-2.82)	3.03 (2.58-3.59)	3.63 (3.07-4.32)	4.55 (3.76-5.73)	5.33 (4.28-6.79)	6.18 (4.78-8.09)	7.10 (5.26-9.59)	8.42 (5.99-11.7)	9.50 (6.54-13.3)
4-day	2.19 (1.88-2.58)	2.56 (2.20-3.02)	3.24 (2.77-3.83)	3.87 (3.28-4.59)	4.83 (4.00-6.06)	5.64 (4.54-7.16)	6.52 (5.06-8.51)	7.48 (5.56-10.1)	8.85 (6.31-12.3)	9.96 (6.88-14.0)
7-day	2.59 (2.24-3.03)	3.00 (2.59-3.51)	3.74 (3.21-4.39)	4.42 (3.77-5.21)	5.44 (4.53-6.77)	6.31 (5.11-7.95)	7.24 (5.65-9.38)	8.25 (6.17-11.0)	9.69 (6.95-13.4)	10.9 (7.55-15.1)
10-day	2.93 (2.54-3.41)	3.37 (2.92-3.93)	4.16 (3.58-4.86)	4.87 (4.17-5.73)	5.94 (4.96-7.35)	6.84 (5.56-8.58)	7.80 (6.11-10.1)	8.84 (6.63-11.8)	10.3 (7.42-14.1)	11.5 (8.02-16.0)
20-day	3.84 (3.34-4.44)	4.40 (3.83-5.09)	5.36 (4.64-6.22)	6.19 (5.34-7.23)	7.40 (6.18-9.01)	8.37 (6.83-10.4)	9.39 (7.39-12.0)	10.5 (7.89-13.8)	11.9 (8.65-16.2)	13.1 (9.23-18.1)
30-day	4.59 (4.01-5.29)	5.26 (4.60-6.07)	6.38 (5.56-7.39)	7.33 (6.34-8.53)	8.66 (7.24-10.5)	9.70 (7.93-11.9)	10.8 (8.49-13.6)	11.8 (8.96-15.5)	13.3 (9.68-17.9)	14.4 (10.2-19.8)
45-day	5.56 (4.88-6.38)	6.39 (5.61-7.34)	7.73 (6.76-8.91)	8.83 (7.68-10.2)	10.3 (8.64-12.3)	11.4 (9.37-13.9)	12.6 (9.94-15.7)	13.7 (10.4-17.7)	15.1 (11.0-20.2)	16.2 (11.5-22.1)
60-day	6.41 (5.64-7.33)	7.38 (6.49-8.45)	8.92 (7.82-10.2)	10.2 (8.85-11.7)	11.8 (9.88-14.0)	13.0 (10.7-15.7)	14.2 (11.2-17.6)	15.3 (11.6-19.7)	16.7 (12.2-22.3)	17.7 (12.7-24.2)

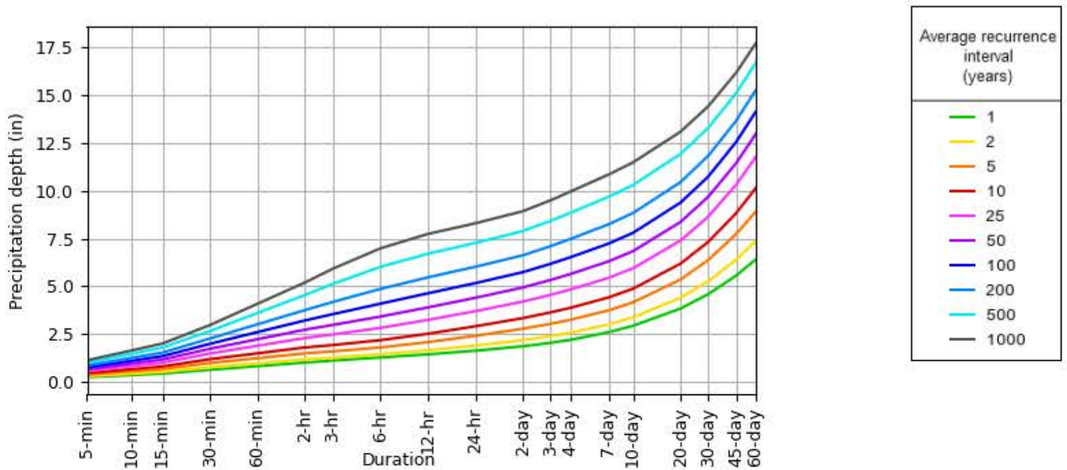
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

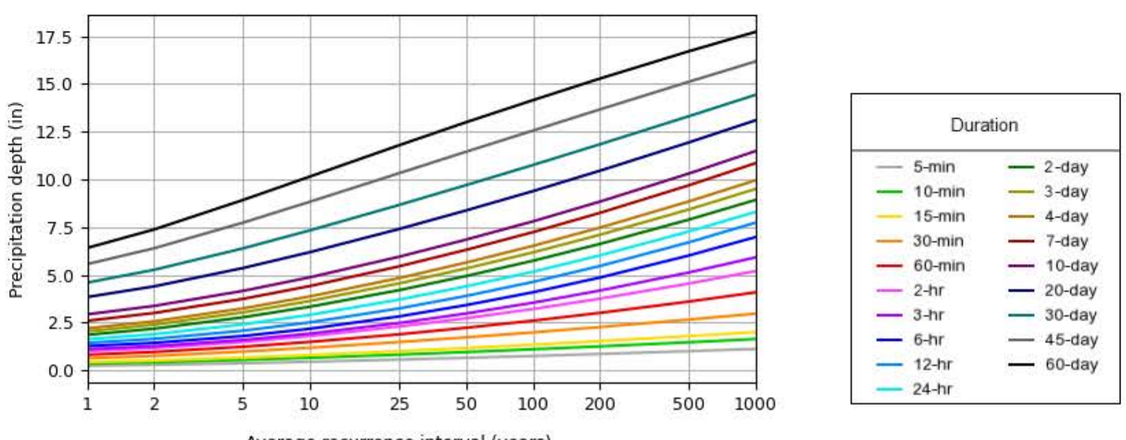
Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

PF graphical

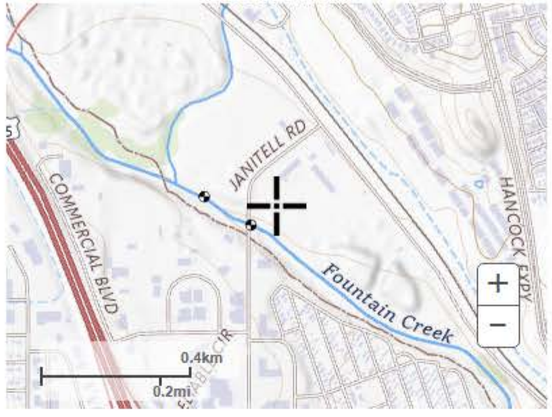
PDS-based depth-duration-frequency (DDF) curves
Latitude: 38.8028°, Longitude: -104.7935°





Maps & aerials

Small scale terrain



Large scale terrain



Large scale map



Job No.: **61243** Date: **9/16/2026 10:35**

Project: **SOMBERS WEST** Calcs By: **CORY G**

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)
EX-A	2.86	0.08	0.35	0%	65	5%	9.0	775	0.010	0.7	18.2	0	0.000	0.0	0.0	840	14.7	14.7
EX-B	1.99	0.08	0.35	0%	100	3%	12.8	413	0.010	0.7	10.0	0	0.000	0.0	0.0	513	12.9	12.9
PP-A	3.54	0.54	0.66	72%	100	4%	6.4	526.3	0.011	0.7	11.7	0	0.000	0.0	0.0	626	13.5	13.5
PP-B	1.31	0.08	0.35	0%	100	2%	14.7	330	0.058	1.7	3.3	0	0.000	0.0	0.0	430	12.4	12.4
OS-1	3.49	0.66	0.77	78%	100	1%	8.0	670	0.013	0.8	13.8	0	0.000	0.0	0.0	770	14.3	14.3
OS-2	3.20	0.44	0.60	51%	100	1%	12.0	238	0.025	3.2	1.2	343	0.003	1.1	5.1	770	14.3	14.3

Job No.: **61243**
Project: **SOMBERS WEST**
Design Storm: **5-Year Storm** *(20% Probability)*
Jurisdiction: **DCM**

Date: **9/16/2026 10:35**
Calcs By: **CORY G**
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)
	OS-1	3.49	0.66	14.3	2.29	3.59	8.25															
	OS-2	3.20	0.44	14.3	1.40	3.59	5.02															
DP-1	EX-B	1.99	0.08	12.9	0.16	3.75	0.60															
	EX-A	2.86	0.08	14.7	0.23	3.55	0.81															
EX-DP2		6.35	0.40					18.8	2.52	3.18	8.0											
DP-1	PP-B	1.31	0.08	12.4	0.10	3.81	0.40															
	PP-A	3.54	0.54	13.5	1.91	3.68	7.02															
PP-DP2		10.23	0.55					15.4	5.60	3.48	19.5											

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

Job No.: **61243**
Project: **SOMBERS WEST**
Design Storm: **100-Year Storm** *(1% Probability)*
Jurisdiction: **DCM**

Date: **9/16/2026 10:35**
Calcs By: **CORY G**
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)
	OS-1	3.49	0.77	14.3	2.68	6.04	16.15															
	OS-2	3.20	0.60	14.3	1.93	6.04	11.64															
DP-1	EX-B	1.99	0.35	12.9	0.70	6.30	4.39															
	EX-A	2.86	0.35	14.7	1.00	5.97	5.97															
EX-DP2		6.35	0.58					18.8	3.68	5.34	19.6											
DP-1	PP-B	1.31	0.35	12.4	0.46	6.39	2.93															
	PP-A	3.54	0.66	13.5	2.35	6.18	14.55															
PP-DP2		10.23	0.68					15.4	6.96	5.84	40.7											

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

Sub-Basin Ex-A Runoff Calculations

Job No.:	**61243**	Date:	**9/16/2026 10:35**
Project:	**SOMBERS WEST**	Calcs by:	**CORY G**
		Checked by:	
Jurisdiction	**DCM**	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	124,436	2.86	0.02	0.08	0.15	0.25	0.3	0.35	0%
Combined	**124,436**	**2.86**	**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

$L_{max,Overland}$: 100 ft C_v: 7

	L (ft)	ΔZ_0 (ft)	S_0 (ft/ft)	v (ft/s)	t (min)	t_{Alt} (min)	
Total	840	11	-	-	-	-	
Initial Time	65	3	0.046	-	9.0	14.7	DCM Eq. 6-8
Shallow Channel	775	8	0.010	0.7	18.2	-	DCM Eq. 6-9
Channelized	0	0	0.000	0.0	0.0	-	V-Ditch
				t_c	**14.7**	**min.**	

Storage Volume

40 -hr release time

Detention is NOT required

EURV 0.00 (in) a = 1

Water Quality is NOT required

WQCV 0.00 (in)

i (return period)	5-year	10-year	100-year			**Design Volume (ft^3)**		
K_i (ft)	0.0000	0.0000	0		% Storage	100-year	WQCV	Total
V_i (acre-ft)	0.000	0.000	0	EURV	0%	0	0	**0**
V_i (ft^3)	0	0	0	WQCV	0%		0	**0**

Rainfall Intensity & Runoff

	2-Yr	**5-Yr**	**10-Yr**	**25-Yr**	**50-Yr**	**100-Yr**
Intensity (in/hr)	2.84	3.55	4.15	4.74	5.33	5.97
Runoff (cfs)	0.2	**0.8**	1.8	3.4	4.6	**6.0**
Release Rates (cfs/ac)	-	-	-	-	-	-
Allowed Release (cfs)	0.2	**0.8**	1.8	3.4	4.6	**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 Ex-B Runoff Calculations

Job No.:	**61243**	Date:	**9/16/2026 10:35**
Project:	**SOMBERS WEST**	Calcs by:	**CORY G**
		Checked by:	
Jurisdiction	**DCM**	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	87,074	1.99	0.02	0.08	0.15	0.25	0.3	0.35	0%
Combined	**87,074**	**1.99**	**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

$L_{max,Overland}$ = 100 ft; C_v = 7

	L (ft)	ΔZ_0 (ft)	S_0 (ft/ft)	v (ft/s)	t (min)	t_{Alt} (min)	
Total	513	7	-	-	-	-	
Initial Time	100	3	0.030	-	12.8	12.9	DCM Eq. 6-8
Shallow Channel	413	4	0.010	0.7	10.0	-	DCM Eq. 6-9
Channelized	0	0	0.000	0.0	0.0	-	V-Ditch
				t_c	**12.9**	**min.**	

Storage Volume

40 -hr release time

Detention is NOT required

Water Quality is NOT required

EURV 0.00 (in) a = 1

WQCV 0.00 (in)

i (return period)	5-year	10-year	100-year			Design Volume (ft^3) 100-year	WQCV	Total
K_i (ft)	0.0000	0.0000	0		% Storage			
V_i (acre-ft)	0.000	0.000	0	EURV	0%	0	0	**0**
V_i (ft^3)	0	0	0	WQCV	0%		0	**0**

Rainfall Intensity & Runoff

	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Intensity (in/hr)	3.00	3.75	4.38	5.00	5.63	6.30
Runoff (cfs)	0.1	**0.6**	1.3	2.5	3.4	**4.4**
Release Rates (cfs/ac)	-	-	-	-	-	-
Allowed Release (cfs)	0.1	**0.6**	1.3	2.5	3.4	**4.4**

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.:	**61243**	Date:	**9/16/2026 10:35**
Project:	**SOMBERS WEST**	Calcs by:	**CORY G**
		Checked by:	
Jurisdiction	**DCM**	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.**
Gravel	138,699	3.18	0.57	0.59	0.63	0.66	0.68	0.7	80%
Pasture/Meadow	15,685	0.36	0.02	0.08	0.15	0.25	0.3	0.35	0%
Combined	**154,384**	**3.54**	**0.51**	**0.54**	**0.58**	**0.62**	**0.64**	**0.66**	**71.9%**
	154384								

Basin Travel Time

Shallow Channel Ground Cover: Short Pasture/Lawns

$L_{max,Overland}$: 100 ft C_v: 7

	L (ft)	ΔZ_0 (ft)	S_0 (ft/ft)	v (ft/s)	t (min)	t_{Alt} (min)	
Total	626	10	-	-	-	-	
Initial Time	100	4	0.040	-	6.4	13.5	DCM Eq. 6-8
Shallow Channel	526	6	0.011	0.7	11.7	-	DCM Eq. 6-9
Channelized	0	0	0.000	0.0	0.0	-	V-Ditch
				t_c	**13.5**	**min.**	

Storage Volume

40 -hr release time

Detention is NOT required

EURV 0.00 (in) a = 1

Water Quality is NOT required

WQCV 0.00 (in)

i (return period)	5-year	10-year	100-year			**Design Volume (ft^3)**		
K_i (ft)	0.0000	0.0000	0		% Storage	100-year	WQCV	Total
V_i (acre-ft)	0.000	0.000	0	EURV	0%	0	0	**0**
V_i (ft^3)	0	0	0	WQCV	0%		0	**0**

Rainfall Intensity & Runoff

	2-Yr	**5-Yr**	**10-Yr**	**25-Yr**	**50-Yr**	**100-Yr**
Intensity (in/hr)	2.94	3.68	4.30	4.91	5.52	6.18
Runoff (cfs)	5.4	**7.0**	8.8	10.8	12.6	**14.6**
Release Rates (cfs/ac)	-	-	-	-	-	-
Allowed Release (cfs)	5.4	**7.0**	8.8	10.8	12.6	**14.6**

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.:	**61243**	Date:	**9/16/2026 10:35**
Project:	**SOMBERS WEST**	Calcs by:	**CORY G**
		Checked by:	
Jurisdiction	**DCM**	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	57,249	1.31	0.02	0.08	0.15	0.25	0.3	0.35	0%
Combined	**57,249**	**1.31**	**0.02**	**0.08**	**0.15**	**0.25**	**0.30**	**0.35**	**0.0%**

Basin Travel Time

Shallow Channel Ground Cover: Short Pasture/Lawns

$L_{max,Overland}$: 100 ft C_v: 7

	L (ft)	ΔZ_0 (ft)	S_0 (ft/ft)	v (ft/s)	t (min)	t_{Alt} (min)	
Total	430	21	-	-	-	-	
Initial Time	100	2	0.020	-	14.7	12.4	DCM Eq. 6-8
Shallow Channel	330	19	0.058	1.7	3.3	-	DCM Eq. 6-9
Channelized	0	0	0.000	0.0	0.0	-	V-Ditch
				t_c	**12.4**	**min.**	

Storage Volume

40 -hr release time

Detention is NOT required

EURV 0.00 (in) a = 1

Water Quality is NOT required

WQCV 0.00 (in)

i (return period)	5-year	10-year	100-year			**Design Volume (ft^3)**		
K_i (ft)	0.0000	0.0000	0		% Storage	100-year	WQCV	Total
V_i (acre-ft)	0.000	0.000	0	EURV	0%	0	0	**0**
V_i (ft^3)	0	0	0	WQCV	0%		0	**0**

Rainfall Intensity & Runoff

	2-Yr	**5-Yr**	**10-Yr**	**25-Yr**	**50-Yr**	**100-Yr**
Intensity (in/hr)	3.04	3.81	4.44	5.08	5.71	6.39
Runoff (cfs)	0.1	**0.4**	0.9	1.7	2.2	**2.9**
Release Rates (cfs/ac)	-	-	-	-	-	-
Allowed Release (cfs)	0.1	**0.4**	0.9	1.7	2.2	**2.9**

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-1 Runoff Calculations

Job No.:	**61243**	Date:	**9/16/2026 10:35**
Project:	**SOMBERS WEST**	Calcs by:	**CORY G**
		Checked by:	
Jurisdiction	**DCM**	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.**
Paved	59,845	1.37	0.89	0.9	0.92	0.94	0.95	0.96	100%
Gravel	58,532	1.34	0.57	0.59	0.63	0.66	0.68	0.7	80%
Landscaping	20,314	0.47	0.03	0.09	0.17	0.26	0.31	0.36	2%
Roofs	13,348	0.31	0.71	0.73	0.75	0.78	0.8	0.81	90%
Combined	**152,039**	**3.49**	**0.64**	**0.66**	**0.69**	**0.73**	**0.75**	**0.77**	**78.3%**
	152,039								

Basin Travel Time

Shallow Channel Ground Cover: Short Pasture/Lawns

$L_{max,Overland}$: 100 ft C_v: 7

	L (ft)	ΔZ_0 (ft)	S_0 (ft/ft)	v (ft/s)	t (min)	t_{Alt} (min)	
Total	770	10	-	-	-	-	
Initial Time	100	1	0.010	-	8.0	14.3	DCM Eq. 6-8
Shallow Channel	670	9	0.013	0.8	13.8	-	DCM Eq. 6-9
Channelized	0	0	0.000	0.0	0.0	-	V-Ditch
				t_c	**14.3**	**min.**	

Storage Volume

40 -hr release time

Detention is NOT required

EURV 0.00 (in) a = 1

Water Quality is NOT required

WQCV 0.00 (in)

i (return period)	5-year	10-year	100-year			**Design Volume (ft^3)**		
K_i (ft)	0.0000	0.0000	0		% Storage	100-year	WQCV	Total
V_i (acre-ft)	0.000	0.000	0	EURV	0%	0	0	**0**
V_i (ft^3)	0	0	0	WQCV	0%		0	**0**

Rainfall Intensity & Runoff

	2-Yr	**5-Yr**	**10-Yr**	**25-Yr**	**50-Yr**	**100-Yr**
Intensity (in/hr)	2.87	3.59	4.19	4.79	5.39	6.04
Runoff (cfs)	6.4	**8.3**	10.1	12.2	14.1	**16.1**
Release Rates (cfs/ac)	-	-	-	-	-	-
Allowed Release (cfs)	6.4	**8.3**	10.1	12.2	14.1	**16.1**

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-2 Runoff Calculations

Job No.:	**61243**	Date:	**9/16/2026 10:35**
Project:	**SOMBERS WEST**	Calcs by:	**CORY G**
		Checked by:	
Jurisdiction	**DCM**	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	56,391	1.29	0.02	0.08	0.15	0.25	0.3	0.35	0%
Gravel	42,093	0.97	0.57	0.59	0.63	0.66	0.68	0.7	80%
Paved	16,597	0.38	0.89	0.9	0.92	0.94	0.95	0.96	100%
Landscaping	1,748	0.04	0.03	0.09	0.17	0.26	0.31	0.36	2%
Roofs	22,500	0.52	0.71	0.73	0.75	0.78	0.8	0.81	90%
Combined	**139,329**	**3.20**	**0.40**	**0.44**	**0.48**	**0.54**	**0.57**	**0.60**	**50.6%**
	139,329								

Basin Travel Time

Shallow Channel Ground Cover: Paved areas/shallow paved swales

$L_{max,Overland}$: 100 ft C_v: 20

	L (ft)	ΔZ_0 (ft)	S_0 (ft/ft)	v (ft/s)	t (min)	t_{Alt} (min)	
Total	770	8	-	-	-	-	
Initial Time	100	1	0.010	-	12.0	14.3	DCM Eq. 6-8
Shallow Channel	238	6	0.025	3.2	1.2	-	DCM Eq. 6-9
Channelized	343	1	0.003	1.1	5.1	-	V-Ditch
				t_c	**14.3**	**min.**	

Storage Volume

40 -hr release time

Detention is NOT required

Water Quality is NOT required

EURV 0.00 (in) a = 1

WQCV 0.00 (in)

i (return period)	5-year	10-year	100-year			Design Volume (ft^3)		
K_i (ft)	0.0000	0.0000	0		% Storage	100-year	WQCV	Total
V_i (acre-ft)	0.000	0.000	0	EURV	0%	0	0	**0**
V_i (ft^3)	0	0	0	WQCV	0%		0	**0**

Rainfall Intensity & Runoff

	2-Yr	**5-Yr**	**10-Yr**	**25-Yr**	**50-Yr**	**100-Yr**
Intensity (in/hr)	2.87	3.59	4.19	4.79	5.39	6.04
Runoff (cfs)	3.7	**5.0**	6.5	8.3	9.9	**11.6**
Release Rates (cfs/ac)	-	-	-	-	-	-
Allowed Release (cfs)	3.7	**5.0**	6.5	8.3	9.9	**11.6**

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

Combined Sub-Basin Runoff Calculations

Includes Basins OS-1 EX-A

Job No.:	**61243**	Date:	**9/16/2026 10:35**
Project:	**SOMBERS WEST**	Calcs by:	**CORY G**
		Checked by:	
Jurisdiction	**DCM**	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.**
Gravel	58,532	1.34	0.57	0.59	0.63	0.66	0.68	0.7	80%
Pasture/Meadow	124,436	2.86	0.02	0.08	0.15	0.25	0.3	0.35	0%
Paved	59,845	1.37	0.89	0.9	0.92	0.94	0.95	0.96	100%
Landscaping	20,314	0.47	0.03	0.09	0.17	0.26	0.31	0.36	2%
Roofs	13,348	0.31	0.71	0.73	0.75	0.78	0.8	0.81	90%
Combined	**276,475**	**6.35**	**0.36**	**0.40**	**0.45**	**0.51**	**0.55**	**0.58**	**43.1%**

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	OS-1	-	770	10	-	-	-	-	14.3
Channelized-1	Trap Ditch	2	350	2	16	10	10	1.3	4.6
Channelized-2									
Channelized-3									
Total			1,120	12					

2 = Natural, Winding, minimal vegetation/shallow grass

t_c (min) **18.8**

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)	2.54	3.18	3.71	4.24	4.77	5.34
Site Runoff (cfs)	5.79	**8.02**	10.57	13.79	16.53	**19.62**
OffSite Runoff (cfs)	-	**0.00**	-	-	-	**0.00**
Release Rates (cfs/ac)	-	-	-	-	-	-
Allowed Release (cfs)	-	**8.0**	-	-	-	**19.6**

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

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

Combined Sub-Basin Runoff Calculations

Includes Basins OS-1 PP-A OS-2

Job No.:	**61243**	Date:	**9/16/2026 10:35**
Project:	**SOMBERS WEST**	Calcs by:	**CORY G**
		Checked by:	
Jurisdiction	**DCM**	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.**
Paved	76,442	1.75	0.89	0.9	0.92	0.94	0.95	0.96	100%
Gravel	239,324	5.49	0.57	0.59	0.63	0.66	0.68	0.7	80%
Landscaping	22,062	0.51	0.03	0.09	0.17	0.26	0.31	0.36	2%
Roofs	35,848	0.82	0.71	0.73	0.75	0.78	0.8	0.81	90%
Pasture/Meadow	72,076	1.65	0.02	0.08	0.15	0.25	0.3	0.35	0%
Combined	**445,752**	**10.23**	**0.52**	**0.55**	**0.59**	**0.63**	**0.66**	**0.68**	**67.4%**

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	OS-1	-	770	10	-	-	-	-	14.3
Channelized-1	Trap Ditch	2	174	2	16	2	2	2.6	1.1
Channelized-2									
Channelized-3									
Total			944	12					

2 = Natural, Winding, minimal vegetation/shallow grass

t_c (min) **15.4**

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)	2.78	3.48	4.06	4.64	5.22	5.84
Site Runoff (cfs)	14.81	**19.49**	24.48	30.00	35.06	**40.66**
OffSite Runoff (cfs)	-	**0.00**	-	-	-	**0.00**
Release Rates (cfs/ac)	-	-	-	-	-	-
Allowed Release (cfs)	-	**19.5**	-	-	-	**40.7**

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

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

3 Hydraulic Calculations

Existing Stormwater Detention and Infiltration Design Data Sheet (SDI Worksheet)
Existing Design Procedure Form: Sand Filter (SF)

Proposed Stormwater Detention and Infiltration Design Data Sheet (SDI Worksheet)
Proposed Design Procedure Form: Sand Filter (SF)

Stormwater Detention and Infiltration Design Data Sheet

SDI-Design Data v2.00, Released January 2020

Stormwater Facility Name: **61243 - Janitell**

Facility Location & Jurisdiction: **Pond A**

User Input: Watershed Characteristics

Sand Filter (SF)	SF	
Watershed Area =	10.23	acres
Watershed Length =	944	ft
Watershed Length to Centroid =	472	ft
Watershed Slope =	0.012	ft/ft
Watershed Imperviousness =	67.4%	percent
Percentage Hydrologic Soil Group A =	0.0%	percent
Percentage Hydrologic Soil Group B =	0.0%	percent
Percentage Hydrologic Soil Groups C/D =	100.0%	percent
Target WQCV Drain Time =	12.0	hours

Location for 1-hr Rainfall Depths (use dropdown):

User Input

After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

Once CUHP has been run and the Stage-Area-Discharge information has been provided, click 'Process Data' to interpolate the Stage-Area-Volume-Discharge data and generate summary results in the table below. Once this is complete, click 'Print to PDF'.

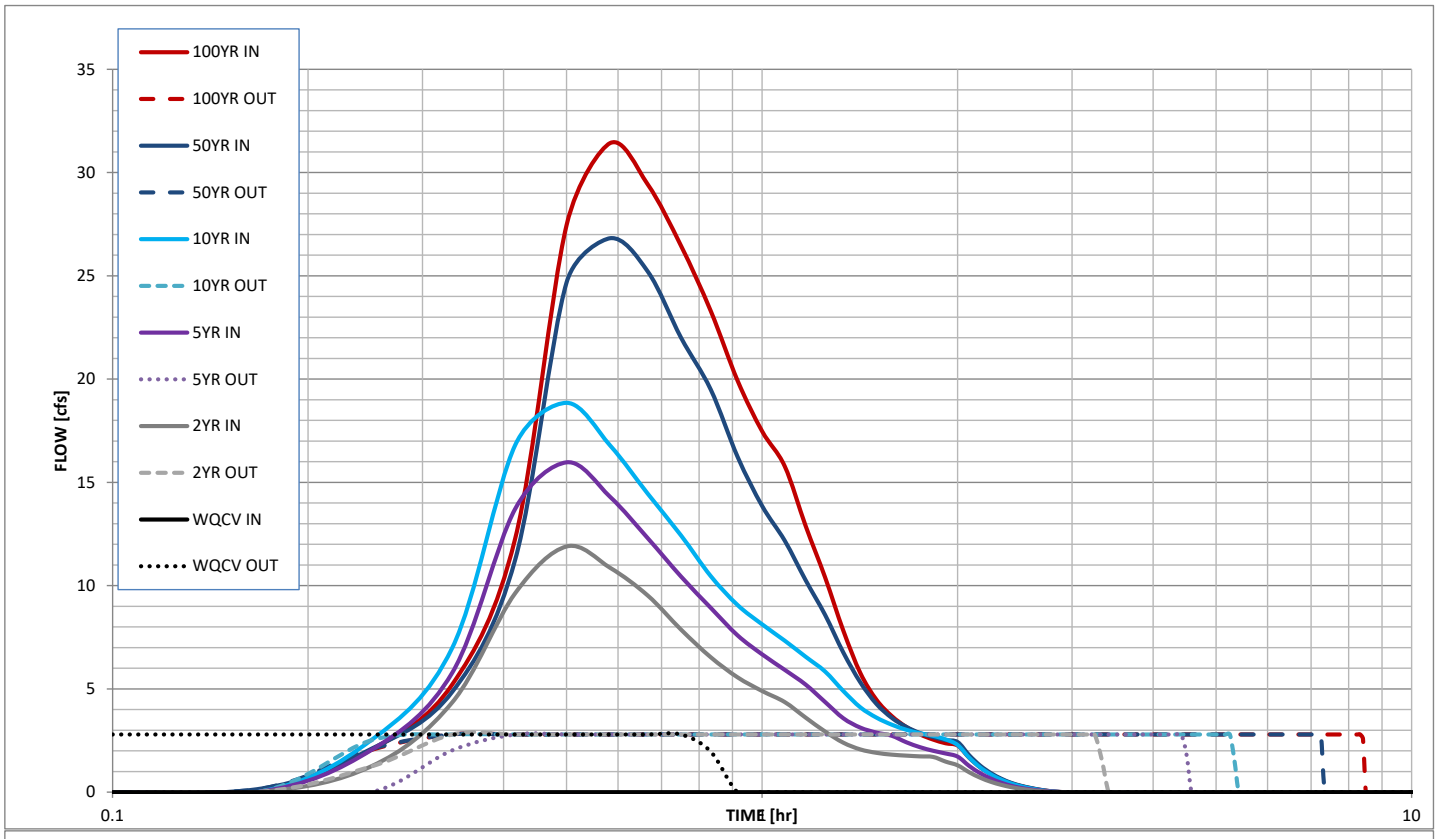
User Defined Stage [ft]	User Defined Area [ft^2]	User Defined Stage [ft]	User Defined Discharge [cfs]
0.00	13,332	0.00	2.79
0.40	13,359	0.40	2.79
1.40	13,387	1.40	2.79
2.40	13,438	2.40	2.80
3.40	13,525	3.40	2.80
4.40	13,630	4.40	2.80
5.40	13,687	5.40	2.80
6.40	13,687	6.40	2.80
7.80	13,687	7.80	2.80

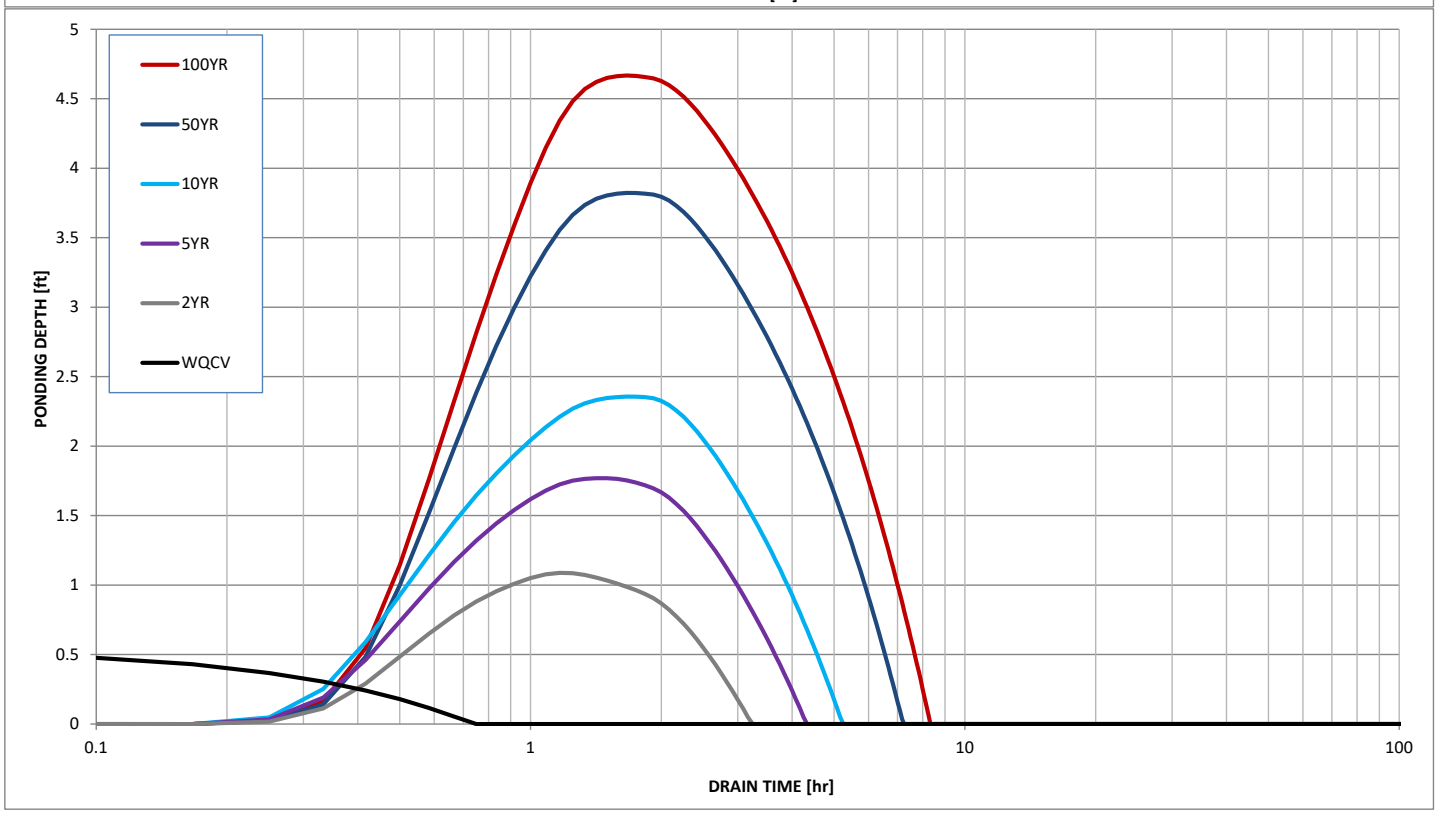
After completing and printing this worksheet to a pdf, go to:
https://maperture.digitaldataservices.com/gvh/?viewer=cswdif
Create a new stormwater facility, and attach the PDF of this worksheet to that record.

Routed Hydrograph Results

Design Storm Return Period =	WQCV	2 Year	5 Year	10 Year	50 Year	100 Year	
One-Hour Rainfall Depth =	N/A	1.19	1.50	1.75	2.25	2.52	in
CUHP Runoff Volume =	0.180	0.707	0.963	1.177	1.633	1.890	acre-ft
Inflow Hydrograph Volume =	N/A	0.707	0.963	1.177	1.633	1.890	acre-ft
Time to Drain 97% of Inflow Volume =	0.8	3.2	**4.3**	5.1	7.1	8.2	hours
Time to Drain 99% of Inflow Volume =	0.8	3.3	4.3	5.3	7.2	**8.3**	hours
Maximum Ponding Depth =	0.59	1.09	1.77	2.36	3.82	4.67	ft
Maximum Ponded Area =	0.31	0.31	0.31	0.31	0.31	**0.31**	acres
Maximum Volume Stored =	0.182	0.333	0.541	0.724	1.178	1.442	acre-ft

Stormwater Detention and Infiltration Design Data Sheet



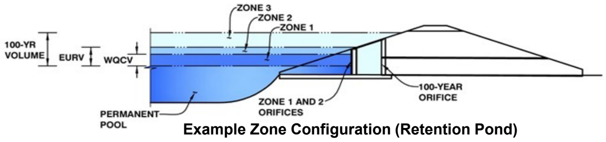


DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)

Project: **61243 - Janitell**

Basin ID: **Pond A**



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	**SF**			
Watershed Area =	10.23	acres		
Watershed Length =	944	ft		
Watershed Length to Centroid =	472	ft		
Watershed Slope =	0.012	ft/ft		
Watershed Imperviousness =	67.40%	percent		
Percentage Hydrologic Soil Group A =	0.0%	percent		
Percentage Hydrologic Soil Group B =	0.0%	percent		
Percentage Hydrologic Soil Groups C/D =	100.0%	percent		
Target WQCV Drain Time =	12.0	hours		
Location for 1-hr Rainfall Depths =	User Input			

After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

			Optional User Overrides	
Water Quality Capture Volume (WQCV) =	0.180	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	0.668	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	0.707	acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	0.963	acre-feet	1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	1.177	acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	1.412	acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	1.633	acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	1.890	acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 3.25 in.) =	2.540	acre-feet	3.25	inches
Approximate 2-yr Detention Volume =	0.599	acre-feet		
Approximate 5-yr Detention Volume =	0.842	acre-feet		
Approximate 10-yr Detention Volume =	0.964	acre-feet		
Approximate 25-yr Detention Volume =	1.027	acre-feet		
Approximate 50-yr Detention Volume =	1.056	acre-feet		
Approximate 100-yr Detention Volume =	1.147	acre-feet		

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	0.180	acre-feet
Zone 2 Volume (EURV - Zone 1) =	0.488	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	0.479	acre-feet
Total Detention Basin Volume =	1.147	acre-feet
Initial Surcharge Volume (ISV) =	N/A	ft^3
Initial Surcharge Depth (ISD) =	N/A	ft
Total Available Detention Depth (H_{total}) =	user	ft
Depth of Trickle Channel (H_{TC}) =	N/A	ft
Slope of Trickle Channel (S_{TC}) =	N/A	ft/ft
Slopes of Main Basin Sides (S_{main}) =	user	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	user	

Depth Increment = ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Media Surface	--	0.00	--	--	--	13,332	0.306		
Btm=36.6'	--	0.40	--	--	--	13,359	0.307	5,338	0.123
	--	1.40	--	--	--	13,387	0.307	18,711	0.430
	--	2.40	--	--	--	13,438	0.308	32,124	0.737
	--	3.40	--	--	--	13,525	0.310	45,605	1.047
	--	4.40	--	--	--	13,630	0.313	59,183	1.359
Spillway=42.0	--	5.40	--	--	--	13,687	0.314	72,841	1.672
	--	6.40	--	--	--	13,687	0.314	86,528	1.986
Top Wall=44.4'	--	7.80	--	--	--	13,687	0.314	105,690	2.426
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Concept Infiltration Pond Stage Storage Relationship

Infiltration Pond Sizing Based On Adjusted Pond Worksheets

Infiltration Area (only bottom area)	13,332	SF
Infiltration rate	9.000	inch/hr
	833.0	**ft3, 5 min**

	Required Pond Volume (cub. Ft)	Volume (Acre-ft)	Time at Peak Volume		FoS
Minimum	49,963	1.147	0.00	hrs	2.0
Required	49,963	1.147			

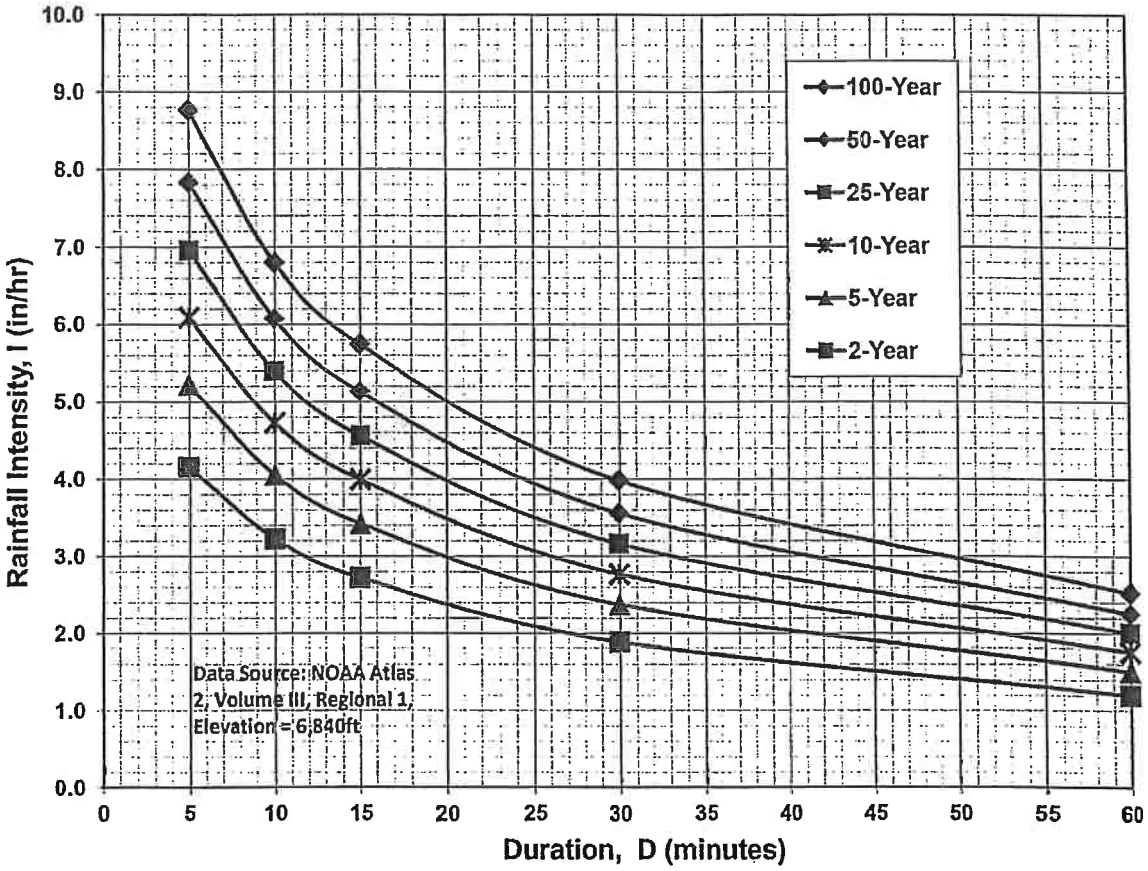
Inflow					
Peak Flowrate	31.4	cfs	At	0.58	hrs
Outflow					
Inf. Basin Infiltration Flowrate	2.8	cfs	833.0	ft3/5mins	
Fully Drained at	8.50	hrs			

Resulting 100 Year Outflow Hydrographs From Each Pond Is Summed In The Combined Inflow Column. These flowrates are converted into a volume: cubic feet per 5 minute interval. The inflow volume into the infiltration pond is subtracted by the infiltration ponds infiltration flowrate to determine the volume accumulated in the infiltration pond.

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

Figure 6-5. Colorado Springs Rainfall Intensity Duration Frequency



IDF Equations

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

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

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

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

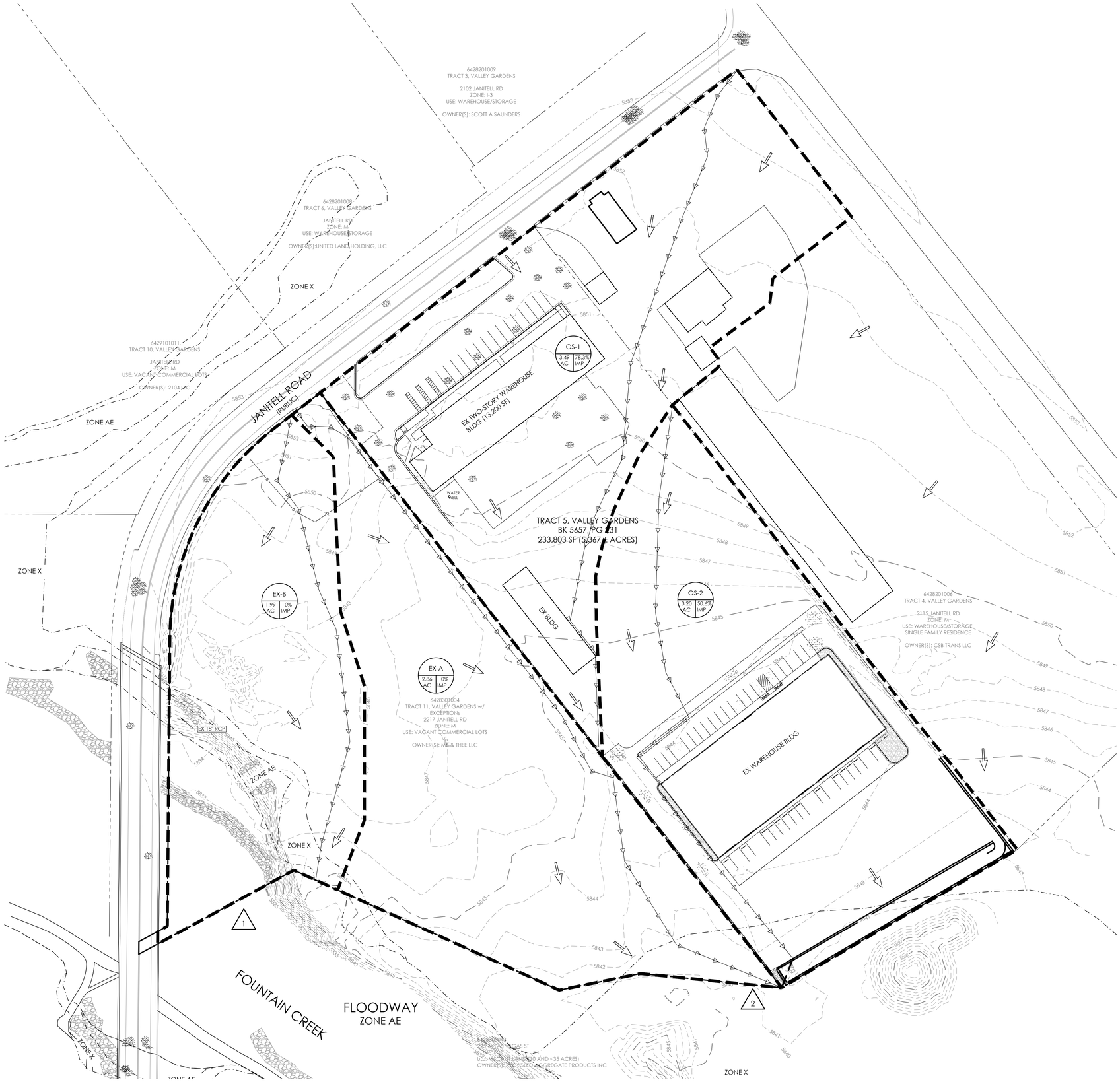
$I_5 = -1.50 \ln(D) + 7.583$

$I_2 = -1.19 \ln(D) + 6.035$

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

4 Report Maps

Existing Conditions Drainage Map
Proposed Conditions Drainage Map



LEGEND

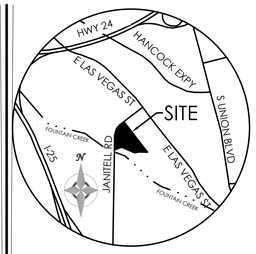
- PROPERTY LINE
- EASEMENT LINE
- LOT LINE

EXISTING

- INDEX CONTOUR (5985)
- INTERMEDIATE CONTOUR (84)

PROPOSED

- INDEX CONTOUR (5985)
- INTERMEDIATE CONTOUR (84)
- CURB INLET
- STORM DRAINAGE (SD)
- AREA INLET
- STORM DRAIN PIPE/ FLARED END SECTION (FES)
- STORM DRAIN MANHOLE (SDMH-1)
- RIPRAP
- BASIN BOUNDARY
- Q_5 = 6.4 cfs, Q_{100} = 21.3 cfs — GENERAL FLOW DIRECTION
- 1.50% — SLOPE DIRECTION AND GRADE
- A1 (1.0 AC, 50% IMP) — BASIN LABEL: AREA IN ACRES, PERCENT IMPERVIOUS
- 1 — DESIGN POINT
- 1.50% — SWALE WITH GRADE
- EXISTING CONDITIONS FLOW ARROW



VICINITY MAP

NOT TO SCALE

BENCHMARK

10 0 20 50 100

1" = 50' 1:600

EXISTING DRAINAGE SUMMARY TABLE

DESIGN POINT	INCLUDED BASIN(S)	AREA (AC)	Tc (MIN.)	RUNOFF Q5 (CFS)	RUNOFF Q100 (CFS)
	EX-A	2.86	14.7	0.8	6.0
DP-1	EX-B	1.99	12.9	0.6	4.4
	OS-1	3.49	14.3	8.3	16.1
	OS-2	3.20	14.3	5.0	11.6
DP-2	OS-1, EX-A	6.35	18.8	8.0	19.6

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

REVISIONS

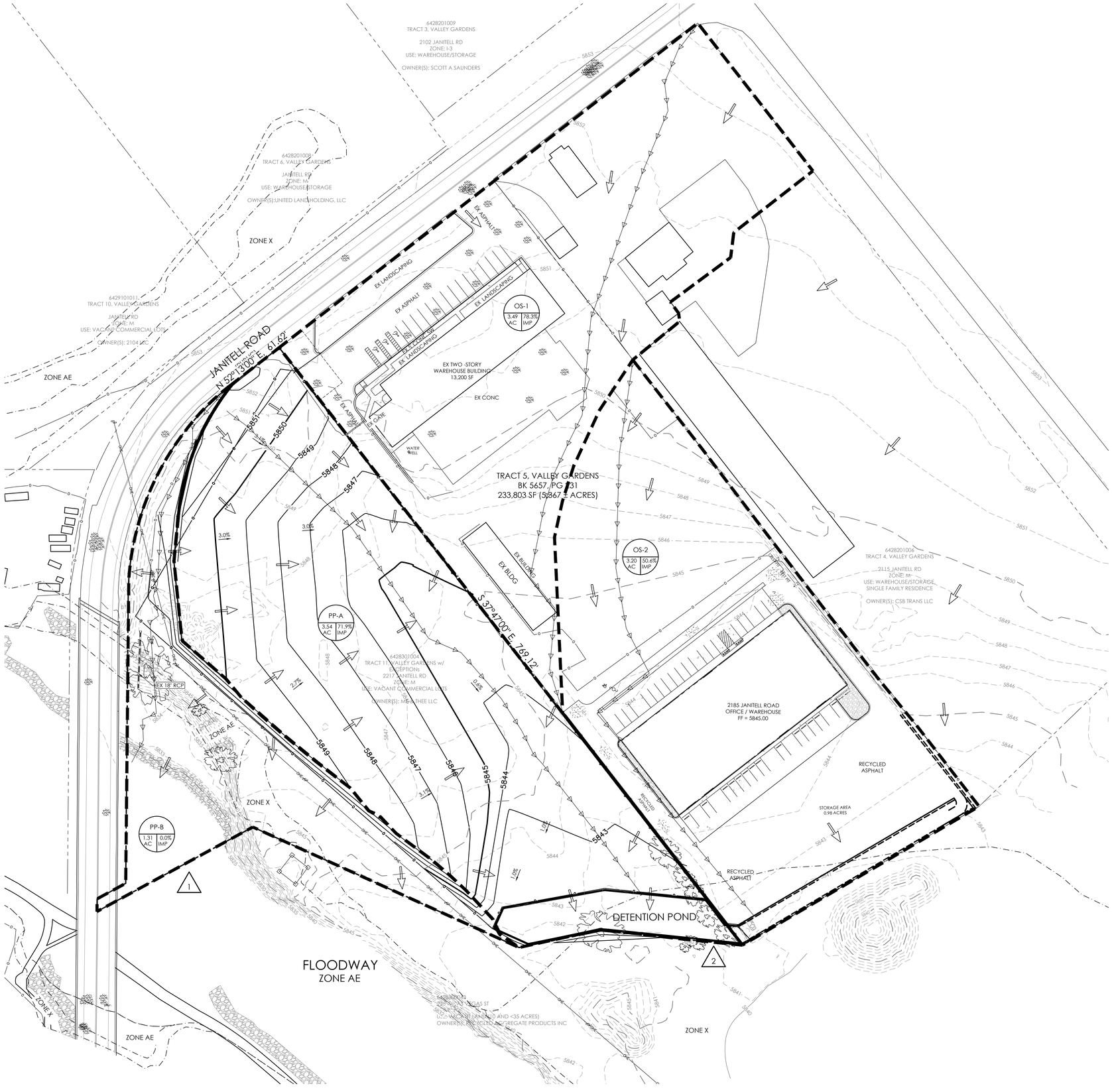
DESIGNED BY CCC
DRAWN BY CCC
CHECKED BY ____
AS-BUILTS BY
CHECKED BY ____

2217 JANTELL ROAD

EXISTING DRAINAGE

MVE PROJECT **61243**
MVE DRAWING **DRAIN-EX**

SEPTEMBER 15, 2026
SHEET 1 OF 1



LEGEND

- PROPERTY LINE
- EASEMENT LINE
- LOT LINE

EXISTING

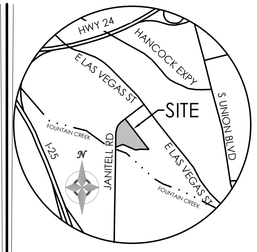
- INDEX CONTOUR (5985)
- INTERMEDIATE CONTOUR (84)

PROPOSED

- INDEX CONTOUR (5985)
- INTERMEDIATE CONTOUR (84)
- CURB INLET
- STORM DRAINAGE (SD)
- AREA INLET
- STORM DRAIN PIPE/ FLARED END SECTION (FES)
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- Q_5 = 6.4 cfs, Q_{100} = 21.3 cfs — GENERAL FLOW DIRECTION
- 1.50% — SLOPE DIRECTION AND GRADE
- A1 (1.0 AC, 50% IMP) — BASIN LABEL: AREA IN ACRES, PERCENT IMPERVIOUS
- 1 — DESIGN POINT
- 1.50% — SWALE WITH GRADE
- EXISTING CONDITIONS FLOW ARROW

PROPOSED DRAINAGE SUMMARY TABLE

DESIGN POINT	INCLUDED BASIN(S)	AREA (AC)	Tc (MIN.)	RUNOFF Q5 (CFS)	RUNOFF Q100 (CFS)
	PP-A	3.54	13.5	7.0	14.6
DP1	PP-B	1.31	12.4	0.4	2.9
	OS-1	3.49	14.3	8.3	16.1
	OS - 2	3.20	14.3	5.0	11.6
DP2	OS-1, OS-2, PP-A	10.23	15.4	19.5	40.7



VICINITY MAP

NOT TO SCALE

BENCHMARK

10 0 20 50 100

1" = 50'

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REVISIONS

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

2217 JANTELL ROAD

DEVELOPED DRAINAGE

MVE PROJECT **61243**
MVE DRAWING **DRAIN-PP**

SEPTEMBER 15, 2026
SHEET 1 OF 1