ROCK CREEK MESA

PRELIMINARY DRAINAGE REPORT

Prepared for:

Rock Creek Residential LLC
90 South Cascade Avenue, Suite 1500
Colorado Springs, CO 80903
(719) 484-4034

Prepared by:

2435 Research Parkway, Suite 300
Colorado Springs, CO 80920
(719) 575-0100
fax (719) 572-0208

March 2026

Project No. 25.002547.00

STM-MP25-0358
STM-REV25-1181

Engineer's Statement:

This report and plan for the drainage design of Rock Creek Mesa was prepared by me (or under my direct supervision) and is correct to the best of my knowledge and belief. Said report and plan has been prepared in accordance with the City of Colorado Springs Drainage Criteria Manual and is in conformity with the master plan of the drainage basin. I understand that the City of Colorado Springs does not and will not assume liability for drainage facilities designed by others. I accept responsibility for any liability caused by any negligent acts, errors or omissions on my part in preparing this report.

_____

Jesse Sullivan
Registered Professional Engineer
State of Colorado
No. 55600

Developer's Statement:

Rock Creek Residential LLC hereby certifies that the drainage facilities for Rock Creek Mesa shall be constructed according to the design presented in this report. I understand that the City of Colorado Springs does not and will not assume liability for the drainage facilities designed and/or certified by my engineer and that are submitted to the City of Colorado Springs pursuant to section 7.4.701 of the City code; and cannot, on behalf of Rock Creek Mesa, guarantee that final drainage design review will absolve **Rock Creek Residential LLC** and/or their successors and/or assigns of future liability for improper design. I further understand that approval of the final plat does not imply approval of my engineer's drainage design.

Developer

Rock Creek Residential LLC

By: _____ _____
Date

Title: _____

Address: _____
_____

City of Colorado Springs:

Filed in accordance with section 7.4.701 of the Code of the City of Colorado Springs, 2025, as amended.

_____ _____
For SWENT Manager Date

Conditions:

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This scope of study seems to exclude roadway work outside of the subdivision itself or the storm drain installation offsite. Address those off-site items and confirm those areas are within the City. If they are located in the County, EPC will need to review separately through EDARP.

I. INTRODUCTION

Rock Creek Mesa is a development located in southwest Colorado Springs which is comprised of approximately 54.46 acres of unplatted and undeveloped land and 1.8 acres of existing single-family residential land. The development is split into 4 separate parcels: 1, 2, 3A, and 3B of 28.89, 7.85, 9.96, 1.79 acres respectively. This Preliminary Drainage Report covers the 54.46-acre Rock Creek Mesa site which contains 185 lots and 8 tracts in parcel 1, 52 lots and 4 tracts in parcel 2, 83 lots and 8 tracts in parcel 3A, and 8 lots and 2 tracts in parcel 3B. 49.32 acres are expected to be disturbed with this development. The site is located to the north and south of Pawnee Road west of its intersection with Colorado Highway 115 and near its intersection of Commanche Road. The site is currently undeveloped aside from a portion of parcel 2, located southwest of the intersection of Pawnee Road and Colorado Highway 115, which is single-family residential.

a. PURPOSE AND SCOPE OF STUDY

The purpose of this Preliminary Drainage Report is to fulfill the City of Colorado Springs Drainage Criteria Manual (DCM) requirements regarding developments. The proposed development is for 185 lots and 8 tracts in parcel 1 (El Paso County Assessor #6530400003, #6530300023, #6530300017), 52 lots and 4 tracts in parcel 2 (El Paso County Assessor #6530400014, #6530400013), 83 lots and 8 tracts in parcel 3A (El Paso County Assessor #6530300026), and 8 lots and 2 tracts in parcel 3B (El Paso County Assessor #6530300028, #6530300030), Rock Creek Mesa, Colorado Springs, El Paso County, Colorado. The project is expected to disturb approximately 49.32± acres.

b. DBPS RELATED INVESTIGATIONS

There are no Drainage Basin Planning Studies for the Fort Carson Drainage Basin which contains this development.

c. GENERAL PROJECT DESCRIPTION

The Rock Creek Mesa site is located to the west of the intersection of Pawnee Road and Highway 115 in southwesterly portions of Colorado Springs. The site is located as follows:

1. General Location: South ½ of Section 30, Township 15 South, Range 66 West of the 6th P.M. in the City of Colorado Springs, County of El Paso, State of Colorado.
2. Drainageway: The Rock Creek Mesa site is located within the Fort Carson Drainage Basin. The site drains overland to the east, eventually draining through Fort Carson and into Fountain Creek.
3. Surrounding Developments: The site is bordered on all sides by unplatted residential lands.
4. Area of Disturbance: The Rock Creek Mesa development is expected to disturb a total area of approximately 49.32 acres.
5. Streamside Zone: This project is not located within a streamside zone.
6. Vegetation: The Rock Creek Mesa site is currently almost entirely undeveloped with only one residential structure on a single parcel. The vegetation of the site consists of natural native grasses and weeds in fair condition throughout.
7. Land Use: The site is currently undeveloped. The developed site will include single- and multi-family residential, associated drives and walks, and open space.

Refer to Appendix D for the Vicinity Map.

d. SOILS CONDITIONS

Soils can be classified in four different hydrologic groups, A, B, C, or D to help predict stormwater runoff rates. Hydrologic group "A" is characterized by deep, well-drained coarse-grained soils with a rapid infiltration rate when thoroughly wet and having a low runoff potential. Group "D" typically has a clay layer at or near to the surface, or a very shallow depth to impervious bedrock and has a very slow infiltration rate and a high runoff potential. See Soils Map, Appendix C. The following soil types are present in the Rock Creek Mesa site:

Table 1.1 – NRCS Soil Survey for El Paso County

Soil ID Number	***Soil***	***Hydrologic Soil Group***	***Percent of Site***
12	Bresser sandy loam, cool, 3 to 5 percent slopes	B	65.1%
38	Jarre-Tecolote complex, 8 to 65 percent slopes	B	8.7%
82	Schamber-Razor complex, 8 to 50 percent slopes	A	26.2%

Note: Class B soil values are used in the hydraulic calculations.

e. DATA SOURCES

Topographical information for the site was found using a combination of ***United States Geological Survey*** (USGS) mapping as well as field surveying. The ***Web Soil Survey,*** created by the ***Natural Resources Conservation Service,*** was utilized to investigate the existing general soil types within the site.

f. APPLICABLE CRITERIA AND STANDARDS

This project is located within the City of Colorado Springs and is subject to the design criteria set forth in the ***City of Colorado Springs Drainage Criteria Manual, Volumes I, revised January 2021, and II, revised December 2020 (DCM).*** In addition to the DCM, the **Urban Storm Drainage Criteria Manuals, Volumes 1 through 3**, most recent version, have been used to supplement the City's Criteria Manual.

II. Hydrologic Methodology

a. MAJOR BASINS AND SUBBASINS

The Rock Creek Mesa site is located within the Fort Carson Drainage Basin. Runoff presently flows overland to the east until exiting the site into the existing 36-inch CMP culvert (Public: CDOT) across Highway 115.

b. METHODOLOGY

The hydrology for this project uses the **Rational Method** as recommended by the Drainage Criteria Manual (DCM) for the minor and major storms. The Rational Method is used for drainage basins less than 100-acres in size. The Rational Method uses the following equation:

$Q=C*i*A$

Where:

Q = Maximum runoff rate in cubic feet per second (cfs)
C = Runoff coefficient
i = Average rainfall intensity (inches per hour)
A = Area of drainage sub-basin (acres)

Rational Method coefficients are described below in the C-Factors section below. The Rational Method will be used primarily for sizing storm sewer infrastructure. See Appendix B for more information.

Time of Concentration
The time of concentration consists of the initial time of overland flow and the travel time in a channel to the inlet or point of interest. A minimum time of concentrations of 5 minutes is utilized for urban areas. The Rational Calculation spreadsheet included in Appendix A shows an initial overland flow length, a channel or street flow length for each sub-basin and also demonstrates the time of concentration calculations for initial (overland) and channel (or street) conditions. A maximum "True Initial" Flow Length of 300 feet will be used for pre-developed sub-basins and a maximum length of 100 feet will be used for Developed sub-basins for time of concentration calculations in compliance with the DCM.

Rainfall Intensity
The rainfall intensity equation for the Rational Method was taken from Drainage Criteria Manual Volume 1 Figure 6-5.

C-Factors
C-factors for the Rational Method are based on anticipated land use and are taken from Table 6-6. The area which is to be residential has been modeled under the Neighborhoods category. Paved areas are modeled under the Streets-Paved category, areas which will be future open spaces or detention facilities are modeled under the Parks and Cemeteries category. Undeveloped or predevelopment areas are model under Undeveloped Areas-Historic Flow Analysis—Greenbelts, Agriculture category.

i. HGL Profile Methods

Preliminary sizing of storm sewer has been completed using the Manning's channel flow calculation. HGL profiles modeled in StormCAD will be included with the Final Drainage Report. Mannings calculations can be found in Appendix A.

Table 9-4. STORMCAD Standard Method Coefficients

Bend Loss		
Bend Angle	**K Coefficient**	
0°	0.05	
22.5°	0.10	
45°	0.40	
60°	0.64	
90°	1.32	
LATERAL LOSS		
One Lateral K Coefficient		
Bend Angle	Non-surcharged	Surcharged
45°	0.27	0.47
60°	0.52	0.90
90°	1.02	1.77
Two Laterals K Coefficient		
45°	0.96	
60°	1.16	
90°	1.52	

III. *BASIN LOCATION AND DISTURBANCE*

The 54.46-acre Rock Creek Mesa site is located within the Fort Carson Drainage Basin and is anticipated to disturb approximately 49.32 acres.

a. MAJOR DRAINAGEWAYS

Fort Carson

The Rock Creek Mesa site is located within the Fort Carson Drainage Basin. Runoff generated within this basin presently flows overland with slopes ranging from 0.5 to 20% until reaching the existing 36-inch CMP culvert across Highway 115 at the east extent of the site. Flows continue through Fort Carson to Fountain Creek to the east.

IV. Previous Studies

There are no known previous studies of this site.

V. Hydrologic Analysis

a. Basin Hydrology

a. The ***Pre-development conditions*** for the Rock Creek Mesa site have been analyzed and are presented by design points and are described as follows:

Pre-development conditions have been analyzed using the Rational Method. Runoff generated on and off-site drains overland eastwards to Highway 115. A delineation of the basin boundaries can be found in Appendix D in drawing DR-01. Runoff calculations can be found in Appendix A. The existing runoff design points are described below:

Design Point EX1 (Q_5 = 0.8 cfs, Q_{100} = 4.2 cfs) (sub-basins: A; Area: 1.64 Ac.) (Slopes: 5.0 to 13%) This design point represents the runoff from Sub-basin EX-A. Runoff tributary to this design point drains to the southeast via sheet flow. Flows channelize offsite when the foot of the adjacent slope is reached and then continue eastward.

Design Point EX2 (Q_5 = 47.7 cfs, Q_{100} = 159.5 cfs) (sub-basins: B; Area: 70.11 Ac.) (Slopes: 5 to 25%) This design point represents the runoff from offsite Sub-basin EX-B. Runoff tributary to Design Point 1 sheet flows to the east until channelizing in a broad existing swale that runs through the residential portion of the area. Upon reaching the design point, flows exit the site and are conveyed across Highway 115 via an existing public (CDOT) 36-inch CMP storm pipe.

Design Point EX3 (Q_5 = 26.0 cfs, Q_{100} = 67.0 cfs) (sub-basins: C; Area: 24.66 Ac.) (Slopes: 5 to 33%) This design point represents the runoff from offsite Sub-basin EX-C. Runoff tributary to this design point sheet flows to the northeast eventually channelizing in an existing offsite street within the adjacent Cheyenne Mountain Estates Mobile Home Park eventually discharging through a portion of the proposed development near is northernmost extents. Flows exit the Rock Creek Mesa development at this design point and continue to the northeast.

Design Point EX4 (Q_5 = 5.5 cfs, Q_{100} = 34.1 cfs) (sub-basins: D & E; Area: 20.99 Ac.) (Slopes: 4 to 20%) This design point represents the runoff from offsite Sub-basins OS-1 and EX-1. Runoff

tributary to Design Point 1 sheet flows to the southeast ultimately draining into the drainage ditch along the east side of the site which conveys the flows to the south.

b. The ***fully developed conditions*** for the site are as follows:

Post development conditions have been analyzed using the rational routed flow. Stormwater runoff generated both on-site and off-site, drains overland and in proposed public and private storm sewer towards proposed private Pond RCM located in the eastern extent of the site near the intersection of Pawnee Road and Highway 115. A delineation of the basin boundaries can be found in Appendix D in drawing DR-02. Runoff calculations can be found in Appendix A. The proposed runoff design points are described below:

Design Point 1 (Q_5 = 9.6 cfs, Q_{100} = 25.6 cfs) (sub-basin: PR-1a & OS-1; Area: 8.15 Ac.) (Slopes: 1 to 10%) Stormwater tributary to this design point. Stormwater runoff generated within sub-basin PR-1 drains overland and in curb and gutter before discharging into the site at Design Point 1 (DP-1). Flows conveyed to DP-1 will be captured by two proposed public COS Type 2 curb inlets and will continue downstream to the east towards Design Point 2 (DP-2) via proposed public 24-inch RCP storm sewer.

Basin PR-1b (Q_5 = 1.7 cfs, Q_{100} = 3.9 cfs) (sub-basins: PR-1b; Area: 1.00 Ac.) (Slopes: 4 to 10%) This basin is included for sizing the two proposed public at-grade 10-foot COS Type 2 inlets capturing runoff from the area. Runoff in the basin will sheet flow to the proposed public road which will convey the channelized flows eastwards to the two proposed public 10-foot COS Type 2 inlets. Captured flows will be directed southwards to DP 3 via proposed public 18-inch RCP storm pipe.

Design Point 2 (Q_5 = 5.1 cfs, Q_{100} = 11.8 cfs) (sub-basins: PR-1c, PR-1d; Area: 3.12 Ac.) (Slopes: 4 to 10%) Stormwater tributary to this design point will sheet flow off of lots to adjacent curb and gutter which will convey the channelized flows to the two proposed public at-grade 10-foot COS Type 2 curb inlets. Captured flows will continue to DP 3 via proposed public 18-inch RCP storm sewer.

Design Point 3 (Q_5 = 5.9 cfs, Q_{100} = 13.5 cfs) (sub-basins: PR-1b, PR-1c, & PR-1d; Area: 4.12 Ac.) (Slopes: 1 to 10%) This design point represents the combination of flows from DP 2 and sub-basin PR-1b at a proposed public storm water manhole. Combined flows will continue south to DP4 via proposed public 18-inch RCP storm sewer.

Design Point 4 (Q_5 = 15.3 cfs, Q_{100} = 38.5 cfs) (sub-basin: OS-1, PR-1a - PR-1d; Area: 12.27 Ac.) (Slopes: 1 to 10%) This design point represents the combination of flows from DP 3 and DP1 at a proposed public storm water manhole. Combined flows will continue east to DP5 via proposed public 24-inch RCP storm sewer.

Basin PR-1f (Q_5 = 2.4 cfs, Q_{100} = 5.9 cfs) (sub-basin: PR-1f; Area: 1.56 Ac.) (Slopes: 2.5 to 10%) Storm water in this basin will sheet flow north from residential lots to proposed public curb and gutter where the channelized flows will be conveyed eastwards to two 5-foot sump proposed public COS Type 2 curb inlets. Captured flows will continue to DP5 via proposed public 18-inch RCP

storm sewer. If the inlets become blocked flows will surcharge the curb and gutter and enter the Pawnee Road curb and gutter flowing towards DP 13.

Design Point 5 (Q_5 = 16.8 cfs, Q_{100} = 42.3 cfs) (sub-basin: PR-1a, PR-1b, PR-1c, PR-1d, & PR-1f; Area: 13.84 Ac.) (Slopes: 1 to 10%) This design point represents the combination of flows from DP 4 and PR-1f at a proposed public storm water manhole. Combined flows will continue east to DP9 via proposed public 30-inch RCP storm sewer.

Design Point TP (Q_5 = 21.5 cfs, Q_{100} = 47.2 cfs) (sub-basins: OS-TP2 & OS-TP3; Area: 16.84 Ac.) (Slopes: 1 to 10%) This point represents the discharge from the offsite development Cheyenne Mountain Estates which is located to the west of the Rock Creek Mesa developments northeast parcel and northeast of the Rock Creek Mesa development's west parcel. This is represented by sub-basins OS-TP2 and OS-TP3 and the flows will be collected by six sump proposed public COS Type 2 curb inlets. Capture flows will continue downstream to DP 6 via proposed public and private 30-inch RCP Storm Sewer. In the case of blockage flows will surcharge the curb and gutter and will be directed to the inlets at DP6.

Please confirm this is City ROW. County GIS does not show Piute Rd in the City's jurisdiction but this may be old data. Show the boundary lines in the maps and plans

Design Point 6 (Q_5 = 4.9 cfs, [illegible] (Slopes: 5 to 10%) This design point represents the capture of flows from basin PR-3a at a pair of proposed public 15-foot COS Type 2 curb inlets. Flows will continue east to DP7 via proposed public 18-inch RCP storm sewer. In the case of inlet blockage, flows will surcharge the crown of the road and will be directed to the inlets at DP 7 and 8a.

Basin PR-3g (Q_5 = 6.4 cfs, Q_{100} = 15.9 cfs) (sub-basin: PR-3g; Area: 2.64 Ac.) (Slopes: 4 to 5%) Storm water in this basin will sheet flow from residential lots to proposed public curb and gutter where the channelized flows will be conveyed southwards to two 10-foot sump proposed public COS Type 2 curb inlets. Captured flows will continue to DP8a via proposed public 24-inch RCP storm sewer. In the case of blockage flows will surcharge the sump area and flow either eastwards along Mackinaw Way to the inlet in basin PR-3d or westwards to the inlet in Basin PR-3h.

Basin PR-3h (Q_5 = 1.7 cfs, Q_{100} = 4.0 cfs) (sub-basin: PR-3h; Area: 0.99 Ac.) (Slopes: 1 to 5%) Storm water in this basin will sheet flow from residential lots to proposed public curb and gutter where the channelized flows will be conveyed southwards to a 10-foot sump proposed public COS Type 2 curb inlet. Captured flows will continue to DP7 via proposed public 24-inch RCP storm sewer. In the case of blockage flows will surcharge the crown of Mackinaw Way and enter the inlet at DP8a.

Design Point 7 (Q_5 = 6.4 cfs, Q_{100} = 15.9 cfs) (sub-basin: PR-3a, & PR-3h; Area: 4.30 Ac.) (Slopes: 1 to 10%) This design point represents the combination of flows from DP 6 and PR-3h at a proposed public storm water manhole. Combined flows will continue east to DP8b via proposed public 24-inch RCP storm sewer.

Design Point 8a (Q_5 = 11.4 cfs, Q_{100} = 26.9 cfs) (sub-basin: PR-3a, PR-3h, & PR-3g; Area: 6.94 Ac.) (Slopes: 1 to 5%) This design point represents the combination of flows from DP 7 and basin PR-3g at a proposed public storm water manhole. Combined flows will continue south to DP8b via proposed private and public 30-inch RCP storm sewer.

Basin PR-3c (Q_5 = 4.0 cfs, Q_{100} = 9.3 cfs) (sub-basin: PR-3c; Area: 2.48 Ac.) (Slopes: 4 to 5%) Storm water in this basin will sheet flow from residential lots to proposed public curb and gutter where the channelized flows will be conveyed eastwards to a 10-foot sump proposed public COS Type 2 curb inlet. Captured flows will continue to DP8b internal to the inlet. If this inlet becomes blocked, flows will surcharge the crown of Mackinaw Way and enter the inlet in basin PR-3h. If both inlets are blocked, flows will surcharge the sump and flow eastwards along Mackinaw Way to the inlets in basin PR-3d

Design Point 8b (Q_5 = 15.6 cfs, Q_{100} = 36.7 cfs) (sub-basins: PR-3a, PR-3c, PR-3g, & PR-3h; Area: 9.42 Ac.) (Slopes: 1 to 10%) This design point represents the combination of flows from DP 8a and PR-3c at a proposed public 10-foot COS Type 2 curb inlet in Basin PR-3c. Combined flows will continue south to DP16 via proposed public 30-inch RCP storm sewer.

Design Point 9 (Q_5 = 25.1 cfs, Q_{100} = 57.0 cfs) (sub-basin: PR-3a, PR-3c, PR-3g, OS-2, OS-TP1, OS-TP2, & OS-TP3; Area: 18.90 Ac.) (Slopes: 1 to 10%) This design point represents the combination of flows from DPTP and OS2 at a proposed public storm water manhole just south of Pawnee Road. Combined flows will continue east to DPSE via proposed private and public 30-inch RCP storm sewer.

Design Point 10 (Q_5 = 9.4 cfs, Q_{100} = 20.9 cfs) (sub-basin: PR-3b; Area: 6.00 Ac.) (Slopes: 4 to 5%) Storm water in this basin will sheet flow from residential lots to proposed public curb and gutter where the channelized flows will be conveyed eastwards to two 10-foot sump proposed public COS Type 2 curb inlets. Captured flows will continue to DP8a via proposed public 30-inch RCP storm sewer. If these inlets become blocked, flows at this design point will surcharge the curb and gutter to the east and enter the Highway 115 road ditch.

Basin PR-3e (Q_5 = 1.0 cfs, Q_{100} = 4.1 cfs) (sub-basin: PR-3e; Area: 1.34 Ac.) (Slopes: 2 to 7%) Storm water in this basin will sheet flow from this park area and the rear of a few residential lots will be conveyed southeastwards to a sump proposed public COS Type 2 Grate Inlet. Captured flows will continue to DP12 via proposed public 18-inch RCP storm sewer. If these inlets become blocked, flows at this design point will surcharge the sump and flow southeast into the Sasquatch Lane cul-de-sac and the inlets in basin PR-3d.

Basin PR-3d (Q_5 = 10.2 cfs, Q_{100} = 22.8cfs) (sub-basin: PR-3e; Area: 5.91 Ac.) (Slopes: 2 to 7%) Storm water in this basin will sheet flow from residential lots to proposed public curb and gutter where the channelized flows will be conveyed eastwards to a 10-foot sump proposed public COS Type 2 curb inlet. Captured flows will continue to DP12 internal to the inlet. If the inlet becomes blocked, flows at this design point will surcharge the curb and gutter and enter the Pawnee Road curb and gutter flowing towards the inlets at DP14.

Design Point 12 (Q_5 = 16.2 cfs, Q_{100} = 37.2 cfs) (sub-basins: PR-3b, PR-3d, & PR-3e; Area: 13.28 Ac.) (Slopes: 1 to 10%) This design point represents the combination of flows from DP 8a and PR-3c at a proposed public 10-foot COS Type 2 curb inlets in Basin PR-3d. Also combined at this location are flows captured in a COS Type 2 Grate inlet in Basin PR-3e. Combined flows will continue south to DP9 via proposed public 36-inch RCP storm sewer.

Design Point 13 (Q_5 = 5.4 cfs, Q_{100} = 10.0 cfs) (sub-basin: PR-2b; Area: 1.84 Ac.) (Slopes: 1 to 5%) Storm water in this basin will sheet flow through the right of way to proposed public curb and gutter where the channelized flows will be conveyed eastwards to two 10-foot at-grade proposed public COS Type 2 curb inlets. Captured flows will continue to DP15 via proposed public 24-inch RCP storm sewer.

Design Point 14 (Q_5 = 9.1 cfs, Q_{100} = 20.0 cfs) (sub-basin: OS-TP1, PR-2a & PR-1e; Area: 5.18 Ac.) (Slopes: 1 to 5%) Storm water in this basin will sheet flow through the right of way to proposed public curb and gutter where the channelized flows will be conveyed eastwards to three 10-foot at-grade proposed public COS Type 2 curb inlets. Captured flows will continue to DP15 via proposed public 24-inch RCP storm sewer.

Design Point 15 (Q_5 = 14.4 cfs, Q_{100} = 30.0 cfs) (sub-basin: PR-1a, PR-1b, PR-1c, PR-1d, & PR-1f; Area: 7.02 Ac.) (Slopes: 1 to 10%) This design point represents the combination of flows from DP13 and DP14 at a proposed public storm water manhole. Combined flows will continue northwest to DP16 via proposed public 30-inch RCP storm sewer.

Design Point 16 (Q_5 = 59.4 cfs, Q_{100} = 137.9 cfs) (sub-basin: PR-1a, PR-1b, PR-1c, PR-1d, PR-1f PR-1e, PR-2a, PR-2b, PR-3a, PR-3b, PR-3c, PR-3d, PR-3e, PR-3g, OS-1, & OS-TP1; Area: 43.56 Ac.) (Slopes: 1 to 10%) This design point represents the combination of flows from DP 15, DP 12 and DP9 at a proposed public storm water manhole. Combined flows will continue west to Detention Pond RCM via proposed public 48-inch RCP storm sewer.

Basin PR-4 (Q_5 = 7.5 cfs, Q_{100} = 16.2 cfs) (sub-basin: PR-4; Area: 3.65 Ac.) (Slopes: 2 to 7%) Storm water in this basin will sheet flow from residential lots to proposed public curb and gutter where the channelized flows will be conveyed southeastwards to a pair of 15-foot sump proposed private COS Type 2 curb inlets. Captured flows will continue to Detention Pond RCM via proposed private 18-inch RCP storm sewer.

Design Point DET-IN/DET-OUT (**IN**: Q_5 = 70.7 cfs, Q_{100} = 165.7 cfs; **OUT**: Q_5 = 1.0 cfs, Q_{100} = 70.2 cfs) (sub-basin: PR-1a, PR-1b, PR-1c, PR-1d, PR-1f PR-1e, PR-2a, PR-2b, PR-3a, PR-3b, PR-3c, PR-3d, PR-3e, PR-3g, PR-4, PR-5, OS-1, & OS-TP1; Area: 49.10 Ac.) (Slopes: 1 to 10%) This design point represents the ultimate combination of flows for on and offsite flows in the proposed private full spectrum RCM Detention Pond. Combined flows will be treated for WQ and will discharge to the east via proposed private 48-inch RCP storm sewer.

Design Point SW (EX1) (SW : Q_5 = 0.7 cfs, Q_{100} = 1.7 cfs) (EX1: Q_5 = 0.6 cfs, Q_{100} = 1.4 cfs) (Change: Q_5 = -0.1 cfs, Q_{100} = -2.5 cfs) (Sub-basin: PR-1g & OS5; Area: 0.45 Ac.) This design point represents the total site discharge at the southwest corner of the proposed development. The values listed above demonstrate that the total site discharge at this point has been slightly decreased and suitable outfall is therefore established.

Design Point SE (EX2) (SE: Q_5 = 35.2 cfs, Q_{100} = 159.2 cfs) (EX2: Q_5 = 47.7 cfs, Q_{100} = 159.5 cfs) (Change: Q_5 = -11.5 cfs, Q_{100} = -0.4 cfs) (sub-basin: PR-1e, PR-2a, PR-2b, PR-3a, PR-3b, PR-3c, PR-3d, PR-3e, PR-3g, PR-4, PR-5, OS-2, OS-3, OS-TP1, OS-TP2, & OS-TP3; Area: 85.52 Ac.) This design point represents the Pond RCM discharge combined with the offsite basin OS-2. The total flows discharged to the CDOT right of way are demonstrated above to be reduced from

predevelopment values. Swale SE will be lined with Type VH (24-inch D_{50}) Riprap to provide a suitable outfall for the detention and bypass discharges. Total flow in this swale is the sum of DP DET-OUT and DP9. Flows from Basin OS-3 combine at the CDOT Culvert. See calculations in appendix A.

Design Point N (EX3) (N: Q_5 = 25.4 cfs, Q_{100} = 59.2 cfs) (EX3: Q_5 = 26.0 cfs, Q_{100} = 67.0 cfs) (Change: Q5 = -0.6 cfs, Q_{100} = -7.9 cfs) (Sub-basins: OS-TP4, OS-TP5, & PR-3f; Area: 24.52 Ac.) This design point represents the discharge through park area in the northernmost portion of the proposed development. This is just northeast of the neighboring trailer park. The values indicated above demonstrate that the outfall will remain suitable. Swale TP4 will convey flows from sub-basin TP4 north to discharge at the existing outfall for the mobile home park.

Design Point NE (EX4) (NE: Q_5 = 2.0 cfs, Q_{100} = 13.6 cfs) (EX4: Q_5 = 5.5 cfs, Q_{100} = 34.1 cfs) (Change: Q_5 = -3.5 cfs, Q_{100} = -20.4 cfs) (Sub-basin: OS-4; Area: 6.94 Ac.) This design point represents the anticipated total discharge at Highway 115 at the northeast corner of the proposed development. As a reduction is demonstrated, the outfall is therefore suitable.

VI. Hydraulic Analysis

The proposed infrastructure associated with Rock Creek Mesa has been designed in conformance with the City of Colorado Springs Drainage Criteria Manual, Volumes I & II, revised January 2021, and December 2020 respectively and all previously approved studies related to the project site.

a. Proposed Inlets

This project will use COS Type 2 inlets in both sump and at-grade conditions, as well as Colorado Springs Area Inlet Type 2 Grate inlets in sump conditions. MHFD Inlet calculations are included in appendix A.

VII. Detention

The proposed private full spectrum extended detention basin, Pond RCM, has been designed to provide water quality and detention for the Rock Creek Mesa site. Pond RCM (proposed private) will be privately owned and maintained. Runoff reduction has been utilized to reduce the required WQCV for Pond RCM (proposed private). Supporting MHFD-Detention and MHFD-BMP spreadsheets for the proposed private detention facility can be found in Appendix A.

Rainfall depths for the MHFD Detention spreadsheet were taken from the approved MDDP and MDDPA. A table including these values can be found in Appendix C.

Supporting calculations including emergency spillway riprap sizing calculations, forebay calculations, trickle channel, and emergency spillway capacity calculations for Pond RCM (proposed private) will be included with the FDR. The table below provides a summary of the pond analysis.

Proposed Pond Summary
Rock Creek Mesa

Pond	Tributary Area	% Impervious	Pre-Development Peak		Pond Outflow		Pre vs. Post Ratio		Detention Volume (Acre-feet)		
			Q5	Q100	Q5	Q100	Q5	Q100	WQCV	EURV	Q100
Pond RCM	49.08	54.9%	5.9	72.7	1.0	70.2	0.2	1.0	1.028	2.908	4.855

Sub-Basins tributary to Pond RCM: PR-1a-f, PR-2a, PR-2b, PR-3a, PR-3b, PR-3c, PR-3d, PR-3e, PR-3g, PR-4, PR-5, OS1, & OS-TP1

Emergency Overflow
The emergency overflow for Pond RCM (proposed private) will be located along the eastern edge of the pond. The proposed emergency overflow spans 56-feet. Soil riprap sizing can be found in Appendix A. If the emergency overflow weir receives flows, these flows will drain to the east along historic paths.

Variance from Standard Criteria
Due to limited space, vertical constraints and hillside overlay constraints the side slopes of the detention pond are set at 3:1 rather than the typical 4:1.

VIII. Storm Water Quality

Per the DCM Volume 2, Chapter 1, Section 4, The City of Colorado Springs requires the 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 has been completed below.

Step 1: Employ Volume Reduction Practices.
The Rock Creek Mesa site has been designed in accordance with the Green Infrastructure Guidance Manual, Designing Landscapes That Reduce Stormwater Volume, Dated March 2022. Planned Infiltration Areas (PIAs) have been incorporated into the site to reduce the volume of stormwater runoff and to protect downstream receiving waters. Improvements associated with this development are expected to disturb approximately 49.32 acres. The volume reduction for the WQCV event

through infiltration, evaporation, and evapotranspiration is calculated to be 10%. The table below summarizes the green infrastructure plan for the areas disturbed with this project. Runoff reduction calculations can be found in Appendix A and a site map detailing the green infrastructure plan can be found in Appendix D.

Green Infrastructure Summary (Disturbed Area) Rock Creek Mesa	
Total site area, ac	54.46
Total Disturbance Area, ac	49.32
Total impervious area, ac	24.7
Total site percent impervious	45.33%
Unconnected Impervious area, ac	6.4
PIA, ac	28.8
WQCV, cf	48810
Stormwater volume reduction, cf	4813
Stormwater volume reduction as % of WQCV	10%

CALCULATED SITE RESULTS (sums results from all columns in worksheet)

Total Area (ft^2)	2,150,049
Total Impervious Area (ft^2)	1,171,440
WQCV (ft^3)	48,810
WQCV Reduction (ft^3)	4,813
WQCV Reduction (%)	10%
Untreated WQCV (ft^3)	43,997

Step 2: **Implement Control Measures that Provide a Water Quality Capture Volume with Slow Release.**

As required by the DCM, runoff from the proposed site which is feasible to treat, is directed into a proposed private Full Spectrum Extended Detention Basin (Pond RCM) via proposed private and public storm sewer. The pond (proposed private) provides water quality treatment for the impervious areas that drain to it and has been designed to meet the DCM standards for providing water quality treatment for the WQCV. Pond RCM (proposed private) will not provide water quality treatment for sub-basins PR-1g, PR-3f, OS2, OS3, and OS4 with proposed disturbance. Sub-basins PR-3f, OS2, OS3, and OS4 contain open space located at the northern and eastern borders of the site and have no impervious areas to treat. Sub-basin PR-1g is a small back portion of residential lots that cannot be detained and the WQCV for this basin is full infiltrated. 49.60 acres are expected to be disturbed as part of this development with all acres receiving water quality treatment of one form or another.

Rock Creek Mesa							
Runoff Reduction Design Point ID	Area (Acres)	Disturbed Area (Acres)	Treatment Type	Tributary to Pond RCM	Disturbed Area Receiving Water Quality Treatment (Acres)	Disturbed Area Not Receiving Water Quality Treatment (Acres)	Percentage of Disturbed Area Receiving Water Quality Treatment (%)
Site	49.10	49.10	EDB RCM	49.10	49.10	0.00	100%
Offsite	0.31	0.31	Infiltration	0.00	0.31	0.00	100%

Site Basins: PR-1a, PR-1b, PR-1c, PR-1d, PR-1f PR-1e, PR-2a, PR-2b, PR-3a, PR-3b, PR-3c, PR-3d, PR-3e, PR-3g, PR-4, PR-5, OS-1, & OS-TP1

Offsite Basin: PR-1g

All water quality treatment areas will be privately owned and maintained by the Rock Creek Mesa metropolitan district.

Verify these sub-basins get treatment for the full length of the roadway or if any exclusions apply

Step 3: **Stabilize Drainageways.**

All new and re-development projects are required to construct or participate in the funding of channel stabilization measures. Drainage basin fees, paid at the time of platting, go towards channel stabilization within the drainage basin. The nearest named channel to the site is Fountain Creek approximately 7 miles east of the site. No channel improvements are anticipated in association with this development. Will the pond outfall into the channel in CDOT ROW require additional improvements or stabilization? Was this area analyzed for channel stability?

Step 4: **Implement Site Specific and Other Source Control Measures.**

There are no commercial or industrial components of this development, therefore no SCMs of this nature are required.

IX. Erosion Control Plan

A grading and erosion control plan (GEC) for the proposed improvements will be submitted for review as a part of this development. The GEC plan will incorporate straw wattles, straw bale check dams, silt fence, vehicle tracking control, inlet & outlet control, sedimentation basins and other best management practices (CMs) identified in the DCM Volume 2.

X. Floodplains

The proposed site is neither in nor adjacent to the regulatory 100-year floodplain. The parcel is located within FIRM 08041C0950G effective December 7, 2018. An annotated FIRM including the parcel locations is located in Appendix C.

XI. Fee Development

a. Drainage Fees

The Rock Creek Mesa site is located within the Fort Carson Drainage Fee Basin. Because this basin has not been studied, it falls under the Miscellaneous Basins Fees and has a fee per acre of $17,700. Please see fee calculation below:

ROCK CREEK MESA
Preliminary Drainage Report
2026 Drainage and Bridge Fees

	Platted Area (ac.)	Fee/ Imp. Acre	Fee Due	Reimbursable Const. Costs	Fee Due at Platting	Drainage Fee Credit
Drainage Fee	54.460	$17,700.00	$963,942.00	$0.00	$963,942.00	$0.00
Bridge Fee	54.460		$0.00	$0.00	$0.00	$0.00
TOTAL					$963,942.00	

XII. Summary

This report demonstrates that the proposed infrastructure associated with Rock Creek Mesa is in conformance with the City of Colorado Springs Drainage Criteria Manual, Volumes I & II, revised January 2021, and December 2020 respectively and all previously approved studies related to the project site. The discussion for design points SW, SE, N, and NE demonstrates that the proposed discharge is anticipated to be lower than the predevelopment value in all cases. These proposed improvements will not adversely affect downstream or surrounding developments and are in conformance with the pertinent studies for the area.

XIII. References

1. ***City of Colorado Springs Drainage Criteria Manual Volumes I & II***, City of Colorado Springs, May 2014, updated December 2021 and May 2022 respectively.
2. ***Web Soil Survey of El Paso County Area, Colorado. United States Department of Agriculture Soil Conservation Service***.
3. ***Flood Insurance Rate Maps for El Paso County, Colorado and Incorporated Areas***
4. ***Federal Emergency Management Agency FIRM 08041C0950G***, Effective Date December 7, 2018.
5. ***Urban Storm Drainage Criteria Manual, Vol. 1-3*** by Mile High Flood District (MHFD), January 2016

Appendices

APPENDIX A

HYDROLOGIC AND HYDRAULIC CALCULATIONS

Rational Method - Existing Conditions

Project Name: ROCK CREEK MESA
Project Location: COLORADO SPRINGS
Designer JTS
Notes: EXISTING CONDITIONS

Average Channel Velocity 4.00 ft/s (If specific channel vel is used, this will be ignored)
Average Slope for Initial Flow 0.04 ft/s (If Elevations are used, this will be ignored)

Channel Flow Type Key

Heavy Meadow	2
Tillage/Field	3
Short Pasture and Lawns	4
Nearly Bare Ground	5
Grassed Waterway	6
Paved Areas	7

		Area			Rational 'C' Values														Flow Lengths										Tc	Rainfall Intensity & Rational Flow Rate					
					95%			65%			30%			2%																					
Sub-basin	Comments			Soil Group	Roads (95% Impervious)			Residential (1/8 or less) (65% Impervious)			Residential (1/3 Acre) (30% Impervious)			Undeveloped/Pervious Areas (2% Impervious)			Composite		Percent Impervious	Initial	True Initial	Channel	True Channel	Average (decimal)	Initial	Average (%)	Channel Flow Type (See Key above)	Velocity	Channel	Total	i5	Q5	i100	Q100	Sub-basin
		sf	acres		C5	C100	Area (SF)	C5	C100	Area	C5	C100	Area	C5	C100	Area	C5	C100		ft	Length ft	ft	Length ft	Slope	Tc (min)	Slope	Ground Type	(ft/s)	Tc (min)	(min)	in/hr	cfs	in/hr	cfs	
A	***DRAINS TO THE SOUTH***	71433	1.64	B	0.81	0.88	2423	0.45	0.59		0.25	0.47		0.09	0.36	69010	0.11	0.38	5.2%	80	80	188	188	0.05	9.28	13.2	4	2.54	1.23	10.51	4.05	**0.8**	6.81	**4.2**	***A***
B	***AREA USED IS WHAT IS ESTIMATED TO HAVE BEEN USED FOR THE CDOT CULVERT DESIGN FROM US TOPOQUAD SHEETS.***	3054022	70.11	B	0.81	0.88	179899	0.45	0.59	795273	0.25	0.47	691321	0.09	0.36	2182802	0.29	0.57	30.7%	60	60	3763	3763	0.05	6.64	6.0	5	2.43	25.82	32.45	2.36	**47.7**	3.97	**159.5**	***B***
C	***DRAINS NORTH***	1074093	24.66	B	0.81	0.88		0.45	0.59	737438	0.25	0.47		0.09	0.36	336655	0.34	0.52	45.3%	328	100	1821	1849	0.05	14.54	10.4	7	6.45	4.78	19.32	3.14	**26.3**	5.27	**67.9**	***C***
D	***DRAINS TO HWY 115***	774461	17.78	B	0.81	0.88		0.45	0.59	23963	0.25	0.47		0.09	0.36	750498	0.10	0.37	3.9%	250	100	1340	1340	0.05	16.62	3.7	4	1.33	16.82	33.44	2.32	**4.2**	3.89	**25.6**	***D***
E	***DRAINS TO HWY 115 MOSTLY HWY 115 R/W***	139879	3.21	B	0.81	0.88		0.45	0.59		0.25	0.47		0.09	0.36	139879	0.09	0.36	2.0%	100	100	806	806	0.20	6.70	3.7	7	3.85	3.49	10.18	4.10	**1.2**	6.89	**8.0**	***E***
DESIGN POINTS	***Sub-basins***																																	***DESIGN POINTS***
EX1	***A***	71433	1.64	B	0.81	0.88	2423	0.45	0.59	0	0.25	0.47	0	0.09	0.36	69010	0.11	0.38	5.2%	80	80	188	188	0.05	9.28	13	4	2.54	1.23	10.51	4.05	**0.8**	6.81	**4.2**	***EX1***
EX2	***B***	3054022	70.11	B	0.81	0.88	179899	0.45	0.59	795273	0.25	0.47	691321	0.09	0.36	2182802	0.29	0.57	30.7%	60	60	3763	3763	0.05	6.64	6	5	2.43	25.82	32.45	2.36	**47.7**	3.97	**159.5**	***EX2***
EX3	***C***	1074093	24.66	B	0.81	0.88	0	0.45	0.59	737438	0.25	0.47	0	0.09	0.36	336655	0.34	0.52	45.3%	328	100	1821	2049	0.05	14.54	10	7	6.45	5.29	19.83	3.10	**26.0**	5.21	**67.0**	***EX3***
EX4	***D & E***	914340	20.99	B	0.81	0.88	0	0.45	0.59	23963	0.25	0.47	0	0.09	0.36	890377	0.10	0.37	3.7%	100	100	1340	1340	0.05	10.53	4	4	1.33	16.82	27.34	2.62	**5.5**	4.40	**34.1**	***EX4***

Rational Method - Proposed Conditions

Project Name:	ROCK CREEK MESA
Project Location:	COLORADO SPRINGS
Designer	JTS
Notes:	Proposed Condition

Average Channel Velocity 4.00 ft/s (If specific channel vel is used, this will be ignored)
Average Slope for Initial Flow 0.04 ft/ft (If Elevations are used, this will be ignored)

Channel Flow Type Key
Heavy Meadow 2
Tillage/Field 3
Short Pasture and Lawns 4
Nearly Bare Ground 5
Grassed Waterway 6
Paved Areas 7

		Area			Rational 'C' Values																			Flow Lengths															
					95%			65%			100%			70%			30%			0%																			Tc	Rainfall Intensity & Rational Flow Rate	
Sub-basin	Comments			Soil Group	Commercial Areas (95% Impervious)			Residential (1/8 or less) (65% Impervious)			Pavement (100% Impervious)			Neighborhoods/Multi-Family (70% Impervious)			Residential (1/3 Acre) (30% Impervious)			Undeveloped/Pervious Areas (0% Impervious)			Composite		Percent Impervious	Initial	True Initial	Channel	True Channel	Average (decimal)	Initial	Average (%)	Channel Flow Type (See Key above)	Velocity	Channel	Total	i5	Q5	i100	Q100	Sub-basin
		sf	acres		C5	C100		C5	C100	Area (SF)	C5	C100	Area (SF)	C5	C100	Area	C5	C100	Area	C5	C100	Area	C5	C100		ft	Length ft	ft	Length ft	Slope	Tc (min)	Slope	Ground Type	(ft/s)	Tc (min)	(min)	in/hr	cfs	in/hr	cfs	
PR-1a	***NORTHWEST PORTION OF WEST DEVELOPMENT AREA***	228723	5.25	B	0.81	0.88		0.45	0.59	173567	0.90	0.96		0.49	0.62		0.25	0.47		0.08	0.35	55156	0.36	0.53	49.3%	251	100	817	968	0.05	12.33	5.6	7	4.73	3.41	15.73	3.45	**6.6**	5.79	**16.3**	***PR-1a***
PR-1b	***NORTHEAST PORTION OF WEST DEVELOPMENT AREA***	43748	1.00	B	0.81	0.88		0.45	0.59	43748	0.90	0.96		0.49	0.62		0.25	0.47		0.08	0.35	2481	0.45	0.61	65.0%	302	100	122	324	0.05	11.81	4.0	7	4.00	1.35	13.15	3.72	**1.7**	6.24	**3.9**	***PR-1b***
PR-1c	***NORTHCENTRAL PORTION OF WEST DEVELOPMENT AREA***	54928	1.26	B	0.81	0.88		0.45	0.59	47620	0.90	0.96		0.49	0.62		0.25	0.47		0.08	0.35	7308	0.40	0.56	56.4%	32	32	488	488	0.05	4.16	3.0	7	3.46	2.35	6.51	4.77	**2.4**	8.01	**5.7**	***PR-1c***
PR-1d	***SOUTHCENTRAL PORTION OF WEST DEVELOPMENT AREA***	80917	1.86	B	0.81	0.88		0.45	0.59	74560	0.90	0.96		0.49	0.62		0.25	0.47		0.08	0.35	6357	0.42	0.57	59.9%	40	40	420	420	0.05	4.52	1.6	7	2.53	2.77	7.28	4.61	**3.6**	7.73	**8.3**	***PR-1d***
PR-1e	***EAST PORTION OF WEST DEVELOPMENT AREA.***	45777	1.05	B	0.81	0.88		0.45	0.59	45777	0.90	0.96		0.49	0.62		0.25	0.47		0.08	0.35	7340	0.46	0.65	65.0%	30	30	479	479	0.05	3.67	0.5	4	0.49	16.13	19.80	3.10	**1.5**	5.21	**3.6**	***PR-1e***
PR-1f	***WEST DEVELOPMENT AREA SOUTH OF PAWNEE NORTH HALF***	68316	1.57	B	0.81	0.88		0.45	0.59	50425	0.90	0.96		0.49	0.62		0.25	0.47		0.08	0.35	17891	0.35	0.53	48.0%	94	94	316	316	0.05	7.62	2.3	7	3.03	1.74	9.35	4.23	**2.4**	7.10	**5.9**	***PR-1f***
PR-1g	***WEST DEVELOPMENT AREA SOUTH OF PAWNEE SOUTH HALF UNDETAINED***	13712	0.31	B	0.81	0.88		0.45	0.59	13712	0.90	0.96		0.49	0.62		0.25	0.47		0.08	0.35		0.45	0.59	65.0%	20	20	316	316	0.05	3.06	2.3	4	1.06	4.96	8.02	4.46	**0.6**	7.49	**1.4**	***PR-1g***
PR-2a	***NORTH HALF OF PAWNEE ROAD***	127964	2.94	B	0.81	0.88	77234	0.45	0.59		0.90	0.96		0.49	0.62		0.25	0.47		0.08	0.35	50730	0.52	0.67	57.3%	16	16	3027	3027	0.05	2.44	4.2	7	4.10	12.31	14.74	3.55	**5.5**	5.95	**11.8**	***PR-2a***
PR-2b	***SOUTH HALF OF PAWNEE ROAD***	80136	1.84	B	0.81	0.88		0.45	0.59		0.90	0.96	69504	0.49	0.62		0.25	0.47		0.08	0.35	10632	0.79	0.88	86.7%	16	16	3027	3027	0.05	1.30	4.2	7	4.10	12.31	13.60	3.67	**5.4**	6.16	**10.0**	***PR-2b***
PR-3a	***WEST PORTION OF EAST DEVELOPMENT AREA DETAINED***	144450	3.32	B	0.81	0.88		0.45	0.59	94271	0.90	0.96		0.49	0.62		0.25	0.47		0.08	0.35	50179	0.32	0.51	42.4%	77	77	483	483	0.05	7.19	4.0	7	4.00	2.01	9.20	4.25	**4.6**	7.14	**12.1**	***PR-3a***
PR-3b	***NORTHEAST PORTION OF EAST DEVELOPMENT AREA DETAINED***	261145	6.00	B	0.81	0.88		0.45	0.59	255350	0.90	0.96		0.49	0.62		0.25	0.47		0.08	0.35	5795	0.44	0.58	63.6%	119	100	1690	1709	0.05	7.56	3.6	7	3.79	7.51	15.06	3.51	**9.4**	5.90	**20.8**	***PR-3b***
PR-3c	***SOUTH PORTION OF EAST DEVELOPMENT AREA DETAINED***	108142	2.48	B	0.81	0.88		0.45	0.59	95131	0.90	0.96		0.49	0.62		0.25	0.47		0.08	0.35	13011	0.41	0.56	57.2%	114	100	821	835	0.05	7.81	4.0	7	4.00	3.48	11.28	3.95	**4.0**	6.63	**9.3**	***PR-3c***
PR-3d	***WEST PORTION OF EAST DEVELOPMENT AREA DETAINED***	258840	5.94	B	0.81	0.88		0.45	0.59	249509	0.90	0.96		0.49	0.62		0.25	0.47		0.08	0.35	9331	0.44	0.58	62.7%	94	94	1075	1075	0.05	6.77	3.6	7	3.79	4.72	11.49	3.92	**10.3**	6.58	**22.9**	***PR-3d***
PR-3e	***SOUTHEAST PORTION OF EAST DEVELOPMENT AREA. PARK DETAINED***	58451	1.34	B	0.81	0.88		0.45	0.59	12860	0.90	0.96		0.49	0.62		0.25	0.47		0.08	0.35	45591	0.16	0.40	14.3%	53	53	160	160	0.05	7.19	6.3	4	1.76	1.52	8.71	4.34	**0.9**	7.28	**4.0**	***PR-3e***
PR-3f	***UNDETAINED PARK AREAS NORTH AND EAST FRINGES AROUND EXTERIOR OF DEVELOPMENT.***	138713	3.18	B	0.81	0.88		0.45	0.59		0.90	0.96		0.49	0.62		0.25	0.47		0.08	0.35	138713	0.08	0.35	0.0%	180	100	437	517	0.25	8.42	23.8	4	3.41	2.53	10.95	3.99	**1.0**	6.70	**7.5**	***PR-3f***
PR-3g	***NORTH CENTRAL SECTION OF EAST DEVELOPMENT AREA***	114864	2.64	B	0.81	0.88		0.45	0.59	114864	0.90	0.96		0.49	0.62		0.25	0.47		0.08	0.35		0.45	0.59	65.0%	54	54	942	942	0.05	5.03	4.0	7	4.00	3.93	8.95	4.30	**5.1**	7.21	**11.3**	***PR-3g***
PR-3h	***SOUTHCENTRAL SECTION OF EAST DEVELOPMENT AREA***	43069	0.99	B	0.81	0.88		0.45	0.59	39697	0.90	0.96		0.49	0.62		0.25	0.47		0.08	0.35	3372	0.42	0.57	59.9%	54	54	560	560	0.05	5.25	1.0	7	2.00	4.67	9.91	4.14	**1.7**	6.96	**4.0**	***PR-3h***
PR-4	***EASTERN AREA SOUTH OF PAWNEE***	159119	3.65	B	0.81	0.88		0.45	0.59		0.90	0.96		0.49	0.62	151368	0.25	0.47		0.08	0.35	7751	0.47	0.61	66.6%	92	92	587	587	0.05	6.36	4.0	7	4.00	2.45	8.80	4.32	**7.5**	7.25	**16.2**	***PR-4***
PR-5	***DETENTION POND***	81868	1.88	B	0.81	0.88		0.45	0.59		0.90	0.96		0.49	0.62		0.25	0.47		0.08	0.35	81868	0.08	0.35	0.0%	149	100	265	314	0.25	7.66	0.5	7	1.41	3.70	11.36	3.94	**0.6**	6.61	**4.4**	***PR-5***
OS-TP1	***TRAILER PARK OFFSITE FLOWS INTO DETENTION POND***	51937	1.19	B	0.81	0.88		0.45	0.59	51937	0.90	0.96		0.49	0.62		0.25	0.47		0.08	0.35		0.45	0.59	65.0%	138	100	312	350	0.05	8.04	3.5	5	1.87	3.12	11.15	3.97	**2.1**	6.66	**4.7**	***OS-TP1***
OS-TP2	***TRAILER PARK OFFSITE FLOWS INTO DETENTION POND***	240934	5.53	B	0.81	0.88		0.45	0.59	240934	0.90	0.96		0.49	0.62		0.25	0.47		0.08	0.35		0.45	0.59	65.0%	377	100	740	1017	0.04	14.31	2.9	7	3.41	4.98	19.28	3.14	**7.9**	5.28	**17.4**	***OS-TP2***
OS-TP3	***TRAILER PARK OFFSITE FLOWS INTO DETENTION POND***	492400	11.30	B	0.81	0.88		0.45	0.59	492400	0.90	0.96		0.49	0.62		0.25	0.47		0.08	0.35		0.45	0.59	65.0%	473	100	1386	1759	0.05	14.78	6.0	7	4.90	5.98	20.76	3.03	**15.6**	5.09	**34.2**	***OS-TP3***
OS-TP4	***TRAILER PARK. DRAINS NORTH AROUND SITE***	319541	7.34	B	0.81	0.88		0.45	0.59	319541	0.90	0.96		0.49	0.62		0.25	0.47		0.08	0.35		0.45	0.59	65.0%	100	100	1108	1108	0.07	6.12	4.6	5	2.14	8.61	14.72	3.55	**11.8**	5.96	**26.0**	***OS-TP4***
OS-TP5	***TRAILER PARK DRAINS NORTH AROUND SITE***	609801	14.00	B	0.81	0.88		0.45	0.59	609801	0.90	0.96		0.49	0.62		0.25	0.47		0.08	0.35		0.45	0.59	65.0%	50	50	1275	1275	0.05	4.84	6.4	7	5.06	4.20	9.03	4.28	**27.2**	7.19	**59.9**	***OS-TP5***
OS-1	***OFFSITE BASIN ON THE WEST SIDE. FLOWS INTO DETENTION POND***	125735	2.89	B	0.81	0.88		0.45	0.59		0.90	0.96		0.49	0.62		0.25	0.47	125735	0.08	0.35		0.25	0.47	30.0%	70	70	889	889	0.05	7.49	6.1	5	2.45	6.05	13.53	3.68	**2.7**	6.17	**8.4**	***OS-1***
OS2	***OFFSITE FLOWS INTO DETENTION POND***	89782	2.06	B	0.81	0.88		0.45	0.59		0.90	0.96		0.49	0.62		0.25	0.47	78992	0.08	0.35	10790	0.23	0.46	26.4%	50	50	553	553	0.04	6.98	4.0	4	1.40	6.58	13.56	3.67	**1.8**	6.17	**5.8**	***OS2***
OS3	***EXISTING NEIGHBORHOOD OFFSITE FLOWS TRIBUTARY TO HWY 115 CULVERT***	763759	17.53	B	0.81	0.88		0.45	0.59		0.90	0.96		0.49	0.62		0.25	0.47	763759	0.08	0.35		0.25	0.47	30.0%	291	100	1763	1954	0.05	15.26	6.0	4	1.71	18.99	34.25	2.28	**10.1**	3.83	**31.8**	***OS3***
OS4	***WEST BASIN ALONG HWY 115 MOSTLY CDOT R/W. SMALL PORTION IS DISTURBED AREA OUTSIDE OF R/W WHICH WILL RETURN TO UNDEVELOPED CONDITION.***	302105	6.94	B	0.81	0.88		0.45	0.59		0.90	0.96		0.49	0.62		0.25	0.47		0.08	0.35	302105	0.08	0.35	0.0%	138	100	806	844	0.20	7.95	3.7	4	1.35	10.45	18.39	3.22	**1.8**	5.40	**13.2**	***OS4***
OS5	***DISTURBED AREAS ON THE SOUTHWEST THAT WILL RETURN TO VEGETATION AND DRAIN SOUTH AWAY FROM THE REST OF THE SITE***	5750	0.13	B	0.81	0.88		0.45	0.59		0.90	0.96		0.49	0.62		0.25	0.47		0.08	0.35	5750	0.08	0.35	0.0%	20	20	360	360	0.02	6.52	2.0	4	0.99	6.06	12.57	3.79	**0.0**	6.36	**0.3**	***OS5***

Rational Method - Proposed Conditions

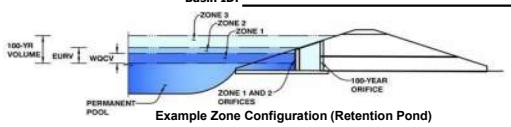
		Area			Rational 'C' Values																				Flow Lengths								Tc	Rainfall Intensity & Rational Flow Rate					
DESIGN POINTS	Sub-basins			Soil Group	Commercial Areas (95% Impervious)			Residential (1/8 or less) (65% Impervious)			Pavement (100% Impervious)			Neighborhoods/Multi-Family (70% Impervious)			Residential (1/3 Acre) (30% Impervious)			Undeveloped/Pervious Areas (2% Impervious)			Composite		Percent Impervious	Initial	True Initial	Channel	True Channel	Average (decimal)	Initial	Average (%)	Channel Flow Type (See Key above)	Velocity	Channel	Total	i5	Q5	i100	Q100	DESIGN POINTS
		sf	acres		C5	C100		C5	C100	Area (SF)	C5	C100	Area (SF)	C5	C100	Area	C5	C100	Area	C5	C100	Area	C5	C100		ft	Length ft	ft	Length ft	Slope	Tc (min)	Slope	Ground Type	(ft/s)	Tc (min)	(min)	in/hr	cfs	in/hr	cfs	
DP1	PR-1a & OS-1	354458	8.14	B	0.81	0.88	0	0.45	0.59	173567	0.90	0.96	0	0.49	0.62	0	0.25	0.47	125735	0.08	0.35	55156	0.32	0.51	42.5%	60	60	1620	1620	0.05	6.35	3.1	?	3.52	7.67	14.01	3.62	9.6	6.08	25.4	DP1
PR-1b	PR-1b	43748	1.00	B	0.81	0.88	0	0.45	0.59	43748	0.90	0.96	0	0.49	0.62	0	0.25	0.47	0	0.08	0.35	2481	0.45	0.61	65.0%	302	100	122	324	0.05	11.81	4.0	?	4.00	1.35	13.15	3.72	1.7	6.24	3.9	PR-1b
DP2	PR-1c & PR-1d	135845	3.12	B	0.81	0.88	0	0.45	0.59	122180	0.90	0.96	0	0.49	0.62	0	0.25	0.47	0	0.08	0.35	13665	0.41	0.57	58.5%	130	100	476	506	0.05	8.25	1.8	?	2.68	3.14	11.39	3.93	5.1	6.60	11.7	DP2
DP3	PR-1b, PR-1c, & PR-1d	179593	4.12	B	0.81	0.88	0	0.45	0.59	165928	0.90	0.96	0	0.49	0.62	0	0.25	0.47	0	0.08	0.35	16146	0.42	0.58	60.1%	302	100	657	859	0.05	12.39	2.5	?	3.16	4.53	16.91	3.34	5.9	5.61	13.4	DP3
DP4	OS-1, PR-1a, PR-1b, PR-1c, & PR-1d	534051	12.26	B	0.81	0.88	0	0.45	0.59	339495	0.90	0.96	0	0.49	0.62	0	0.25	0.47	125735	0.08	0.35	71302	0.36	0.53	48.4%	60	60	2018	2018	0.05	6.07	3.2	?	3.58	9.40	15.47	3.47	15.3	5.83	38.4	DP4
PR-1f	PR-1f	68316	1.57	B	0.81	0.88	0	0.45	0.59	50425	0.90	0.96	0	0.49	0.62	0	0.25	0.47	0	0.08	0.35	17891	0.35	0.53	48.0%	94	94	316	316	0.05	7.62	2.3	?	3.03	1.74	9.35	4.23	2.4	7.10	5.9	PR-1f
DP5	PR-1a, PR-1b, PR-1c, PR-1d, & PR-1f	602367	13.83	B	0.81	0.88	0	0.45	0.59	389920	0.90	0.96	0	0.49	0.62	0	0.25	0.47	125735	0.08	0.35	89193	0.36	0.53	48.3%	60	60	2116	2116	0.05	6.07	2.9	?	3.41	10.33	16.42	3.39	16.8	5.68	42.1	DP5
DP7P	OS-TP2 & OS-TP3	733334	16.84	B	0.81	0.88	0	0.45	0.59	733334	0.90	0.96	0	0.49	0.62	0	0.25	0.47	0	0.08	0.35	0	0.45	0.59	63.0%	473	100	1727	2100	0.04	16.03	4.7	?	4.34	8.07	24.10	2.81	21.5	4.72	47.2	DP7P
DP6	PR-3a	144450	3.32	B	0.81	0.88	0	0.45	0.59	94271	0.90	0.96	0	0.49	0.62	0	0.25	0.47	0	0.08	0.35	50179	0.32	0.51	42.4%	77	77	483	483	0.05	7.19	4.0	?	4.00	2.01	9.20	4.25	4.6	7.14	12.1	DP6
PR-3b	PR-3b	43069	0.99	B	0.81	0.88	0	0.45	0.59	39697	0.90	0.96	0	0.49	0.62	0	0.25	0.47	0	0.08	0.35	3372	0.42	0.57	59.9%	54	54	560	560	0.05	5.25	1.0	?	2.00	4.67	9.91	4.14	1.7	6.96	4.0	PR-3b
DP7	PR-3a, PR-3b	187519	4.30	B	0.81	0.88	0	0.45	0.59	133968	0.90	0.96	0	0.49	0.62	0	0.25	0.47	0	0.08	0.35	53551	0.34	0.52	46.4%	54	54	1132	1132	0.05	5.85	4.0	?	4.00	4.72	10.56	4.05	6.0	6.80	15.4	DP7
PR-3g	PR-3g	114864	2.64	B	0.81	0.88	0	0.45	0.59	114864	0.90	0.96	0	0.49	0.62	0	0.25	0.47	0	0.08	0.35	0	0.45	0.59	65.0%	54	54	942	942	0.05	5.03	4.0	?	4.00	3.93	8.95	4.30	5.1	7.21	11.3	PR-3g
DP8a	PR-3a, PR-3b, & PR-3g	302383	6.94	B	0.81	0.88	0	0.45	0.59	248832	0.90	0.96	0	0.49	0.62	0	0.25	0.47	0	0.08	0.35	53551	0.38	0.55	53.5%	54	54	1150	1150	0.05	5.53	4.3	?	4.15	4.62	10.15	4.11	11.0	6.89	26.4	DP8a
PR-3c	PR-3c	308142	2.48	B	0.81	0.88	0	0.45	0.59	95131	0.90	0.96	0	0.49	0.62	0	0.25	0.47	0	0.08	0.35	13011	0.41	0.56	57.2%	114	100	821	835	0.05	7.81	4.0	?	4.00	3.48	11.28	3.95	4.0	6.63	9.3	PR-3c
DP8b	PR-3a, PR-3c, PR-3g, & PR-3b	410525	9.42	B	0.81	0.88	0	0.45	0.59	343963	0.90	0.96	0	0.49	0.62	0	0.25	0.47	0	0.08	0.35	66562	0.39	0.55	54.5%	54	54	1150	1150	0.05	5.49	4.3	?	4.15	4.62	10.11	4.11	15.2	6.90	36.1	DP8b
OS-2	OS-2	89782	2.06	B	0.81	0.88	0	0.45	0.59	0	0.90	0.96	0	0.49	0.62	0	0.25	0.47	78992	0.08	0.35	10790	0.23	0.46	26.4%	50	50	553	553	0.04	6.98	4.0	4	1.40	6.58	13.56	3.67	1.8	6.17	5.8	OS-2
DP9	OS-2, OS-TP2, & OS-TP3	823116	18.90	B	0.81	0.88	0	0.45	0.59	733334	0.90	0.96	0	0.49	0.62	0	0.25	0.47	78992	0.08	0.35	10790	0.43	0.58	60.8%	60	60	3463	3463	0.05	5.50	4.0	?	4.00	14.43	19.92	3.10	25.1	5.20	56.9	DP9
DP10	PR-3b	261145	6.00	B	0.81	0.88	0	0.45	0.59	255330	0.90	0.96	0	0.49	0.62	0	0.25	0.47	0	0.08	0.35	5795	0.44	0.58	63.6%	119	100	1690	1709	0.05	7.56	3.6	?	3.79	7.51	15.06	3.51	9.4	5.90	20.8	DP10
PR-3c	PR-3c	58451	1.34	B	0.81	0.88	0	0.45	0.59	12860	0.90	0.96	0	0.49	0.62	0	0.25	0.47	0	0.08	0.35	45591	0.16	0.40	14.3%	53	53	160	160	0.05	7.19	6.3	4	1.76	1.52	8.71	4.34	0.9	7.28	4.0	PR-3c
PR-3d	PR-3d	258840	5.94	B	0.81	0.88	0	0.45	0.59	249509	0.90	0.96	0	0.49	0.62	0	0.25	0.47	0	0.08	0.35	9331	0.44	0.58	62.7%	94	94	1075	1075	0.05	6.77	3.6	?	3.79	4.72	11.49	3.92	10.3	6.58	22.9	PR-3d
DP12	PR-3b, PR-3d, & PR-3e	578436	13.28	B	0.81	0.88	0	0.45	0.59	517719	0.90	0.96	0	0.49	0.62	0	0.25	0.47	0	0.08	0.35	60717	0.41	0.56	58.2%	119	100	2232	2251	0.05	7.91	1.7	?	2.61	14.39	22.29	2.93	16.1	4.91	37.1	DP12
DP13	PR-2b	80136	1.84	B	0.81	0.88	0	0.45	0.59	0	0.90	0.96	69504	0.49	0.62	0	0.25	0.47	0	0.08	0.35	10632	0.79	0.88	86.7%	16	16	3027	3027	0.05	1.30	4.1	?	4.05	12.46	13.75	3.65	5.4	6.13	10.0	DP13
DP14	OS-TP1, PR-2a & PR-1e	225678	5.18	B	0.81	0.88	77234	0.45	0.59	97714	0.90	0.96	0	0.49	0.62	0	0.25	0.47	0	0.08	0.35	58070	0.49	0.65	60.7%	16	16	3027	3027	0.05	2.56	4.1	?	4.05	12.46	15.01	3.52	9.1	5.91	20.0	DP14
DP15	OS-TP1, PR-2a, PR-2b, & PR-1e	305814	7.02	B	0.81	0.88	77234	0.45	0.59	97714	0.90	0.96	69504	0.49	0.62	0	0.25	0.47	0	0.08	0.35	68702	0.57	0.71	67.5%	16	16	3030	3030	0.05	2.23	4.1	?	4.05	12.47	14.69	3.55	14.4	5.96	29.9	DP15
DP16	OS-TP1, PR-1e, PR-2a, PR-2b, PR-3a, PR-3b, PR-3c, PR-3d, PR-3e, & PR-3g	1897142	43.55	B	0.81	0.88	77234	0.45	0.59	1349316	0.90	0.96	69504	0.49	0.62	0	0.25	0.47	125735	0.08	0.35	285174	0.41	0.57	55.7%	119	100	2310	2329	0.05	7.87	3.6	?	3.79	10.23	18.09	3.24	59.0	5.44	137.1	DP16
PR-4	PR-4	159119	3.65	B	0.81	0.88	0	0.45	0.59	0	0.90	0.96	0	0.49	0.62	151368	0.25	0.47	0	0.08	0.35	7751	0.47	0.61	66.6%	92	92	587	587	0.05	6.36	4.0	?	4.00	2.45	8.80	4.32	7.5	7.25	16.2	PR-4
DET-IN	OS-TP1, PR-1e, PR-2a, PR-2b, PR-3a, PR-3b, PR-3c, PR-3d, PR-3e, PR-3g, PR-4, & PR-5	2138129	49.08	B	0.81	0.88	77234	0.45	0.59	1349316	0.90	0.96	69504	0.49	0.62	151368	0.25	0.47	125735	0.08	0.35	374793	0.41	0.57	54.4%	60	60	2400	2400	0.05	5.66	4.3	?	4.15	9.64	15.30	3.49	70.1	5.86	164.8	DET-IN
DET-OUT	OS-TP1, PR-1e, PR-2a, PR-2b, PR-3a, PR-3b, PR-3c, PR-3d, PR-3e, PR-3g, PR-4, & PR-5	2138129	49.08	B	0.81	0.88	77234	0.45	0.59	1349316	0.90	0.96	69504	0.49	0.62	151368	0.25	0.47	125735	0.08	0.35	374793	0.41	0.57	54.4%													1.0		70.4	DET-OUT
SW	PR-3g & OS5	19462	0.45	B	0.81	0.88	0	0.45	0.59	13712	0.90	0.96	0	0.49	0.62	0	0.25	0.47	0	0.08	0.35	5750	0.34	0.52	45.8%	20	20	316	316	0.05	3.57	2.3	4	1.06	4.96	8.53	4.37	0.7	7.33	1.7	SW
SE	DET-OUT & OS3	3725004	85.51	B	0.81	0.88	77234	0.45	0.59	2082630	0.90	0.96	69504	0.49	0.62	151368	0.25	0.47	968486	0.08	0.35	385583	0.38	0.55	50.8%													36.2		159.2	SE
N	OS-TP4, OS-TP5, & PR-3f	1068055	24.52	B	0.81	0.88	0	0.45	0.59	929342	0.90	0.96	0	0.49	0.62	0	0.25	0.47	0	0.08	0.35	138713	0.40	0.56	56.6%	328	100	1821	2049	0.05	13.31	10.0	4	2.21	15.43	28.73	2.55	25.3	4.27	59.0	N
NE	OS-4	302105	6.94	B	0.81	0.88	0	0.45	0.59	0	0.90	0.96	0	0.49	0.62	0	0.25	0.47	0	0.08	0.35	302105	0.08	0.35	0.0%	138	100	806	844	0	7.95	4	4	1.35	10.43	18.39	3.22	1.8	5.40	13.2	NE

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)

Project: Rock Creek Mesa PDR

Basin ID:



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	**EDB**	
Watershed Area =	49.10	acres
Watershed Length =	2,400	ft
Watershed Length to Centroid =	1,200	ft
Watershed Slope =	0.060	ft/ft
Watershed Imperviousness =	54.40%	percent
Percentage Hydrologic Soil Group A =	0.0%	percent
Percentage Hydrologic Soil Group B =	100.0%	percent
Percentage Hydrologic Soil Groups C/D =	0.0%	percent
Target WQCV Drain Time =	40.0	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) =	1.025	acre-feet	1.025	acre-feet
Excess Urban Runoff Volume (EURV) =	2.875	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 0.97 in.) =	2.016	acre-feet	0.97	inches
5-yr Runoff Volume (P1 = 1.24 in.) =	2.834	acre-feet	1.24	inches
10-yr Runoff Volume (P1 = 1.49 in.) =	3.724	acre-feet	1.49	inches
25-yr Runoff Volume (P1 = 1.89 in.) =	5.557	acre-feet	1.89	inches
50-yr Runoff Volume (P1 = 2.23 in.) =	6.952	acre-feet	2.23	inches
100-yr Runoff Volume (P1 = 2.6 in.) =	8.662	acre-feet	2.60	inches
500-yr Runoff Volume (P1 = 3.59 in.) =	12.921	acre-feet	3.59	inches
Approximate 2-yr Detention Volume =	1.785	acre-feet		
Approximate 5-yr Detention Volume =	2.462	acre-feet		
Approximate 10-yr Detention Volume =	3.315	acre-feet		
Approximate 25-yr Detention Volume =	4.003	acre-feet		
Approximate 50-yr Detention Volume =	4.383	acre-feet		
Approximate 100-yr Detention Volume =	5.041	acre-feet		

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	1.025	acre-feet
Zone 2 Volume (EURV - Zone 1) =	1.850	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	2.166	acre-feet
Total Detention Basin Volume =	5.041	acre-feet
Initial Surcharge Volume (ISV) =	user	ft^3
Initial Surcharge Depth (ISD) =	user	ft
Total Available Detention Depth (H_{total}) =	user	ft
Depth of Trickle Channel (H_{TC}) =	user	ft
Slope of Trickle Channel (S_{TC}) =	user	ft/ft
Slopes of Main Basin Sides (S_{main}) =	user	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	user	

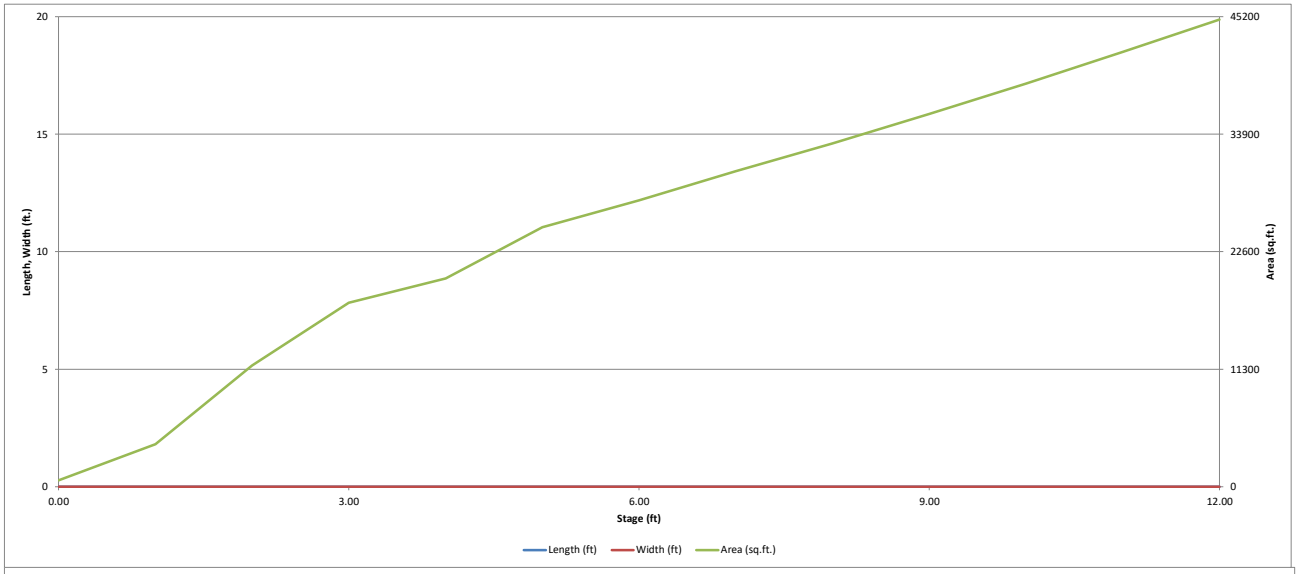
Initial Surcharge Area (A_{ISV}) =	user	ft^2
Surcharge Volume Length (L_{ISV}) =	user	ft
Surcharge Volume Width (W_{ISV}) =	user	ft
Depth of Basin Floor (H_{FLOOR}) =	user	ft
Length of Basin Floor (L_{FLOOR}) =	user	ft
Width of Basin Floor (W_{FLOOR}) =	user	ft
Area of Basin Floor (A_{FLOOR}) =	user	ft^2
Volume of Basin Floor (V_{FLOOR}) =	user	ft^3
Depth of Main Basin (H_{MAIN}) =	user	ft
Length of Main Basin (L_{MAIN}) =	user	ft
Width of Main Basin (W_{MAIN}) =	user	ft
Area of Main Basin (A_{MAIN}) =	user	ft^2
Volume of Main Basin (V_{MAIN}) =	user	ft^3
Calculated Total Basin Volume (V_{total}) =	**user**	acre-feet

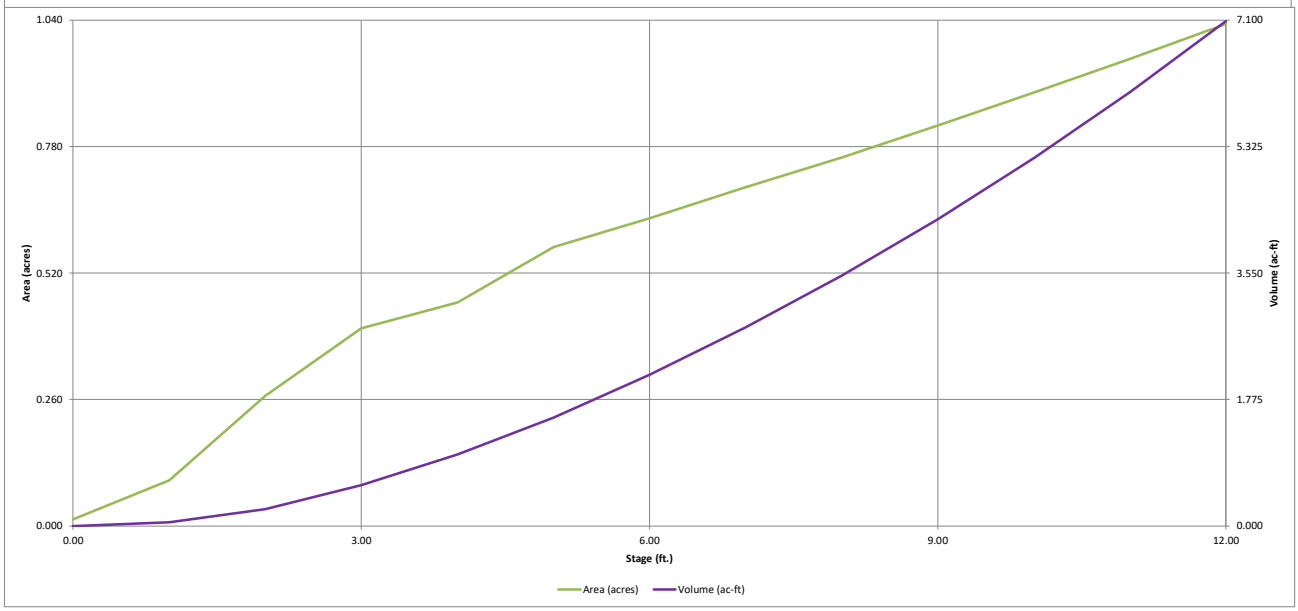
Depth Increment = 0.50 ft

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)
Top of Micropool	--	0.00	--	--	--	600	0.014		
	--	1.00	--	--	--	4,099	0.094	2,349	0.054
	--	2.00	--	--	--	11,665	0.268	10,231	0.235
	--	3.00	--	--	--	17,696	0.406	24,912	0.572
	--	4.00	--	--	--	20,032	0.460	43,776	1.005
	--	5.00	--	--	--	24,962	0.573	66,273	1.521
	--	6.00	--	--	--	27,557	0.633	92,532	2.124
	--	7.00	--	--	--	30,327	0.696	121,474	2.789
	--	8.00	--	--	--	33,004	0.758	153,140	3.516
	--	9.00	--	--	--	35,857	0.823	187,570	4.306
	--	10.00	--	--	--	38,796	0.891	224,897	5.163
	--	11.00	--	--	--	41,821	0.960	265,205	6.088
	--	12.00	--	--	--	44,933	1.032	308,582	7.084

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)



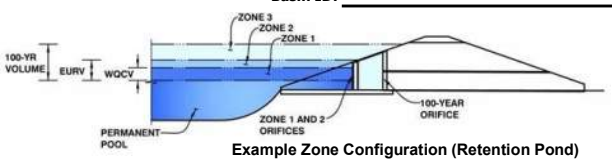


DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)

Project: **Rock Creek Mesa PDR**

Basin ID:



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	4.05	1.025	Orifice Plate
Zone 2 (EURV)	7.13	1.850	Orifice Plate
Zone 3 (100-year)	9.87	2.166	Weir&Pipe (Restrict)
Total (all zones)		5.041	

User Input: Orifice at Underdrain Outlet (typically used to drain WQCV in a Filtration BMP)

Underdrain Orifice Invert Depth =	N/A	ft (distance below the filtration media surface)	Underdrain Orifice Area =	N/A	ft^2
Underdrain Orifice Diameter =	N/A	inches	Underdrain Orifice Centroid =	N/A	feet

Calculated Parameters for Underdrain

User Input: Orifice Plate with one or more orifices or Elliptical Slot Weir (typically used to drain WQCV and/or EURV in a sedimentation BMP)

Centroid of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)	WQ Orifice Area per Row =	3.403E-02	ft^2
Depth at top of Zone using Orifice Plate =	7.52	ft (relative to basin bottom at Stage = 0 ft)	Elliptical Half-Width =	N/A	feet
Orifice Plate: Orifice Vertical Spacing =	30.10	inches	Elliptical Slot Centroid =	N/A	feet
Orifice Plate: Orifice Area per Row =	4.90	sq. inches (use rectangular openings)	Elliptical Slot Area =	N/A	ft^2

Calculated Parameters for Plate

User Input: Stage and Total Area of Each Orifice Row (numbered from lowest to highest)

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	2.51	5.01					
Orifice Area (sq. inches)	4.90	4.90	4.90					

	Row 9 (optional)	Row 10 (optional)	Row 11 (optional)	Row 12 (optional)	Row 13 (optional)	Row 14 (optional)	Row 15 (optional)	Row 16 (optional)
Stage of Orifice Centroid (ft)								
Orifice Area (sq. inches)								

User Input: Vertical Orifice (Circular or Rectangular)

	Not Selected	Not Selected			Not Selected	Not Selected	
Invert of Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Area =	N/A	N/A	ft^2
Depth at top of Zone using Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Centroid =	N/A	N/A	feet
Vertical Orifice Diameter =	N/A	N/A	inches				

Calculated Parameters for Vertical Orifice

User Input: Overflow Weir (Dropbox with Flat or Sloped Grate and Outlet Pipe OR Rectangular/Trapezoidal Weir and No Outlet Pipe)

	Zone 3 Weir	Not Selected			Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	7.52	N/A	ft (relative to basin bottom at Stage = 0 ft)	Height of Grate Upper Edge, H_t =	7.52	N/A	feet
Overflow Weir Front Edge Length =	6.00	N/A	feet	Overflow Weir Slope Length =	4.00	N/A	feet
Overflow Weir Grate Slope =	0.00	N/A	H:V	Grate Open Area / 100-yr Orifice Area =		N/A	
Horiz. Length of Weir Sides =	4.00	N/A	feet	Overflow Grate Open Area w/o Debris =	16.70	N/A	ft^2
Overflow Grate Type =	Type C Grate	N/A		Overflow Grate Open Area w/ Debris =	8.35	N/A	ft^2
Debris Clogging % =	50%	N/A	%				

Calculated Parameters for Overflow Weir

User Input: Outlet Pipe w/ Flow Restriction Plate (Circular Orifice, Restrictor Plate, or Rectangular Orifice)

	Zone 3 Restrictor	Not Selected			Zone 3 Restrictor	Not Selected	
Depth to Invert of Outlet Pipe =	0.00	N/A	ft (distance below basin bottom at Stage = 0 ft)	Outlet Orifice Area =		N/A	ft^2
Outlet Pipe Diameter =	36.00	N/A	inches	Outlet Orifice Centroid =		N/A	feet
Restrictor Plate Height Above Pipe Invert =			inches	Half-Central Angle of Restrictor Plate on Pipe =		N/A	radians

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	9.85	ft (relative to basin bottom at Stage = 0 ft)	Spillway Design Flow Depth=	0.96	feet
Spillway Crest Length =	56.00	feet	Stage at Top of Freeboard =	11.81	feet
Spillway End Slopes =	4.00	H:V	Basin Area at Top of Freeboard =	1.02	acres
Freeboard above Max Water Surface =	1.00	feet	Basin Volume at Top of Freeboard =	6.88	acre-ft

Calculated Parameters for Spillway

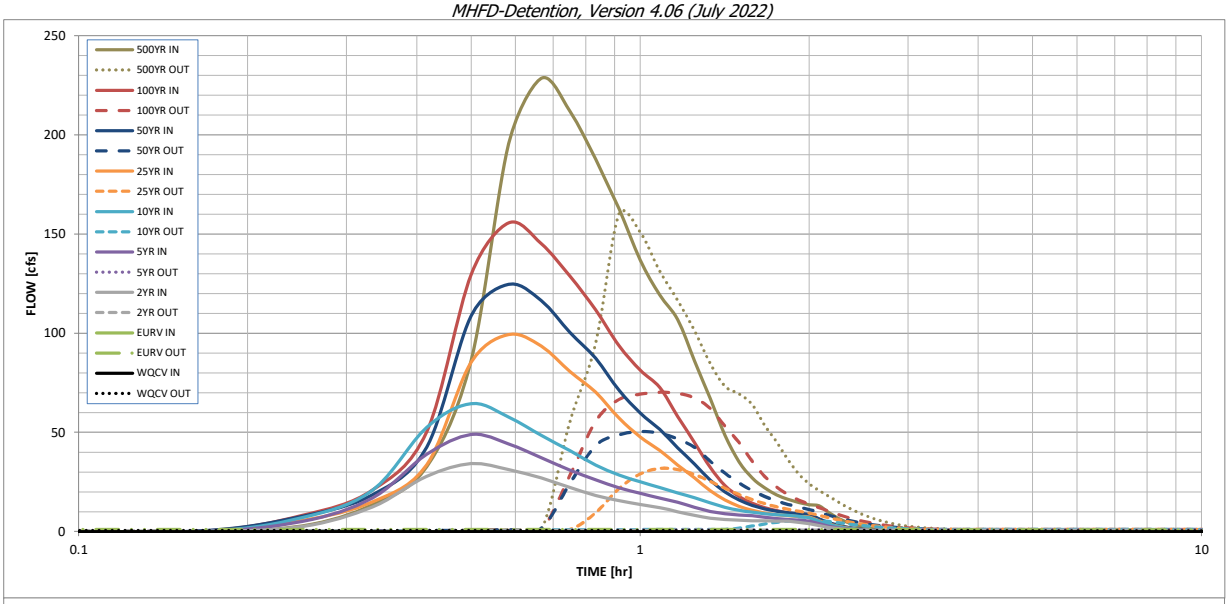
Routed Hydrograph Results

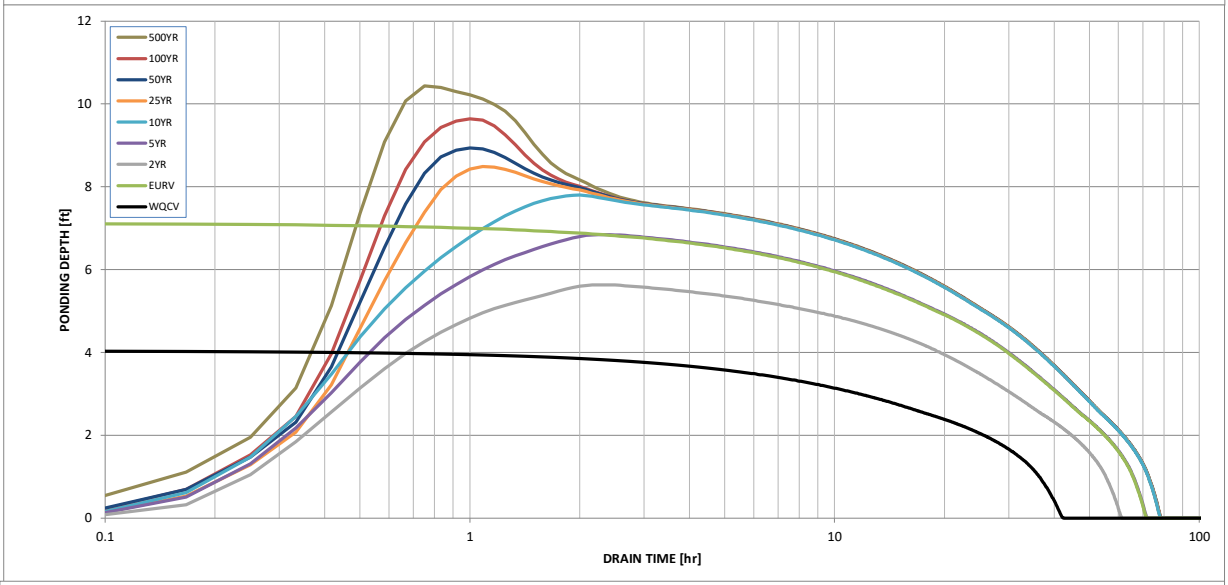
The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	N/A	N/A	0.97	1.24	1.49	1.89	2.23	2.60	3.59
CUHP Runoff Volume (acre-ft) =	1.025	2.875	2.016	2.834	3.724	5.557	6.952	8.662	12.921
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	2.016	2.834	3.724	5.557	6.952	8.662	12.921
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	0.7	5.9	14.2	38.5	53.4	72.8	116.9
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.01	0.12	0.29	0.78	1.09	1.48	2.38
Peak Inflow Q (cfs) =	N/A	N/A	34.3	48.9	64.5	99.3	124.7	155.7	228.5
Peak Outflow Q (cfs) =	0.5	1.0	0.8	1.0	5.8	31.8	50.4	70.2	160.0
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.2	0.4	0.8	0.9	1.0	1.4
Structure Controlling Flow =	Plate	Plate	Plate	Plate	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Spillway
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	N/A	-0.1	-0.1	-0.1	-0.1	-0.1
Max Velocity through Grate 2 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours) =	38	64	55	64	69	65	63	61	54
Time to Drain 99% of Inflow Volume (hours) =	**40**	68	58	68	74	72	71	70	68
Maximum Ponding Depth (ft) =	4.05	7.13	5.63	6.84	7.80	8.49	8.94	9.64	10.44
Area at Maximum Ponding Depth (acres) =	0.47	0.70	0.61	0.69	0.74	0.79	0.82	0.87	0.92
Maximum Volume Stored (acre-ft) =	1.028	2.880	1.894	2.678	3.358	3.887	4.249	4.847	5.552

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)





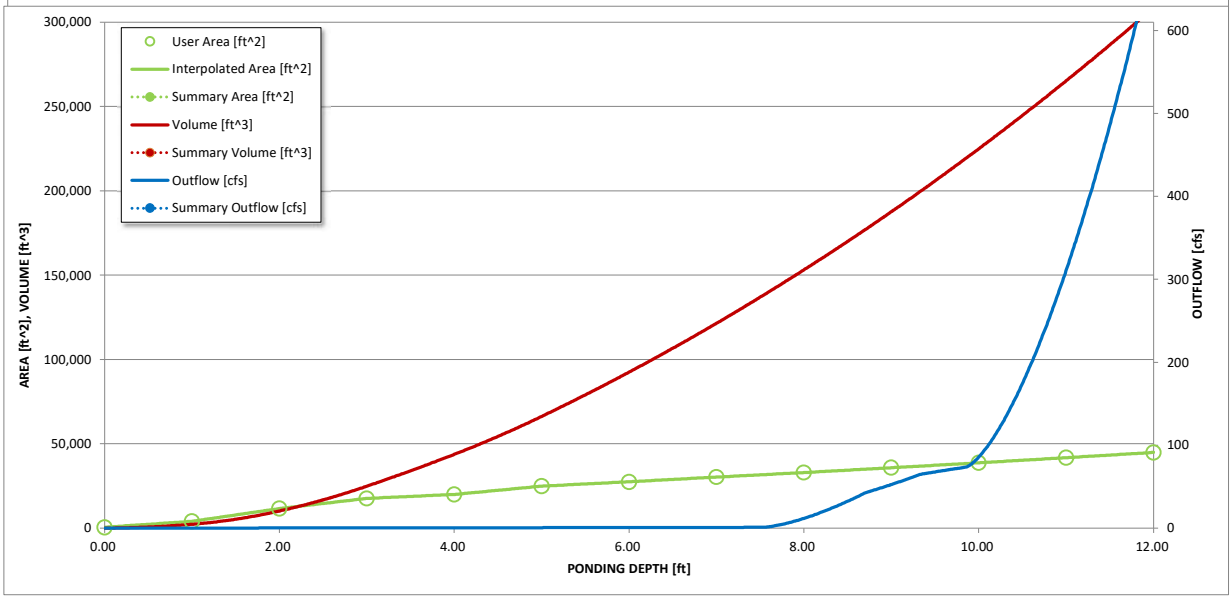


Figure 13-12b. Emergency Spillway Profile at Embankment

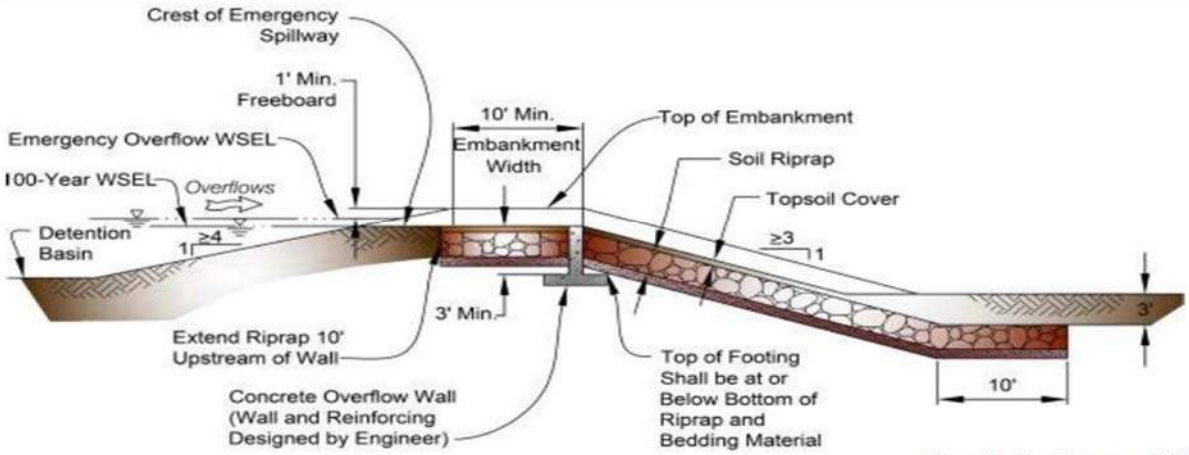
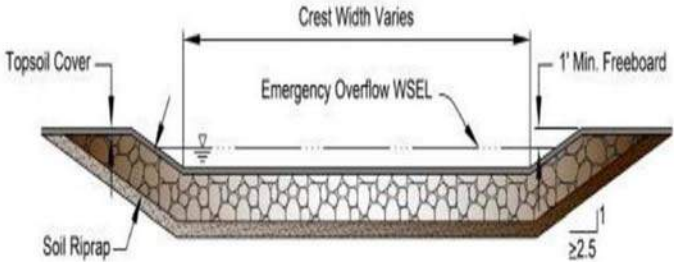


Figure 13-12c. Emergency Spillway Protection

Q=167.6 CFS
LENGTH=56
UNIT FLOW RATE: 2.99 CFS/FT

=> TYPE M (12") RIP RAP



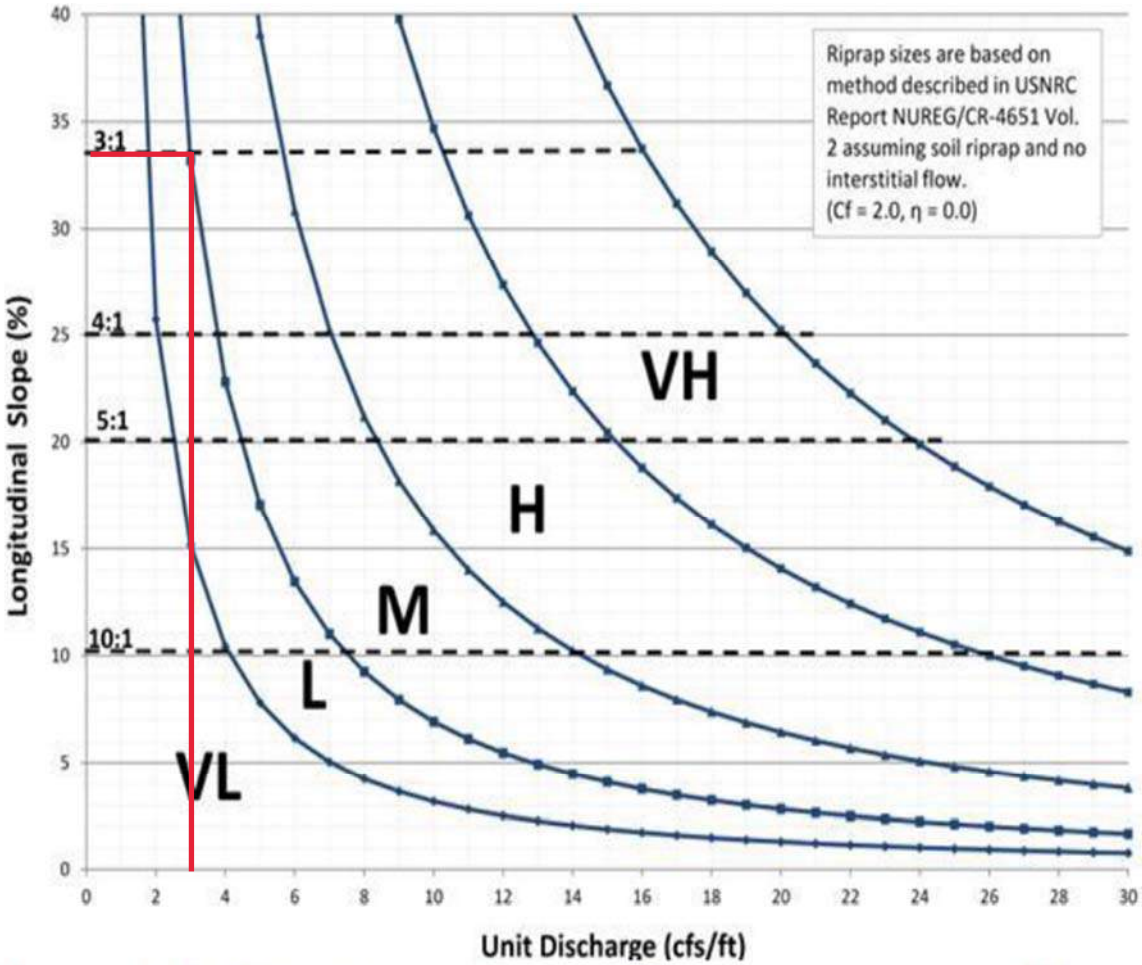


Figure 13-12d. Riprap Types for Emergency Spillway Protection

Design Procedure Form: Runoff Reduction

UD-BMP (Version 3.07, March 2018)

Designer: JTS
Company: MATRIX
Date: March 17, 2026
Project: ROCK CREEK MESA DP - DETAINED AREAS
Location: SW CO SPRINGS

SITE INFORMATION (User Input in Blue Cells)

WQCV Rainfall Depth: 0.60 inches
Depth of Average Runoff Producing Storm, d_6 = 0.43 inches (for Watersheds Outside of the Denver Region, Figure 3-1 in USDCM Vol. 3)

Area Type	DCIA	SPA	UIA:RPA	UIA:RPA	UIA:RPA	UIA:RPA	UIA:RPA	UIA:RPA	UIA:RPA			
Area ID	RCM1	RCM2	PR-3	PR-1	PR-2a	Pond PIA-1	Pond PIA-2	Pond PIA-3	Pond PIA-4			
Downstream Design Point ID	Site	Site	Site	Site	Site	Site	Site	Site	Site			
Downstream BMP Type	EDB	EDB	EDB	EDB	EDB	EDB	EDB	EDB	EDB			
DCIA (ft^2)	877,525	--	--	--	--	--	--	--	--			
UIA (ft^2)	--	--	35,065	18,361	13,089	55,007	55,007	55,007	55,007			
RPA (ft^2)	--	--	15,108	7,646	18,160	4,063	4,063	4,063	4,063			
SPA (ft^2)	--	917,353	--	--	--	--	--	--	--			
HSG A (%)	--	0%	0%	0%	0%	0%	0%	0%	0%			
HSG B (%)	--	100%	100%	100%	100%	100%	100%	100%	100%			
HSG C/D (%)	--	0%	0%	0%	0%	0%	0%	0%	0%			
Average Slope of RPA (ft/ft)	--	--	0.060	0.060	0.050	0.040	0.040	0.040	0.040			
UIA:RPA Interface Width (ft)	--	--	29.00	20.00	2573.00	236.00	236.00	236.00	236.00			

CALCULATED RUNOFF RESULTS

Area ID	RCM1	RCM2	PR-3	PR-1	PR-2a	Pond PIA-1	Pond PIA-2	Pond PIA-3	Pond PIA-4			
UIA:RPA Area (ft^2)	--	--	50,173	26,007	31,249	59,069	59,069	59,069	59,069			
L / W Ratio	--	--	16.00	16.00	0.06	1.06	1.06	1.06	1.06			
UIA / Area	--	--	0.6989	0.7060	0.4189	0.9312	0.9312	0.9312	0.9312			
Runoff (in)	0.50	0.00	0.01	0.02	0.00	0.37	0.37	0.37	0.37			
Runoff (ft^3)	36564	0	33	50	0	1837	1837	1837	1837			
Runoff Reduction (ft^3)	0	45868	1428	715	545	454	454	454	454			

CALCULATED WQCV RESULTS

Area ID	RCM1	RCM2	PR-3	PR-1	PR-2a	Pond PIA-1	Pond PIA-2	Pond PIA-3	Pond PIA-4			
WQCV (ft^3)	36564	0	1461	765	545	2292	2292	2292	2292			
WQCV Reduction (ft^3)	0	0	1428	715	545	454	454	454	454			
WQCV Reduction (%)	0%	0%	98%	93%	100%	20%	20%	20%	20%			
Untreated WQCV (ft^3)	36564	0	33	50	0	1837	1837	1837	1837			

CALCULATED DESIGN POINT RESULTS (sums results from all columns with the same Downstream Design Point ID)

Downstream Design Point ID	Site											
DCIA (ft^2)	877,525											
UIA (ft^2)	286,541											
RPA (ft^2)	57,165											
SPA (ft^2)	917,353											
Total Area (ft^2)	2,138,584											
Total Impervious Area (ft^2)	1,164,066											
WQCV (ft^3)	48,503											
WQCV Reduction (ft^3)	4,506											
WQCV Reduction (%)	9.3%											
Untreated WQCV (ft^3)	43,997											

CALCULATED SITE RESULTS (sums results from all columns in worksheet)

Total Area (ft^2)	2,138,584
Total Impervious Area (ft^2)	1,164,066
WQCV (ft^3)	48,503
WQCV Reduction (ft^3)	4,506
WQCV Reduction (%)	9%
Untreated WQCV (ft^3)	43,997

Design Procedure Form: Runoff Reduction

UD-BMP (Version 3.07, March 2018)

Designer: JTS
Company: MATRIX
Date: March 17, 2026
Project: ROCK CREEK MESA DP - DISTURBED AREAS
Location:

SITE INFORMATION (User Input in Blue Cells)

WQCV Rainfall Depth: 0.60 inches
Depth of Average Runoff Producing Storm, d_6 = 0.43 inches (for Watersheds Outside of the Denver Region, Figure 3-1 in USDCM Vol. 3)

Area Type	DCIA	SPA	UIA:RPA	UIA:RPA	UIA:RPA	UIA:RPA	UIA:RPA	UIA:RPA	UIA:RPA	UIA:RPA		
Area ID	RCM1	RCM2	PR-3	PR-1	PR-1g	Pond PIA-1	Pond PIA-2	Pond PIA-3	Pond PIA-4	PR-2a		
Downstream Design Point ID	Site	Site	Site	Site	Offsite	Site	Site	Site	Site	Site		
Downstream BMP Type	EDB	EDB	EDB	EDB	None	EDB	EDB	EDB	EDB	EDB		
DCIA (ft^2)	877,525	--	--	--	--	--	--	--	--	--		
UIA (ft^2)	--	--	35,065	18,361	7,374	55,007	55,007	55,007	55,007	13,089		
RPA (ft^2)	--	--	15,108	7,646	4,091	4,063	4,063	4,063	4,063	18,160		
SPA (ft^2)	--	917,353	--	--	--	--	--	--	--	--		
HSG A (%)	--	0%	0%	0%	0%	0%	0%	0%	0%	0%		
HSG B (%)	--	100%	100%	100%	100%	100%	100%	100%	100%	100%		
HSG C/D (%)	--	0%	0%	0%	0%	0%	0%	0%	0%	0%		
Average Slope of RPA (ft/ft)	--	--	0.060	0.060	0.060	0.040	0.040	0.040	0.040	0.050		
UIA:RPA Interface Width (ft)	--	--	29.00	20.00	7.00	236.00	236.00	236.00	236.00	2573.00		

CALCULATED RUNOFF RESULTS

Area ID	RCM1	RCM2	PR-3	PR-1	PR-1g	Pond PIA-1	Pond PIA-2	Pond PIA-3	Pond PIA-4	PR-2a		
UIA:RPA Area (ft^2)	--	--	50,173	26,007	11,465	59,069	59,069	59,069	59,069	31,249		
L / W Ratio	--	--	16.00	16.00	16.00	1.06	1.06	1.06	1.06	0.06		
UIA / Area	--	--	0.6989	0.7060	0.6432	0.9312	0.9312	0.9312	0.9312	0.4189		
Runoff (in)	0.50	0.00	0.01	0.02	0.00	0.37	0.37	0.37	0.37	0.00		
Runoff (ft^3)	36564	0	33	50	0	1837	1837	1837	1837	0		
Runoff Reduction (ft^3)	0	45868	1428	715	307	454	454	454	454	545		

CALCULATED WQCV RESULTS

Area ID	RCM1	RCM2	PR-3	PR-1	PR-1g	Pond PIA-1	Pond PIA-2	Pond PIA-3	Pond PIA-4	PR-2a		
WQCV (ft^3)	36564	0	1461	765	307	2292	2292	2292	2292	545		
WQCV Reduction (ft^3)	0	0	1428	715	307	454	454	454	454	545		
WQCV Reduction (%)	0%	0%	98%	93%	100%	20%	20%	20%	20%	100%		
Untreated WQCV (ft^3)	36564	0	33	50	0	1837	1837	1837	1837	0		

CALCULATED DESIGN POINT RESULTS (sums results from all columns with the same Downstream Design Point ID)

Downstream Design Point ID	Site	Offsite										
DCIA (ft^2)	877,525	0										
UIA (ft^2)	286,541	7,374										
RPA (ft^2)	57,165	4,091										
SPA (ft^2)	917,353	0										
Total Area (ft^2)	2,138,584	11,465										
Total Impervious Area (ft^2)	1,164,066	7,374										
WQCV (ft^3)	48,503	307										
WQCV Reduction (ft^3)	4,506	307										
WQCV Reduction (%)	9%	100%										
Untreated WQCV (ft^3)	43,997	0										

CALCULATED SITE RESULTS (sums results from all columns in worksheet)

Total Area (ft^2)	2,150,049
Total Impervious Area (ft^2)	1,171,440
WQCV (ft^3)	48,810
WQCV Reduction (ft^3)	4,813
WQCV Reduction (%)	10%
Untreated WQCV (ft^3)	43,997

Design Procedure Form: Runoff Reduction

UD-BMP (Version 3.07, March 2018)

Designer: JTS
Company: MATRIX
Date: March 17, 2026
Project: ROCK CREEK MESA DP - TREATMENT BY PIA IN LIEU OF DETENTION
Location:

SITE INFORMATION (User Input in Blue Cells)

WQCV Rainfall Depth = 0.60 inches
Depth of Average Runoff Producing Storm, d_6 = 0.43 inches (for Watersheds Outside of the Denver Region, Figure 3-1 in USDCM Vol. 3)

Area Type	UIA:RPA											
Area ID	PR-1g											
Downstream Design Point ID	Offsite											
Downstream BMP Type	None											
DCIA (ft^2)	--											
UIA (ft^2)	7,374											
RPA (ft^2)	4,091											
SPA (ft^2)	--											
HSG A (%)	0%											
HSG B (%)	100%											
HSG C/D (%)	0%											
Average Slope of RPA (ft/ft)	0.060											
UIA:RPA Interface Width (ft)	7.00											

CALCULATED RUNOFF RESULTS

Area ID	PR-1g											
UIA:RPA Area (ft^2)	11,465											
L / W Ratio	16.00											
UIA / Area	0.6432											
Runoff (in)	0.00											
Runoff (ft^3)	0											
Runoff Reduction (ft^3)	307											

CALCULATED WQCV RESULTS

Area ID	PR-1g											
WQCV (ft^3)	307											
WQCV Reduction (ft^3)	307											
WQCV Reduction (%)	100%											
Untreated WQCV (ft^3)	0											

CALCULATED DESIGN POINT RESULTS (sums results from all columns with the same Downstream Design Point ID)

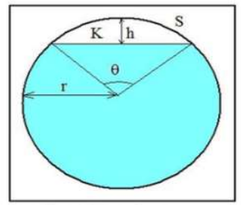
Downstream Design Point ID	Offsite											
DCIA (ft^2)	0											
UIA (ft^2)	7,374											
RPA (ft^2)	4,091											
SPA (ft^2)	0											
Total Area (ft^2)	11,465											
Total Impervious Area (ft^2)	7,374											
WQCV (ft^3)	307											
WQCV Reduction (ft^3)	307											
WQCV Reduction (%)	100%											
Untreated WQCV (ft^3)	0											

CALCULATED SITE RESULTS (sums results from all columns in worksheet)

Total Area (ft^2)	11,465
Total Impervious Area (ft^2)	7,374
WQCV (ft^3)	307
WQCV Reduction (ft^3)	307
WQCV Reduction (%)	100%
Untreated WQCV (ft^3)	0

INITIAL STORM SEWER CAPACITY CALCULATIONS - MANNINGS CHANNEL FLOW METHOD

Design Point	Notes	Max Q (Q100) Proposed	Flow Type / Capacity Analysis	Storm Pipe Calculated Max Q for Pipe (CFS)	Percent of Pipe Channel Capacity Used	n(full)	Slope (ft/ft)	n	Pipe Diameter (ft)	Width (ft) Box Culvert Only	Pipe Depth (inches)	Optimum Flow Depth (+/- 0.94 x D)	Θ (Radians)	A (Sq. Ft.)	Wetted Perimeter (ft)	Velocity at Max Pipe Capacity
DP1		25.4	Channel/Adequate	46.2	55%	0.013	0.038	0.013	2		24	1.88	0.990	3.065	5.293	15.07
PR-1b		3.9	Channel/Adequate	14.8	26%	0.013	0.018	0.013	1.5		18	1.41	0.990	1.724	3.970	8.56
DP2		11.7	Channel/Adequate	18.4	64%	0.013	0.028	0.013	1.5		18	1.41	0.990	1.724	3.970	10.68
DP3		13.4	Channel/Adequate	18.4	73%	0.013	0.028	0.013	1.5		18	1.41	0.990	1.724	3.970	10.68
DP4		38.4	Channel/Adequate	46.2	83%	0.013	0.038	0.013	2		24	1.88	0.990	3.065	5.293	15.07
PR-1f		5.9	Channel/Adequate	17.4	34%	0.013	0.025	0.013	1.5		18	1.41	0.990	1.724	3.970	10.09
DP5		42.1	Channel/Adequate	82.6	51%	0.013	0.037	0.013	2.5		30	2.35	0.990	4.788	6.617	17.25
DPTP		47.2	Channel/Adequate	79.2	60%	0.013	0.034	0.013	2.5		30	2.35	0.990	4.788	6.617	16.54
DP6		12.1	Channel/Adequate	18.1	67%	0.013	0.027	0.013	1.5		18	1.41	0.990	1.724	3.970	10.48
PR-3c		9.3	Channel/Adequate	30.0	31%	0.013	0.016	0.013	2		24	1.88	0.990	3.065	5.293	9.78
DP7		15.4	Channel/Adequate	31.8	48%	0.013	0.018	0.013	2		24	1.88	0.990	3.065	5.293	10.37
PR-3g		11.3	Channel/Adequate	23.7	48%	0.013	0.010	0.013	2		24	1.88	0.990	3.065	5.293	7.73
DP8a		26.4	Channel/Adequate	69.3	38%	0.013	0.026	0.013	2.5		30	2.35	0.990	4.788	6.617	14.46
DP8b		36.1	Channel/Adequate	69.3	52%	0.013	0.026	0.013	2.5		30	2.35	0.990	4.788	6.617	14.46
OS-2		5.8	Channel/Adequate	11.0	53%	0.013	0.010	0.013	1.5		18	1.41	0.990	1.724	3.970	6.38
DP9		56.9	Channel/Adequate	69.3	82%	0.013	0.0260	0.013	2.5		30	2.35	0.990	4.788	6.617	14.46
DP10		20.8	Channel/Adequate	43.0	49%	0.013	0.010	0.013	2.5		30	2.35	0.990	4.788	6.617	8.97
PR-3e		4.0	Channel/Adequate	11.0	36%	0.013	0.010	0.013	1.5		18	1.41	0.990	1.724	3.970	6.38
DP11		20.0	Channel/Adequate	43.0	47%	0.013	0.0100	0.013	2.5		30	2.35	0.990	4.788	6.617	8.97
DP12		37.1	Channel/Adequate	69.8	53%	0.013	0.0100	0.013	3		36	2.82	0.990	6.895	7.940	10.13
DP13		10.0	Channel/Adequate	23.7	42%	0.013	0.010	0.013	2		24	1.88	0.990	3.065	5.293	7.73
DP14		20.0	Channel/Adequate	43.0	46%	0.013	0.010	0.013	2.5		30	2.35	0.990	4.788	6.617	8.97
DP15		29.9	Channel/Adequate	43.0	70%	0.013	0.010	0.013	2.5		30	2.35	0.990	4.788	6.617	8.97
DP16		137.1	Channel/Adequate	220.6	62%	0.013	0.022	0.013	4		48	3.76	0.990	12.259	10.587	17.99
PR-4		16.2	Channel/Adequate	22.0	74%	0.013	0.040	0.013	1.5		18	1.41	0.990	1.724	3.970	12.76
DET-OUT		70.4	Channel/Adequate	106.4	66%	0.013	0.005	0.013	4		48	3.76	0.990	12.259	10.587	8.68



Partially Full Pipe Flow Parameters
(More Than Half Full)

r = D/2

h = 2r - y

(hydraulic radius)

R = A/P

(Manning Equation)

$Q = (1.49/n)(A)(R^{2/3})(S^{1/2})$

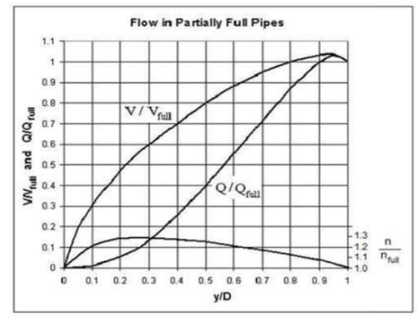
V = Q/A P

$$\theta = 2\arccos\left(\frac{r - h}{r}\right)$$

$$A = \pi r^2 - \frac{r^2(\theta - \sin\theta)}{2}$$

$$P = 2\pi r - r * \theta$$

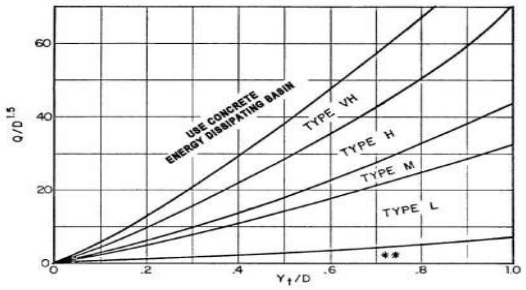
Equation used for n/n_{full}: $\mathbf{n/n_{full} = 1.25 - (y/D - 0.5)^{*}0.5}$ (for $0.5 \le y/D \le 1$)



Flow In Partially Full Pipes

OUTFALL PROTECTION CALCULATIONS

	DP9		DET-OUT	
Pipe Size (D)	30	Inches	48	Inches
Q	56.9	cfs	70.4	cfs
L	7.5	Feet	12	Feet
W	7.5	Feet	12	Feet
D	0	Feet	0	Feet
d50	0.42	Feet	0.33	Feet
	5.03	Inches	3.99	Inches
Depth of Flow	2.06	Feet	2.65	Feet
Q/D^1.5	14.40		8.80	
Yt/D	0.822		0.662	
Rip Rap	Type L for 3 x Pipe Dia Downstream		Type L for 3 x Pipe Dia Downstream	
Length of Rock	7.5	Feet	12	Feet
Width of Rock	7.5	Feet	12.0	Feet



Use D_o instead of D whenever flow is supercritical in the barrel.
** Use Type L for a distance of 3D downstream.

Figure 9-38. Riprap erosion protection at circular conduit outlet (valid for Q/D2.5 ≤ 6.0)

CLASSIFICATION AND GRADATION OF ORDINARY RIP RAP

Rip Rap Designation by Weight	% Smaller Than Given Size (inches)	Intermediate Rock Dimension	d50* (inches)
Type VL	70 – 100	12	6**
	50 – 70	9	
	35 – 50	6	
	2 - 10	2	
Type L	70 – 100	15	9**
	50 – 70	12	
	35 – 50	9	
	2 - 10	3	
Type M	70 – 100	21	12
	50 – 70	18	
	35 – 50	12	
	2 - 10	4	
Type H	70 – 100	30	18
	50 – 70	24	
	35 – 50	18	
	2 - 10	6	
Type VH	70 – 100	42	24
	50 – 70	33	
	35 – 50	24	
	2 - 10	9	

* d50 = Mean particle size
** Bury types VL and L with native top soil and revegetate to protect from vandalism.

Inputs
calculations

3.2.3 Rock Sizing for Riprap Apron and Low Tailwater Basin

Scour resulting from highly turbulent, rapidly decelerating flow is a common problem at conduit outlets. The following section summarizes the method for sizing riprap protection for both riprap aprons (Section 3.2.1) and low tailwater basins (Section 3.2.2).

Use Figure 9-38 to determine the required rock size for circular conduits and Figure 9-39 for rectangular conduits. Figure 9-38 is valid for $Q/D_o^{2.5}$ of 6.0 or less and Figure 9-39 is valid for $Q/WH^{1.5}$ of 8.0 or less. The parameters in these two figures are:

1. $Q/D^{1.5}$ or $Q/WH^{0.5}$ in which Q is the design discharge in cfs, D_o is the diameter of a circular conduit in feet, and W and H are the width and height of a rectangular conduit in feet.

2. Y_t/D_o or Y_t/H in which Y_t is the tailwater depth in feet, D_o is the diameter of a circular conduit in feet, and H is the height of a rectangular conduit in feet. In cases where Y_t is unknown or a hydraulic jump is suspected downstream of the outlet, use $Y_t/D_o = Y_t/H = 0.40$ when using Figures 9-38 and 9-39.

3. The riprap size requirements in Figures 9-38 and 9-39 are based on the non-dimensional parametric Equations 9-16 and 9-17 (Steven, Simons, and Watts 1971 and Smith 1975).

Circular culvert:

$$d_n = \frac{0.023Q}{Y_t^{1.2} D_o^{0.5}} \qquad \text{Equation 9-16}$$

Rectangular culvert:

$$d_n = \frac{0.014H^{0.5}Q}{Y_t W} \qquad \text{Equation 9-17}$$

3.2.2 Low Tailwater Basin

The design of low tailwater riprap basins is necessary when the receiving channel may have little or no flow or tailwater at time when the pipe or culvert is in operation. Figure 9-37 provides a plan and profile view of a typical low tailwater riprap basin.

By providing a low tailwater basin at the end of a storm drain conduit or culvert, the kinetic energy of the discharge dissipates under controlled conditions without causing scour at the channel bottom.

Low tailwater is defined as being equal to or less than ⅓ of the height of the storm drain, that is:

$$y_t \le \frac{D}{3} \quad \text{or} \quad y_t \le \frac{H}{3}$$

Where:

y_t = tailwater depth at design flow (feet)

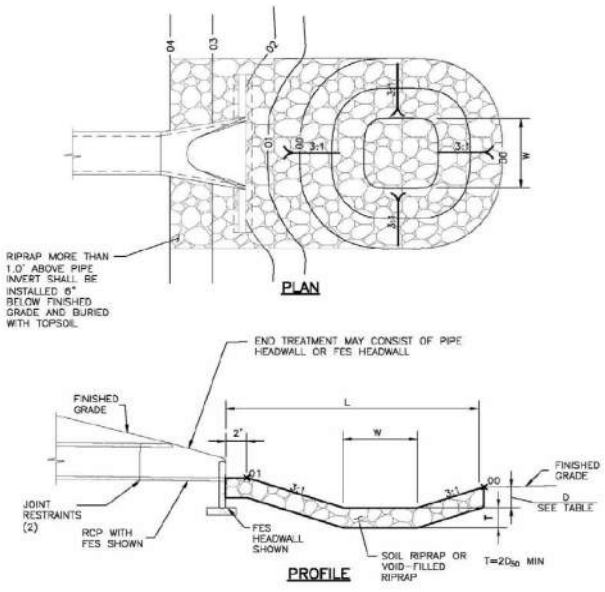
D = diameter of circular pipe (feet)

H = height of rectangular pipe (feet)

Rock Size
The procedure for determining the required riprap size downstream of a conduit outlet is in Section 3.2.3.

After selecting the riprap size, the minimum thickness of the riprap layer, T, in feet, in the basin is defined as:

$$T = 2D_{50} \qquad \text{Equation 9-15}$$



PIPE SIZE OR BOX HEIGHT	D	W*	L
18" – 24"	1'–0"	4'	15'
30" – 36"	1'–6"	6'	20'
42" – 48"	2'–0"	7'	24'
54" – 60"	2'–6"	8'	28'
66" – 72"	3'–0"	9'	32'

* IF OUTLET PIPE IS A BOX CULVERT WITH A WIDTH GREATER THAN W, THEN W = CULVERT WIDTH

Figure 9-37. Low tailwater riprap basin

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INLET MANAGEMENT

Project: ROCK CREEK MESA
Minor: 5-year
Major: 100-year

Worksheet Protected

INLET NAME	PR-4 STREET	PR-4 INLET
Inlet Application (Street or Area)	STREET	STREET
Hydraulic Condition	On Grade	In Sump
Inlet Type		CDOT Type R Curb Opening
Number of Inlet Units		2

USER-DEFINED INPUT

User-Defined Peak Flows

Minor Peak Flow, Q (cfs)	7.50	7.50
Major Peak Flow, Q (cfs)	16.20	16.20

Bypass (Carry-Over) Flow from Upstream Inlets must be organized from upstream (left) to downstream (right) in order for

Receive Bypass Flow from:	No Bypass Flow Received	No Bypass Flow Received
Bypass Flow Description (Optional):		
Minor Bypass Flow Received, Q_b (cfs)	0.00	0.00
Major Bypass Flow Received, Q_b (cfs)	0.00	0.00

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	7.50	7.50
Major Total Design Peak Flow, Q (cfs)	16.20	16.20
Minor Inlet Interception Capacity, Q_a (cfs)		24.69
Major Inlet Interception Capacity, Q_a (cfs)		24.69
Minor Flow Bypassed Downstream, Qb (cfs)		N/A
Major Flow Bypassed Downstream, Qb (cfs)		N/A
Minor Flow Capture Percentage, C%		100%
Major Flow Capture Percentage, C%		100%

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INLET MANAGEMENT

Project: ROCK CREEK MESA
Minor: 5-year
Major: 100-year

Worksheet Protected

INLET NAME	DP1 INLET	PR-1b STREET
Inlet Application (Street or Area)	STREET	STREET
Hydraulic Condition	On Grade	On Grade
Inlet Type	CDOT Type R Curb Opening	
Number of Inlet Units	2	

USER-DEFINED INPUT

User-Defined Peak Flows

Minor Peak Flow, Q (cfs)	9.50	1.70
Major Peak Flow, Q (cfs)	25.20	3.90

Bypass (Carry-Over) Flow from Upstream bypass flows to be linked.

Receive Bypass Flow from:	No Bypass Flow Received	No Bypass Flow Received
Bypass Flow Description (Optional):		
Minor Bypass Flow Received, Q_b (cfs)	0.00	0.00
Major Bypass Flow Received, Q_b (cfs)	0.00	0.00

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	9.50	1.70
Major Total Design Peak Flow, Q (cfs)	25.20	3.90
Minor Inlet Interception Capacity, Q_a (cfs)	9.27	
Major Inlet Interception Capacity, Q_a (cfs)	17.21	
Minor Flow Bypassed Downstream, Qb (cfs)	0.23	
Major Flow Bypassed Downstream, Qb (cfs)	7.99	
Minor Flow Capture Percentage, C%	98%	
Major Flow Capture Percentage, C%	68%	

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INLET MANAGEMENT

Project: ROCK CREEK MESA
Minor: 5-year
Major: 100-year

Worksheet Protected

INLET NAME	PR-1b INLET	DP2 INLET
Inlet Application (Street or Area)	STREET	STREET
Hydraulic Condition	In Sump	On Grade
Inlet Type	CDOT Type R Curb Opening	CDOT Type R Curb Opening
Number of Inlet Units	2	2

USER-DEFINED INPUT

User-Defined Peak Flows

Minor Peak Flow, Q (cfs)	1.70	5.10
Major Peak Flow, Q (cfs)	3.90	11.70

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	No Bypass Flow Received	No Bypass Flow Received
Bypass Flow Description (Optional):		
Minor Bypass Flow Received, Q_b (cfs)	0.00	0.00
Major Bypass Flow Received, Q_b (cfs)	0.00	0.00

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	1.70	5.10
Major Total Design Peak Flow, Q (cfs)	3.90	11.70
Minor Inlet Interception Capacity, Q_a (cfs)	16.67	5.10
Major Inlet Interception Capacity, Q_a (cfs)	16.67	11.70
Minor Flow Bypassed Downstream, Qb (cfs)	N/A	0.00
Major Flow Bypassed Downstream, Qb (cfs)	N/A	0.00
Minor Flow Capture Percentage, C%	100%	100%
Major Flow Capture Percentage, C%	100%	100%

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INLET MANAGEMENT

Project: ROCK CREEK MESA
Minor: 5-year
Major: 100-year

Worksheet Protected

INLET NAME	PR-1f STREET	PR-1f INLET
Inlet Application (Street or Area)	STREET	STREET
Hydraulic Condition	On Grade	In Sump
Inlet Type		CDOT Type R Curb Opening
Number of Inlet Units		2

USER-DEFINED INPUT

User-Defined Peak Flows

Minor Peak Flow, Q (cfs)	2.40	2.40
Major Peak Flow, Q (cfs)	5.90	5.90

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	No Bypass Flow Received	No Bypass Flow Received
Bypass Flow Description (Optional):		
Minor Bypass Flow Received, Q_b (cfs)	0.00	0.00
Major Bypass Flow Received, Q_b (cfs)	0.00	0.00

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	2.40	2.40
Major Total Design Peak Flow, Q (cfs)	5.90	5.90
Minor Inlet Interception Capacity, Q_a (cfs)		10.26
Major Inlet Interception Capacity, Q_a (cfs)		10.26
Minor Flow Bypassed Downstream, Qb (cfs)		N/A
Major Flow Bypassed Downstream, Qb (cfs)		N/A
Minor Flow Capture Percentage, C%		100%
Major Flow Capture Percentage, C%		100%

MHFD-Inlet, Version 6.00 (August 2025)

INLET MANAGEMENT

Project: ROCK CREEK MESA
Minor: 5-year
Major: 100-year

Worksheet Protected

INLET NAME	DPTP STREET	DPTP INLET
Inlet Application (Street or Area)	STREET	STREET
Hydraulic Condition	On Grade	In Sump
Inlet Type		CDOT Type R Curb Opening
Number of Inlet Units		6

USER-DEFINED INPUT

User-Defined Peak Flows

Minor Peak Flow, Q (cfs)	21.50	21.50
Major Peak Flow, Q (cfs)	47.20	47.20

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	No Bypass Flow Received	No Bypass Flow Received
Bypass Flow Description (Optional):		
Minor Bypass Flow Received, Q_b (cfs)	0.00	0.00
Major Bypass Flow Received, Q_b (cfs)	0.00	0.00

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	21.50	21.50
Major Total Design Peak Flow, Q (cfs)	47.20	47.20
Minor Inlet Interception Capacity, Q_a (cfs)		50.84
Major Inlet Interception Capacity, Q_a (cfs)		50.84
Minor Flow Bypassed Downstream, Qb (cfs)		N/A
Major Flow Bypassed Downstream, Qb (cfs)		N/A
Minor Flow Capture Percentage, C%		100%
Major Flow Capture Percentage, C%		100%

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INLET MANAGEMENT

Project: ROCK CREEK MESA
Minor: 5-year
Major: 100-year

Worksheet Protected

INLET NAME	PR-3a STREET	PR-3a INLET
Inlet Application (Street or Area)	STREET	STREET
Hydraulic Condition	On Grade	In Sump
Inlet Type		CDOT Type R Curb Opening
Number of Inlet Units		2

USER-DEFINED INPUT

User-Defined Peak Flows

Minor Peak Flow, Q (cfs)	4.60	4.60
Major Peak Flow, Q (cfs)	12.10	12.10

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	No Bypass Flow Received	No Bypass Flow Received
Bypass Flow Description (Optional):		
Minor Bypass Flow Received, Q_b (cfs)	0.00	0.00
Major Bypass Flow Received, Q_b (cfs)	0.00	0.00

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	4.60	4.60
Major Total Design Peak Flow, Q (cfs)	12.10	12.10
Minor Inlet Interception Capacity, Q_a (cfs)		15.08
Major Inlet Interception Capacity, Q_a (cfs)		15.08
Minor Flow Bypassed Downstream, Qb (cfs)		N/A
Major Flow Bypassed Downstream, Qb (cfs)		N/A
Minor Flow Capture Percentage, C%		100%
Major Flow Capture Percentage, C%		100%

MHFD-Inlet, Version 6.00 (August 2025)

INLET MANAGEMENT

Project: ROCK CREEK MESA
Minor: 5-year
Major: 100-year

Worksheet Protected

INLET NAME	PR-3h STREET	PR-3h INLET
Inlet Application (Street or Area)	STREET	STREET
Hydraulic Condition	On Grade	In Sump
Inlet Type		CDOT Type R Curb Opening
Number of Inlet Units		1

USER-DEFINED INPUT

User-Defined Peak Flows

Minor Peak Flow, Q (cfs)	1.70	1.70
Major Peak Flow, Q (cfs)	4.00	4.00

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	No Bypass Flow Received	No Bypass Flow Received
Bypass Flow Description (Optional):		
Minor Bypass Flow Received, Q_b (cfs)	0.00	0.00
Major Bypass Flow Received, Q_b (cfs)	0.00	0.00

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	1.70	1.70
Major Total Design Peak Flow, Q (cfs)	4.00	4.00
Minor Inlet Interception Capacity, Q_a (cfs)		12.66
Major Inlet Interception Capacity, Q_a (cfs)		12.66
Minor Flow Bypassed Downstream, Qb (cfs)		N/A
Major Flow Bypassed Downstream, Qb (cfs)		N/A
Minor Flow Capture Percentage, C%		100%
Major Flow Capture Percentage, C%		100%

MHFD-Inlet, Version 6.00 (August 2025)

INLET MANAGEMENT

Project: ROCK CREEK MESA
Minor: 5-year
Major: 100-year

Worksheet Protected

INLET NAME	PR-3g STREET	PR-3g INLET
Inlet Application (Street or Area)	STREET	STREET
Hydraulic Condition	On Grade	In Sump
Inlet Type		CDOT Type R Curb Opening
Number of Inlet Units		2

USER-DEFINED INPUT

User-Defined Peak Flows

Minor Peak Flow, Q (cfs)	5.10	5.10
Major Peak Flow, Q (cfs)	11.30	11.30

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	No Bypass Flow Received	No Bypass Flow Received
Bypass Flow Description (Optional):		
Minor Bypass Flow Received, Q_b (cfs)	0.00	0.00
Major Bypass Flow Received, Q_b (cfs)	0.00	0.00

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	5.10	5.10
Major Total Design Peak Flow, Q (cfs)	11.30	11.30
Minor Inlet Interception Capacity, Q_a (cfs)		16.67
Major Inlet Interception Capacity, Q_a (cfs)		16.67
Minor Flow Bypassed Downstream, Qb (cfs)		N/A
Major Flow Bypassed Downstream, Qb (cfs)		N/A
Minor Flow Capture Percentage, C%		100%
Major Flow Capture Percentage, C%		100%

MHFD-Inlet, Version 6.00 (August 2025)

INLET MANAGEMENT

Project: ROCK CREEK MESA
Minor: 5-year
Major: 100-year

Worksheet Protected

INLET NAME	PR-3c STREET	PR-3c INLET
Inlet Application (Street or Area)	STREET	STREET
Hydraulic Condition	On Grade	In Sump
Inlet Type		CDOT Type R Curb Opening
Number of Inlet Units		1

USER-DEFINED INPUT

User-Defined Peak Flows

Minor Peak Flow, Q (cfs)	4.00	4.00
Major Peak Flow, Q (cfs)	9.30	9.30

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	No Bypass Flow Received	No Bypass Flow Received
Bypass Flow Description (Optional):		
Minor Bypass Flow Received, Q_b (cfs)	0.00	0.00
Major Bypass Flow Received, Q_b (cfs)	0.00	0.00

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	4.00	4.00
Major Total Design Peak Flow, Q (cfs)	9.30	9.30
Minor Inlet Interception Capacity, Q_a (cfs)		10.26
Major Inlet Interception Capacity, Q_a (cfs)		10.26
Minor Flow Bypassed Downstream, Qb (cfs)		N/A
Major Flow Bypassed Downstream, Qb (cfs)		N/A
Minor Flow Capture Percentage, C%		100%
Major Flow Capture Percentage, C%		100%

MHFD-Inlet, Version 6.00 (August 2025)

INLET MANAGEMENT

Project: ROCK CREEK MESA
Minor: 5-year
Major: 100-year

Worksheet Protected

INLET NAME	OS-2 INLET	DP10 STREET
Inlet Application (Street or Area)	AREA	STREET
Hydraulic Condition	Swale	On Grade
Inlet Type	CDOT Type C	
Number of Inlet Units	1	

USER-DEFINED INPUT

User-Defined Peak Flows

Minor Peak Flow, Q (cfs)	1.80	9.40
Major Peak Flow, Q (cfs)	5.80	20.80

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	No Bypass Flow Received	No Bypass Flow Received
Bypass Flow Description (Optional):		
Minor Bypass Flow Received, Q_b (cfs)	0.00	0.00
Major Bypass Flow Received, Q_b (cfs)	0.00	0.00

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	1.80	9.40
Major Total Design Peak Flow, Q (cfs)	5.80	20.80
Minor Inlet Interception Capacity, Q_a (cfs)	8.25	
Major Inlet Interception Capacity, Q_a (cfs)	16.03	
Minor Flow Bypassed Downstream, Qb (cfs)	0.00	
Major Flow Bypassed Downstream, Qb (cfs)	0.00	
Minor Flow Capture Percentage, C%	100%	
Major Flow Capture Percentage, C%	100%	

MHFD-Inlet, Version 6.00 (August 2025)

INLET MANAGEMENT

Project: ROCK CREEK MESA
Minor: 5-year
Major: 100-year

Worksheet Protected

INLET NAME	DP10 INLET	PR-3e INLET
Inlet Application (Street or Area)	STREET	AREA
Hydraulic Condition	In Sump	Swale
Inlet Type	CDOT Type R Curb Opening	CDOT Type C
Number of Inlet Units	2	1

USER-DEFINED INPUT

User-Defined Peak Flows

Minor Peak Flow, Q (cfs)	9.40	0.90
Major Peak Flow, Q (cfs)	20.80	4.00

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	No Bypass Flow Received	No Bypass Flow Received
Bypass Flow Description (Optional):		
Minor Bypass Flow Received, Q_b (cfs)	0.00	0.00
Major Bypass Flow Received, Q_b (cfs)	0.00	0.00

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	9.40	0.90
Major Total Design Peak Flow, Q (cfs)	20.80	4.00
Minor Inlet Interception Capacity, Q_a (cfs)	24.71	5.62
Major Inlet Interception Capacity, Q_a (cfs)	24.71	13.08
Minor Flow Bypassed Downstream, Qb (cfs)	N/A	0.00
Major Flow Bypassed Downstream, Qb (cfs)	N/A	0.00
Minor Flow Capture Percentage, C%	100%	100%
Major Flow Capture Percentage, C%	100%	100%

MHFD-Inlet, Version 6.00 (August 2025)

INLET MANAGEMENT

Project: ROCK CREEK MESA
Minor: 5-year
Major: 100-year

Worksheet Protected

INLET NAME	PR-3d STREET	PR-3d INLET
Inlet Application (Street or Area)	STREET	STREET
Hydraulic Condition	On Grade	In Sump
Inlet Type		CDOT Type R Curb Opening
Number of Inlet Units		1

USER-DEFINED INPUT

User-Defined Peak Flows

Minor Peak Flow, Q (cfs)	10.30	10.30
Major Peak Flow, Q (cfs)	22.90	22.90

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	No Bypass Flow Received	No Bypass Flow Received
Bypass Flow Description (Optional):		
Minor Bypass Flow Received, Q_b (cfs)	0.00	0.00
Major Bypass Flow Received, Q_b (cfs)	0.00	0.00

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	10.30	10.30
Major Total Design Peak Flow, Q (cfs)	22.90	22.90
Minor Inlet Interception Capacity, Q_a (cfs)		12.66
Major Inlet Interception Capacity, Q_a (cfs)		22.83
Minor Flow Bypassed Downstream, Qb (cfs)		N/A
Major Flow Bypassed Downstream, Qb (cfs)		N/A
Minor Flow Capture Percentage, C%		100%
Major Flow Capture Percentage, C%		100%

MHFD-Inlet, Version 6.00 (August 2025)

INLET MANAGEMENT

Project: ROCK CREEK MESA
Minor: 5-year
Major: 100-year

Worksheet Protected

INLET NAME	DP13 INLET	DP14 INLET
Inlet Application (Street or Area)	STREET	STREET
Hydraulic Condition	On Grade	On Grade
Inlet Type	CDOT Type R Curb Opening	CDOT Type R Curb Opening
Number of Inlet Units	2	3

USER-DEFINED INPUT

User-Defined Peak Flows

Minor Peak Flow, Q (cfs)	5.40	9.10
Major Peak Flow, Q (cfs)	10.00	20.00

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	No Bypass Flow Received	DP1 INLET
Bypass Flow Description (Optional):		
Minor Bypass Flow Received, Q_b (cfs)	0.00	0.23
Major Bypass Flow Received, Q_b (cfs)	0.00	7.99

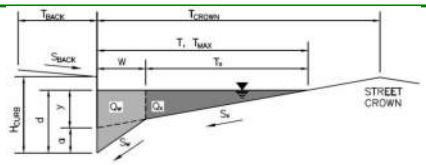
CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	5.40	9.33
Major Total Design Peak Flow, Q (cfs)	10.00	27.99
Minor Inlet Interception Capacity, Q_a (cfs)	5.40	9.33
Major Inlet Interception Capacity, Q_a (cfs)	9.97	27.99
Minor Flow Bypassed Downstream, Qb (cfs)	0.00	0.00
Major Flow Bypassed Downstream, Qb (cfs)	0.03	0.00
Minor Flow Capture Percentage, C%	100%	100%
Major Flow Capture Percentage, C%	100%	100%

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

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

Project: **ROCK CREEK MESA**
Inlet ID: **PR-4 STREET**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	1.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.050	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	13.5	ft
Gutter Width	W =	0.83	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.014	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

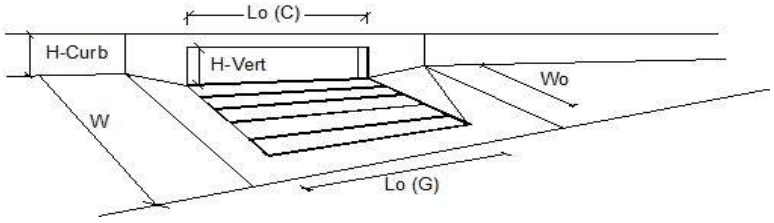
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	13.5	13.5	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	6.9	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☑	

		Minor Storm	Major Storm	
x MINOR STORM Allowable Capacity is based on Spread Criterion				
x MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**8.0**	**39.1**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 7.50 cfs on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design peak flow of 16.20 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 6.00 (August 2025)



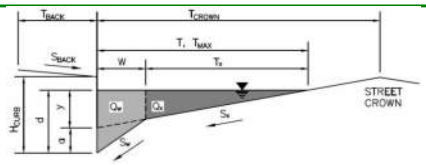
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =			
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =			inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =			
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =			ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =			ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =			
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =			

Street Hydraulics		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q_a =**			**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**			**cfs**
Capture Percentage = Q_a/Q_o	**C% =**			**%**

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

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

Project: **ROCK CREEK MESA**
Inlet ID: **PR-4 INLET**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	1.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.050	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	13.5	ft
Gutter Width	W =	0.83	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

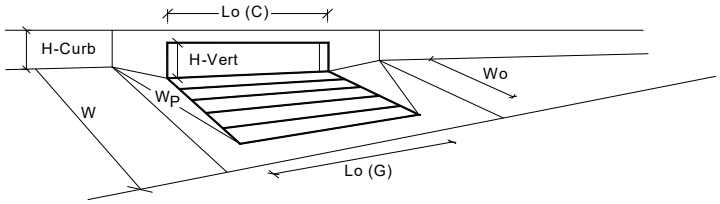
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	13.5	13.5	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	6.9	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

MINOR STORM Allowable Capacity is not applicable to Sump Condition
MAJOR STORM Allowable Capacity is not applicable to Sump Condition

	Minor Storm	Major Storm	
Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 6.00 (August 2025)

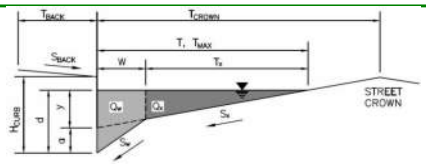


Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	2	2	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	6.0	6.0	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	15.00	15.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	0.83	0.83	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.43	0.43	ft
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.79	0.79	
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**24.7**	**24.7**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)	$Q_{PEAK\ REQUIRED}$ =	7.5	16.2	cfs

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

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

Project: **ROCK CREEK MESA**
Inlet ID: **DP1 INLET**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.5	ft
Gutter Width	W =	0.83	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.010	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.5	17.5	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	7.8	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☑	

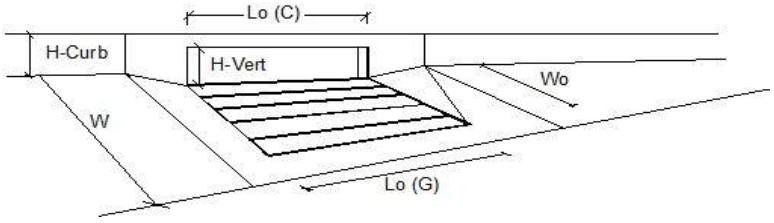
MINOR STORM Allowable Capacity is based on Spread Criterion
MAJOR STORM Allowable Capacity is based on Depth Criterion

	Minor Storm	Major Storm	
Q_{allow} =	**13.3**	**51.1**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 9.50 cfs on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design peak flow of 25.20 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 6.00 (August 2025)



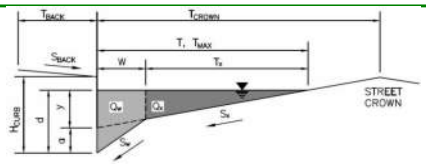
Design Information (Input)		MINOR	MAJOR	
Type of Inlet (CDOT Type R Curb Opening)	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	2	2	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	

Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q_a =**	**9.3**	**17.2**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.2**	**8.0**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**98**	**68**	**%**

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

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

Project: **ROCK CREEK MESA**
Inlet ID: **PR-1b STREET**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.5	ft
Gutter Width	W =	0.83	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.040	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.5	17.5	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	7.8	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☑	

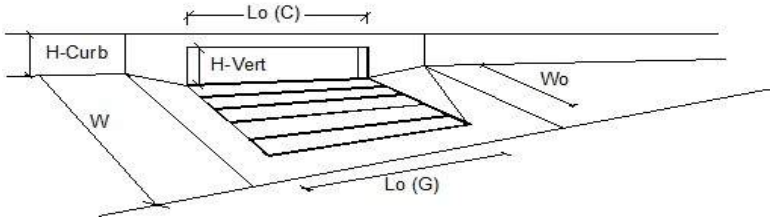
MINOR STORM Allowable Capacity is based on Spread Criterion
MAJOR STORM Allowable Capacity is based on Depth Criterion

	Minor Storm	Major Storm	
Q_{allow} =	**26.6**	**48.9**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 1.70 cfs on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design peak flow of 3.90 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 6.00 (August 2025)



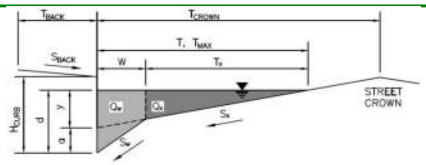
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =			
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =			inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =			
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =			ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =			ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =			
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =			

Street Hydraulics		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q_a =**			**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**			**cfs**
Capture Percentage = Q_a/Q_o	**C% =**			**%**

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

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

Project: **ROCK CREEK MESA**
Inlet ID: **PR-1b INLET**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.5	ft
Gutter Width	W =	0.83	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

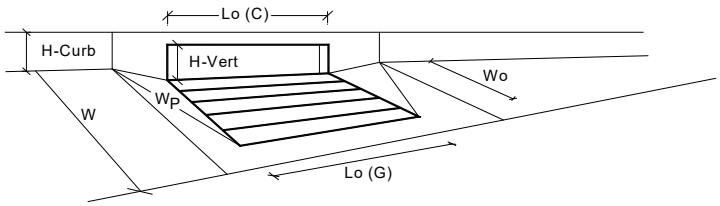
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.5	17.5	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	7.8	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

MINOR STORM Allowable Capacity is not applicable to Sump Condition
MAJOR STORM Allowable Capacity is not applicable to Sump Condition

	Minor Storm	Major Storm	
Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 6.00 (August 2025)

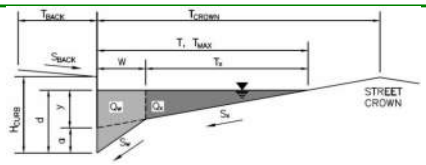


Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	2	2	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	6.0	6.0	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	0.83	0.83	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.43	0.43	ft
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.79	0.79	
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**16.7**	**16.7**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)	$Q_{PEAK\ REQUIRED}$ =	1.7	3.9	cfs

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

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

Project: **ROCK CREEK MESA**
Inlet ID: **DP2 INLET**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.5	ft
Gutter Width	W =	0.83	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.010	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.5	17.5	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	7.8	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☑	

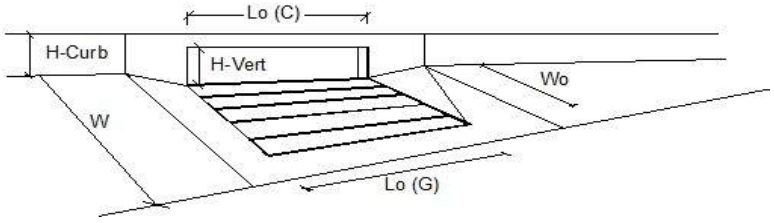
MINOR STORM Allowable Capacity is based on Spread Criterion
MAJOR STORM Allowable Capacity is based on Depth Criterion

	Minor Storm	Major Storm	
Q_{allow} =	**13.3**	**51.1**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 5.10 cfs on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design peak flow of 11.70 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 6.00 (August 2025)



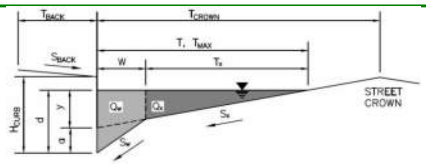
Design Information (Input)		MINOR	MAJOR	
Type of Inlet (CDOT Type R Curb Opening)	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	2	2	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	

Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q_a =**	**5.1**	**11.7**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.0**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**100**	**100**	**%**

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

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

Project: **ROCK CREEK MESA**
Inlet ID: **PR-1f STREET**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	1.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	13.5	ft
Gutter Width	W =	0.83	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.019	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	13.5	13.5	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	6.4	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☑	

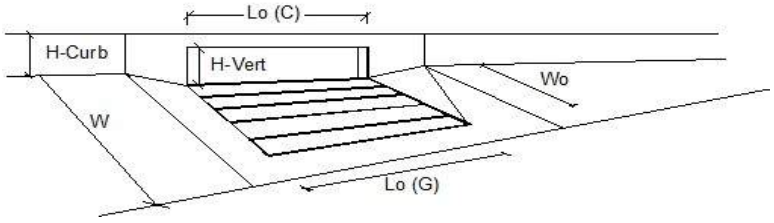
MINOR STORM Allowable Capacity is based on Spread Criterion
MAJOR STORM Allowable Capacity is based on Depth Criterion

	Minor Storm	Major Storm	
Q_{allow} =	**9.3**	**32.4**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 2.40 cfs on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design peak flow of 5.90 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 6.00 (August 2025)



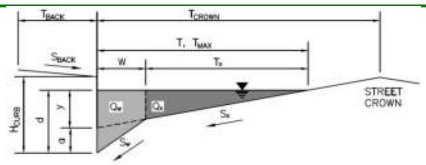
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =			
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =			inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =			
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =			ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =			ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =			
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =			

Street Hydraulics		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q_a =**			**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**			**cfs**
Capture Percentage = Q_a/Q_o	**C% =**			**%**

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

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

Project: **ROCK CREEK MESA**
Inlet ID: **PR-1f INLET**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	1.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	13.5	ft
Gutter Width	W =	0.83	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

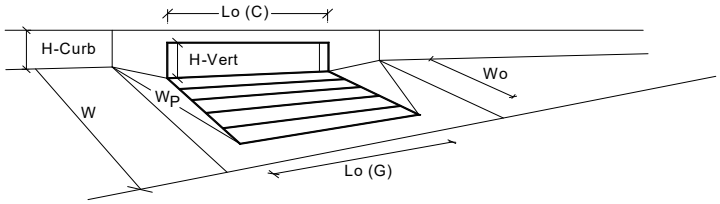
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	13.5	13.5	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	6.4	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

MINOR STORM Allowable Capacity is not applicable to Sump Condition
MAJOR STORM Allowable Capacity is not applicable to Sump Condition

	Minor Storm	Major Storm	
Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 6.00 (August 2025)

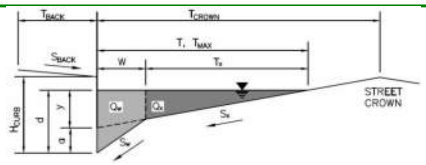


Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	2	2	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	6.0	6.0	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	0.83	0.83	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.43	0.43	ft
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.93	0.93	
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**10.3**	**10.3**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)	$Q_{PEAK\ REQUIRED}$ =	2.4	5.9	cfs

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

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

Project: ROCK CREEK MESA
Inlet ID: DPTP STREET



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	0.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	16.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.027	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	16.0	16.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	6.0	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☑	

MINOR STORM Allowable Capacity is based on Spread Criterion
MAJOR STORM Allowable Capacity is based on Depth Criterion

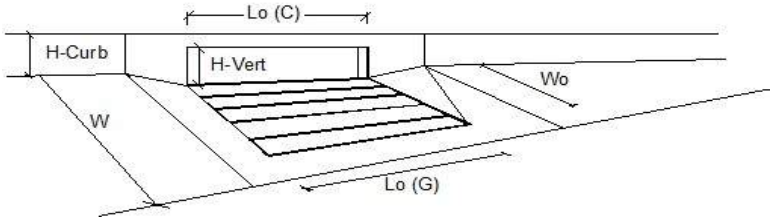
	Minor Storm	Major Storm	
Q_{allow} =	**18.9**	**22.4**	**cfs**

WARNING: MINOR STORM max. allowable capacity is less than the design peak flow of 21.50 cfs on sheet 'Inlet Management'
WARNING: MAJOR STORM max. allowable capacity is less than the design peak flow of 47.20 cfs on sheet 'Inlet Management'

Flow will be divided between both sides of the road effectively doubling the capacity demonstrated here.

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 6.00 (August 2025)



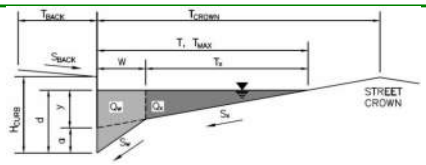
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =			
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =			inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =			
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =			ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =			ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =			
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =			

Street Hydraulics		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q_a =**			**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**			**cfs**
Capture Percentage = Q_a/Q_o	**C% =**			**%**

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

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

Project: **ROCK CREEK MESA**
Inlet ID: **DPTP INLET**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	0.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	16.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

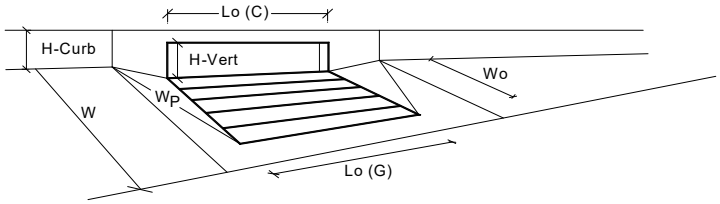
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	16.0	16.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	6.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

MINOR STORM Allowable Capacity is not applicable to Sump Condition
MAJOR STORM Allowable Capacity is not applicable to Sump Condition

	Minor Storm	Major Storm	
Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 6.00 (August 2025)

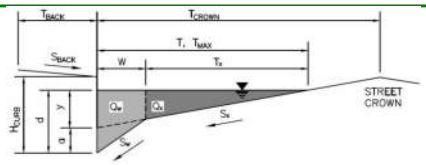


Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	6	6	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	6.0	6.0	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	15.00	15.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.33	0.33	ft
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.79	0.79	
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**50.8**	**50.8**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)	$Q_{PEAK\ REQUIRED}$ =	21.5	47.2	cfs

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

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

Project: **ROCK CREEK MESA**
Inlet ID: **PR-3a STREET**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.5	ft
Gutter Width	W =	0.83	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.010	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.5	17.5	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	7.8	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

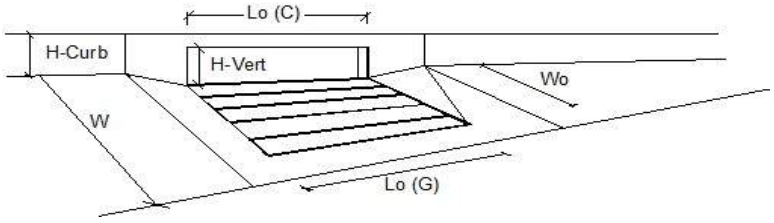
MINOR STORM Allowable Capacity is based on Spread Criterion
MAJOR STORM Allowable Capacity is based on Spread Criterion

	Minor Storm	Major Storm	
Q_{allow} =	**13.3**	**13.3**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 4.60 cfs on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design peak flow of 12.10 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 6.00 (August 2025)



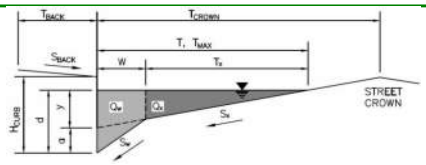
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =			
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =			inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =			
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =			ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =			ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =			
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =			

Street Hydraulics		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q_a =**			**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**			**cfs**
Capture Percentage = Q_a/Q_o	**C% =**			**%**

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

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

Project: **ROCK CREEK MESA**
Inlet ID: **PR-3a INLET**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.5	ft
Gutter Width	W =	0.83	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

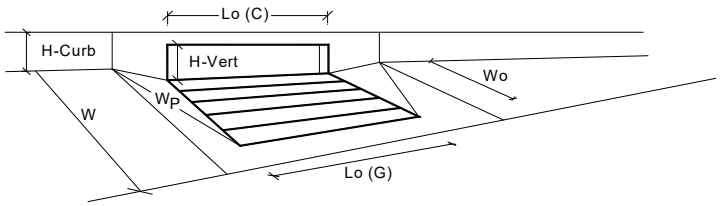
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.5	17.5	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	7.8	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

MINOR STORM Allowable Capacity is not applicable to Sump Condition
MAJOR STORM Allowable Capacity is not applicable to Sump Condition

	Minor Storm	Major Storm	
Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 6.00 (August 2025)

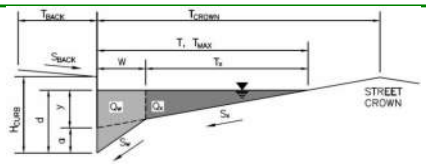


Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	2	2	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	4.8	4.8	inches
Grate Information		MINOR	MAJOR	☐ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	15.00	15.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	0.83	0.83	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.33	0.33	ft
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.71	0.71	
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**15.1**	**15.1**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)	$Q_{PEAK\ REQUIRED}$ =	4.6	12.1	cfs

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

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

Project: **ROCK CREEK MESA**
Inlet ID: **PR-3h STREET**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.5	ft
Gutter Width	W =	0.83	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.025	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.5	17.5	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	7.8	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

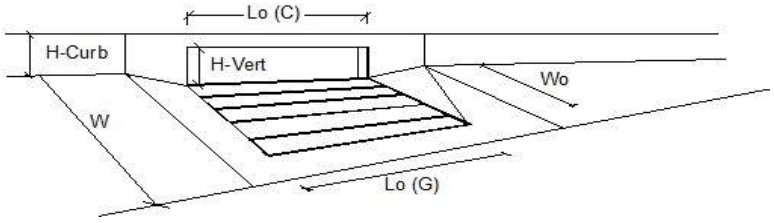
MINOR STORM Allowable Capacity is based on Spread Criterion
MAJOR STORM Allowable Capacity is based on Spread Criterion

	Minor Storm	Major Storm	
Q_{allow} =	**21.1**	**21.1**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 1.70 cfs on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design peak flow of 4.00 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 6.00 (August 2025)



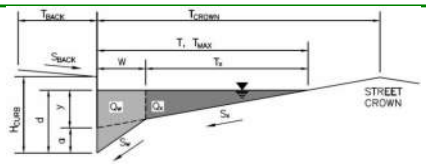
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =			
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =			inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =			
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =			ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =			ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =			
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =			

Street Hydraulics		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q_a =**			**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**			**cfs**
Capture Percentage = Q_a/Q_o	**C% =**			**%**

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

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

Project: **ROCK CREEK MESA**
Inlet ID: **PR-3h INLET**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.5	ft
Gutter Width	W =	0.83	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

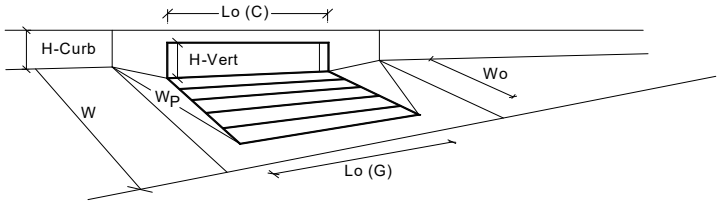
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.5	17.5	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	7.8	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

MINOR STORM Allowable Capacity is not applicable to Sump Condition
MAJOR STORM Allowable Capacity is not applicable to Sump Condition

	Minor Storm	Major Storm	
Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 6.00 (August 2025)

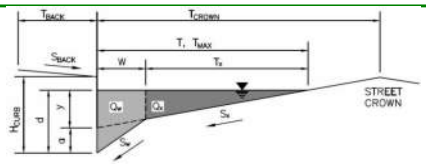


Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	6.0	6.0	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	15.00	15.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	0.83	0.83	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.43	0.43	ft
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.79	0.79	
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**12.7**	**12.7**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)	$Q_{PEAK\ REQUIRED}$ =	1.7	4.0	cfs

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

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

Project: **ROCK CREEK MESA**
Inlet ID: **PR-3g STREET**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.5	ft
Gutter Width	W =	0.83	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.010	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.5	17.5	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	7.8	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☑	

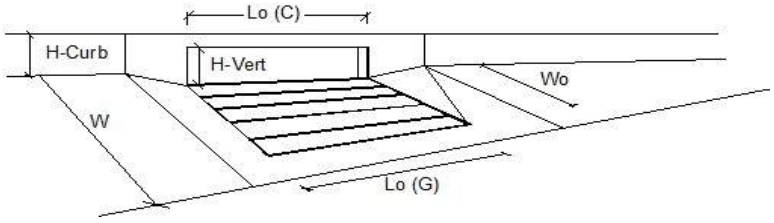
MINOR STORM Allowable Capacity is based on Spread Criterion
MAJOR STORM Allowable Capacity is based on Depth Criterion

	Minor Storm	Major Storm	
Q_{allow} =	**13.3**	**51.1**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 5.10 cfs on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design peak flow of 11.30 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 6.00 (August 2025)



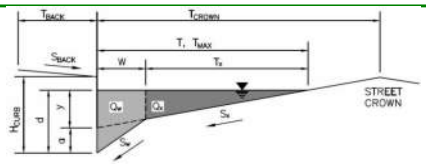
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =			
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =			inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =			
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =			ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =			ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =			
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =			

Street Hydraulics		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q_a =**			**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**			**cfs**
Capture Percentage = Q_a/Q_o	**C% =**			**%**

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

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

Project: **ROCK CREEK MESA**
Inlet ID: **PR-3g INLET**



Gutter Geometry:

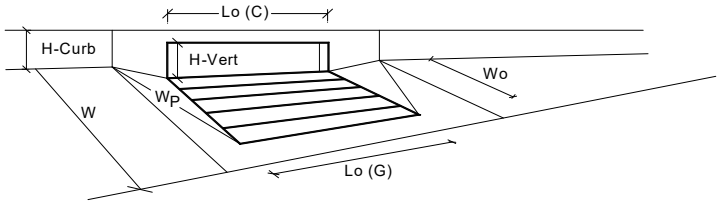
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.5	ft
Gutter Width	W =	0.83	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.5	17.5	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	7.8	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is not applicable to Sump Condition				
MAJOR STORM Allowable Capacity is not applicable to Sump Condition	**Q_{allow} =**	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 6.00 (August 2025)

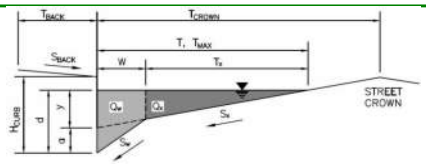


Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	2	2	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	6.0	6.0	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	0.83	0.83	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.43	0.43	ft
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.79	0.79	
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**16.7**	**16.7**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)	$Q_{PEAK\ REQUIRED}$ =	5.1	11.3	cfs

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

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

Project: **ROCK CREEK MESA**
Inlet ID: **PR-3c STREET**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.5	ft
Gutter Width	W =	0.83	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.025	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.5	17.5	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	7.8	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

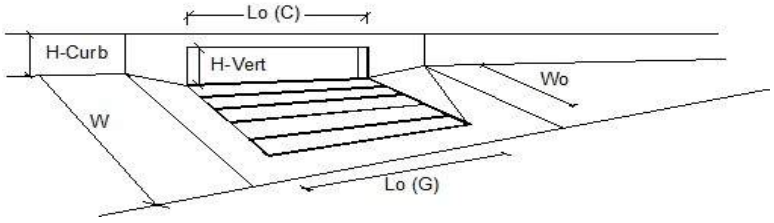
MINOR STORM Allowable Capacity is based on Spread Criterion
MAJOR STORM Allowable Capacity is based on Spread Criterion

	Minor Storm	Major Storm	
Q_{allow} =	**21.1**	**21.1**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 4.00 cfs on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design peak flow of 9.30 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 6.00 (August 2025)



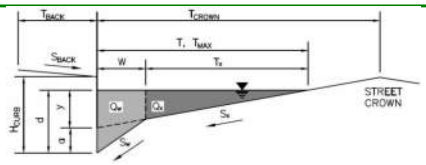
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =			
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =			inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =			
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =			ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =			ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =			
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =			

Street Hydraulics		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q_a =**			**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**			**cfs**
Capture Percentage = Q_a/Q_o	**C% =**			**%**

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

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

Project: **ROCK CREEK MESA**
Inlet ID: **PR-3c INLET**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.5	ft
Gutter Width	W =	0.83	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

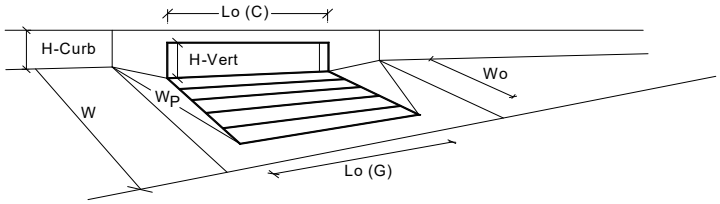
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.5	17.5	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	7.8	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

MINOR STORM Allowable Capacity is not applicable to Sump Condition
MAJOR STORM Allowable Capacity is not applicable to Sump Condition

	Minor Storm	Major Storm	
Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 6.00 (August 2025)

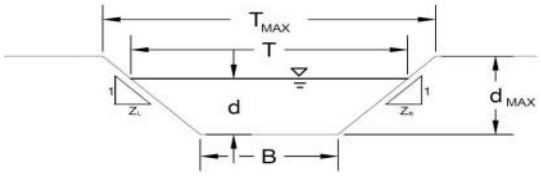


Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	6.0	6.0	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	0.83	0.83	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.43	0.43	ft
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.93	0.93	
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**10.3**	**10.3**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)	$Q_{PEAK\ REQUIRED}$ =	4.0	9.3	cfs

AREA INLET IN A SWALE

ROCK CREEK MESA

OS-2 INLET



This worksheet uses the NRCS vegetal retardance method to determine Manning's n for grass-lined channels.

An override Manning's n can be entered for other channel materials.

Analysis of Trapezoidal Channel (Grass-Lined uses SCS Method)

	NRCS Vegetal Retardance (A, B, C, D, or E)	A, B, C, D, or E =	D	
	Manning's n (Leave cell D16 blank to manually enter an n value)	n =	see details below	
	Channel Invert Slope	S_O =	0.0180	ft/ft
	Bottom Width	B =	2.00	ft
Warning 01	Left Side Slope	Z1 =	0.25	ft/ft
Warning 01	Right Side Sloe	Z2 =	0.25	ft/ft

Check one of the following soil types:

Soil Type:	Max. Velocity (V_{MAX})	Max Froude No. (F_{MAX})
Non-Cohesive	5.0 fps	0.60
Cohesive	7.0 fps	0.80
Paved	N/A	N/A

Choose One:
- (●) Non-Cohesive
- ( ) Cohesive
- ( ) Paved

		Minor Storm	Major Storm	
	Maximum Allowable Top Width of Channel for Minor & Major Storm	**T_{MAX} =**	**5.00**	**5.00**	**ft**
	Maximum Allowable Water Depth in Channel for Minor & Major Storm	**d_{MAX} =**	**1.00**	**1.00**	**ft**

Maximum Channel Capacity Based On Allowable Top Width

		Minor Storm	Major Storm	
	Maximum Allowable Top Width	**T_{MAX} =**	**5.00**	**5.00**	**ft**
Warning 02	Water Depth	d =	6.00	6.00	ft
	Flow Area	A =	21.00	21.00	sq ft
	Wetted Perimeter	P =	14.37	14.37	ft
	Hydraulic Radius	R =	1.46	1.46	ft
	Manning's n based on NRCS Vegetal Retardance	n =	0.032	0.032	
	Flow Velocity	V =	8.14	8.14	fps
	Velocity-Depth Product	VR =	11.90	11.90	ft^2/s
	Hydraulic Depth	D =	4.20	4.20	ft
	Froude Number	Fr =	0.70	0.70	
	Maximum Flow Based on Allowable Water Depth	**Q_T =**	**171.0**	**171.0**	**cfs**

Maximum Channel Capacity Based On Allowable Water Depth

		Minor Storm	Major Storm	
	Maximum Allowable Water Depth	**d_{MAX} =**	**1.00**	**1.00**	**ft**
	Top Width	T =	2.50	2.50	ft
	Flow Area	A =	2.25	2.25	sq ft
	Wetted Perimeter	P =	4.06	4.06	ft
	Hydraulic Radius	R =	0.55	0.55	ft
	Manning's n based on NRCS Vegetal Retardance	n =	0.050	0.050	
	Flow Velocity	V =	2.69	2.69	fps
	Velocity-Depth Product	VR =	1.49	1.49	ft^2/s
	Hydraulic Depth	D =	0.90	0.90	ft
	Froude Number	Fr =	0.50	0.50	
	Maximum Flow Based On Allowable Water Depth	**Q_d =**	**6.0**	**6.0**	**cfs**

Allowable Channel Capacity Based On Channel Geometry

		Minor Storm	Major Storm	
	MINOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**6.0**	**6.0**	**cfs**
	MAJOR STORM Allowable Capacity is based on Depth Criterion	**d_{allow} =**	**1.00**	**1.00**	**ft**

Water Depth in Channel Based On Design Peak Flow

	Design Peak Flow	**Q_o =**	**1.8**	**5.8**	**cfs**
	Water Depth	**d =**	**0.58**	**0.98**	**ft**
	Top Width	T =	2.29	2.49	ft
	Flow Area	A =	1.25	2.21	sq ft
	Wetted Perimeter	P =	3.20	4.03	ft
	Hydraulic Radius	R =	0.39	0.55	ft
	Manning's n based on NRCS Vegetal Retardance	n =	0.075	0.051	
	Flow Velocity	V =	1.44	2.63	fps
	Velocity-Depth Product	VR =	0.56	1.44	ft^2/s
	Hydraulic Depth	D =	0.55	0.89	ft
	Froude Number	Fr =	0.34	0.49	

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

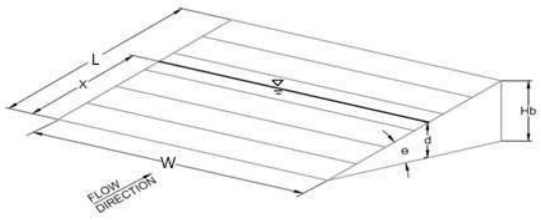
AREA INLET IN A SWALE

ROCK CREEK MESA

OS-2 INLET

Inlet Design Information (Input)

Type of Inlet	CDOT Type C	Inlet Type =	CDOT Type C	
Angle of Inclined Grate (must be <= 30 degrees)		θ =	0.00	degrees
Width of Grate		W =	3.00	ft
Length of Grate		L =	3.00	ft
Open Area Ratio		A_{RATIO} =	0.70	
Height of Inclined Grate		H_B =	0.00	ft
Clogging Factor		C_f =	0.50	
Grate Discharge Coefficient		C_d =	0.96	
Orifice Coefficient		C_o =	0.64	
Weir Coefficient		C_w =	2.05	



		MINOR	MAJOR	
Water Depth at Inlet (for depressed inlets, 1 foot is added for depression)	d =	0.58	0.98	
Grate Capacity as a Weir				
Submerged Side Weir Length	X =	3.00	3.00	ft
Inclined Side Weir Flow	Q_{ws} =	4.8	10.5	cfs
Base Weir Flow	Q_{wb} =	6.9	15.0	cfs
Interception Without Cloggging	Q_{wi} =	16.5	36.0	cfs
Interception With Clogging	Q_{wa} =	8.3	18.0	cfs
Grate Capacity as an Orifice				
Interception Without Clogging	Q_{oi} =	24.7	32.1	cfs
Interception With Clogging	Q_{oa} =	12.4	16.0	cfs
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**8.3**	**16.0**	**cfs**
Bypassed Flow	**Q_b =**	**0.0**	**0.0**	**cfs**
Capture Percentage = Qa/Qo	**C% =**	**100**	**100**	**%**

Warning 01: Sideslope steepness exceeds USDCM Volume I recommendation.
Warning 02: Depth (d) exceeds USDCM Volume I recommendation.

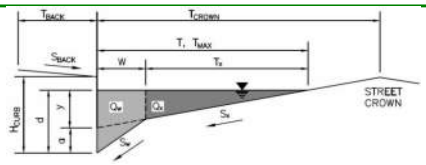
Warning 01:
The FDR will provide design for slope protection to address Warning 01.

Warning 02:
This is regarding a conceptual maximum capacity within the proposed storm facility which will not be achieved with the tributary area and may thus be disregarded.

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

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

Project: **ROCK CREEK MESA**
Inlet ID: **DP10 STREET**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.5	ft
Gutter Width	W =	0.83	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.010	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.5	17.5	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	7.8	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☑	

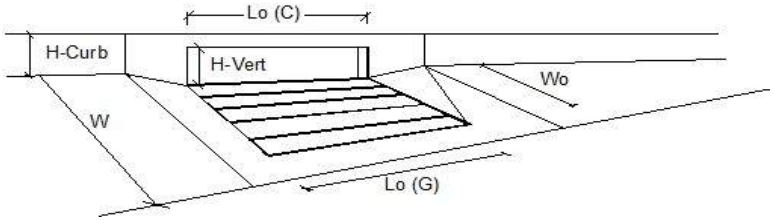
MINOR STORM Allowable Capacity is based on Spread Criterion
MAJOR STORM Allowable Capacity is based on Depth Criterion

	Minor Storm	Major Storm	
Q_{allow} =	**13.3**	**51.1**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 9.40 cfs on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design peak flow of 20.80 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 6.00 (August 2025)



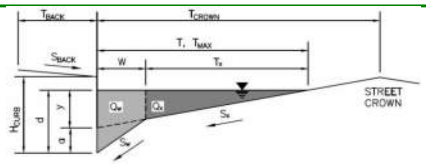
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =			
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =			inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =			
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =			ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =			ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =			
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =			

Street Hydraulics		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q_a =**			**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**			**cfs**
Capture Percentage = Q_a/Q_o	**C% =**			**%**

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

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

Project: **ROCK CREEK MESA**
Inlet ID: **DP10 INLET**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.5	ft
Gutter Width	W =	0.83	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

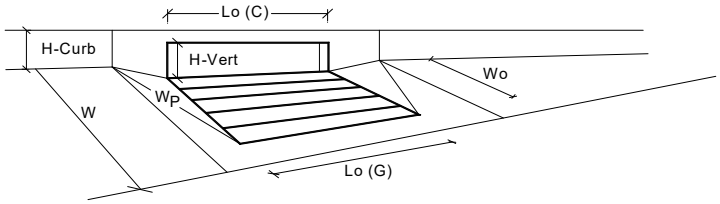
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.5	17.5	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	7.8	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

MINOR STORM Allowable Capacity is not applicable to Sump Condition
MAJOR STORM Allowable Capacity is not applicable to Sump Condition

	Minor Storm	Major Storm	
Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 6.00 (August 2025)

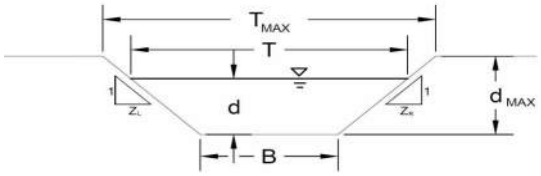


Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	2	2	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	6.0	6.0	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	15.00	15.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	0.83	0.83	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.43	0.43	ft
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.79	0.79	
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**24.7**	**24.7**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)	$Q_{PEAK\ REQUIRED}$ =	9.4	20.8	cfs

AREA INLET IN A SWALE

ROCK CREEK MESA

PR-3e INLET



This worksheet uses the NRCS vegetal retardance method to determine Manning's n for grass-lined channels.

An override Manning's n can be entered for other channel materials.

Analysis of Trapezoidal Channel (Grass-Lined uses SCS Method)

	NRCS Vegetal Retardance (A, B, C, D, or E)	A, B, C, D, or E =	D	
	Manning's n (Leave cell D16 blank to manually enter an n value)	n =	see details below	
	Channel Invert Slope	S_O =	0.0200	ft/ft
	Bottom Width	B =	2.00	ft
Warning 01	Left Side Slope	Z1 =	0.25	ft/ft
Warning 01	Right Side Sloe	Z2 =	0.25	ft/ft

Check one of the following soil types:

Soil Type:	Max. Velocity (V_{MAX})	Max Froude No. (F_{MAX})
Non-Cohesive	5.0 fps	0.60
Cohesive	7.0 fps	0.80
Paved	N/A	N/A

Choose One:
- (●) Non-Cohesive
- ( ) Cohesive
- ( ) Paved

		Minor Storm	Major Storm	
	Maximum Allowable Top Width of Channel for Minor & Major Storm	**T_{MAX} =**	**10.00**	**10.00**	**ft**
	Maximum Allowable Water Depth in Channel for Minor & Major Storm	**d_{MAX} =**	**1.00**	**1.00**	**ft**

Maximum Channel Capacity Based On Allowable Top Width

			Minor Storm	Major Storm	
	Maximum Allowable Top Width	**T_{MAX} =**	**10.00**	**10.00**	**ft**
Warning 02	Water Depth	d =	16.00	16.00	ft
	Flow Area	A =	96.00	96.00	sq ft
	Wetted Perimeter	P =	34.98	34.98	ft
	Hydraulic Radius	R =	2.74	2.74	ft
	Manning's n based on NRCS Vegetal Retardance	n =	0.030	0.030	
	Flow Velocity	V =	13.77	13.77	fps
	Velocity-Depth Product	VR =	37.78	37.78	ft^2/s
	Hydraulic Depth	D =	9.60	9.60	ft
	Froude Number	Fr =	0.78	0.78	
	Maximum Flow Based on Allowable Water Depth	**Q_T =**	**1,321.6**	**1,321.6**	**cfs**

Maximum Channel Capacity Based On Allowable Water Depth

			Minor Storm	Major Storm	
	Maximum Allowable Water Depth	**d_{MAX} =**	**1.00**	**1.00**	**ft**
	Top Width	T =	2.50	2.50	ft
	Flow Area	A =	2.25	2.25	sq ft
	Wetted Perimeter	P =	4.06	4.06	ft
	Hydraulic Radius	R =	0.55	0.55	ft
	Manning's n based on NRCS Vegetal Retardance	n =	0.049	0.049	
	Flow Velocity	V =	2.91	2.91	fps
	Velocity-Depth Product	VR =	1.61	1.61	ft^2/s
	Hydraulic Depth	D =	0.90	0.90	ft
	Froude Number	Fr =	0.54	0.54	
	Maximum Flow Based On Allowable Water Depth	**Q_d =**	**6.5**	**6.5**	**cfs**

Allowable Channel Capacity Based On Channel Geometry

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**6.5**	**6.5**	**cfs**
MAJOR STORM Allowable Capacity is based on Depth Criterion	**d_{allow} =**	**1.00**	**1.00**	**ft**

Water Depth in Channel Based On Design Peak Flow

Design Peak Flow	**Q_o =**	**0.9**	**4.0**	**cfs**
Water Depth	**d =**	**0.45**	**0.79**	**ft**
Top Width	T =	2.23	2.40	ft
Flow Area	A =	0.96	1.75	sq ft
Wetted Perimeter	P =	2.93	3.64	ft
Hydraulic Radius	R =	0.33	0.48	ft
Manning's n based on NRCS Vegetal Retardance	n =	0.106	0.056	
Flow Velocity	V =	0.94	2.29	fps
Velocity-Depth Product	VR =	0.31	1.10	ft^2/s
Hydraulic Depth	D =	0.43	0.73	ft
Froude Number	Fr =	0.25	0.47	

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

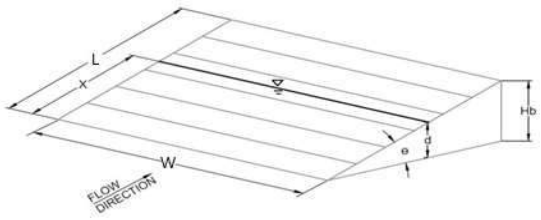
AREA INLET IN A SWALE

ROCK CREEK MESA

PR-3e INLET

Inlet Design Information (Input)

Type of Inlet: CDOT Type C — Inlet Type = CDOT Type C



Angle of Inclined Grate (must be <= 30 degrees)	θ =	0.00		degrees
Width of Grate	W =	3.00		ft
Length of Grate	L =	3.00		ft
Open Area Ratio	A_{RATIO} =	0.70		
Height of Inclined Grate	H_B =	0.00		ft
Clogging Factor	C_f =	0.50		
Grate Discharge Coefficient	C_d =	0.96		
Orifice Coefficient	C_o =	0.64		
Weir Coefficient	C_w =	2.05		

		MINOR	MAJOR	
Water Depth at Inlet (for depressed inlets, 1 foot is added for depression)	d =	0.45	0.79	
Grate Capacity as a Weir				
Submerged Side Weir Length	X =	3.00	3.00	ft
Inclined Side Weir Flow	Q_{ws} =	3.3	7.6	cfs
Base Weir Flow	Q_{wb} =	4.7	10.9	cfs
Interception Without Cloggging	Q_{wi} =	11.2	26.2	cfs
Interception With Clogging	Q_{wa} =	5.6	13.1	cfs
Grate Capacity as an Orifice				
Interception Without Clogging	Q_{oi} =	21.7	28.8	cfs
Interception With Clogging	Q_{oa} =	10.9	14.4	cfs
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**5.6**	**13.1**	**cfs**
Bypassed Flow	**Q_b =**	**0.0**	**0.0**	**cfs**
Capture Percentage = Qa/Qo	**C% =**	**100**	**100**	**%**

Warning 01: Sideslope steepness exceeds USDCM Volume I recommendation.
Warning 02: Depth (d) exceeds USDCM Volume I recommendation.

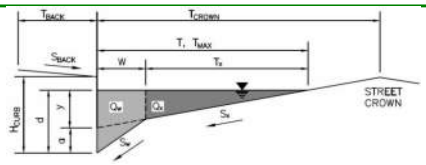
Warning 01:
The FDR will provide design for slope protection to address Warning 01.

Warning 02:
This is regarding a conceptual maximum capacity within the proposed storm facility which will not be achieved with the tributary area and may thus be disregarded.

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

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

Project: **ROCK CREEK MESA**
Inlet ID: **PR-3d STREET**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.5	ft
Gutter Width	W =	0.83	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.010	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.5	17.5	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	7.8	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☑	

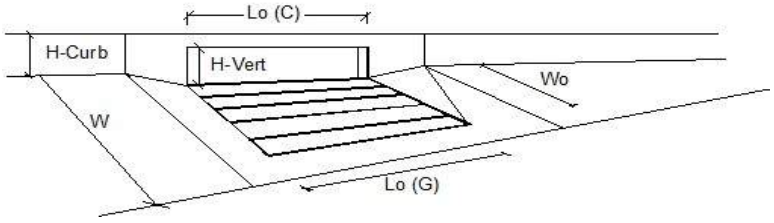
MINOR STORM Allowable Capacity is based on Spread Criterion
MAJOR STORM Allowable Capacity is based on Depth Criterion

	Minor Storm	Major Storm	
Q_{allow} =	**13.3**	**51.1**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 10.30 cfs on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design peak flow of 22.90 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 6.00 (August 2025)



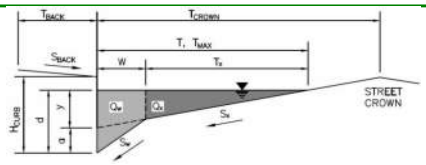
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =			
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =			inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =			
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =			ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =			ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =			
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =			

Street Hydraulics		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q_a =**			**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**			**cfs**
Capture Percentage = Q_a/Q_o	**C% =**			**%**

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

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

Project: **ROCK CREEK MESA**
Inlet ID: **PR-3d INLET**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.5	ft
Gutter Width	W =	0.83	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

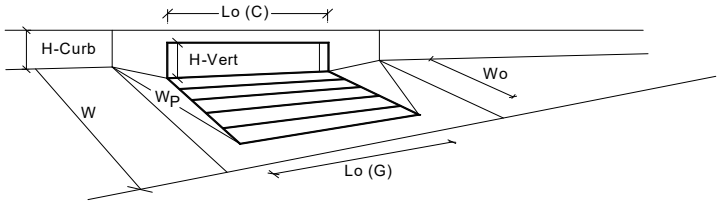
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.5	17.5	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	7.8	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

MINOR STORM Allowable Capacity is not applicable to Sump Condition
MAJOR STORM Allowable Capacity is not applicable to Sump Condition

	Minor Storm	Major Storm	
Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 6.00 (August 2025)

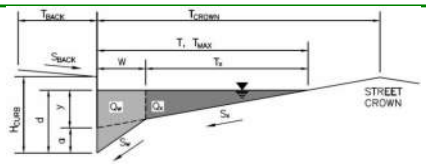


Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	6.0	7.9	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	15.00	15.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	0.83	0.83	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.43	0.59	ft
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.79	0.89	
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**12.7**	**22.8**	**cfs**
WARNING: Inlet Capacity < Q Peak for Major Storm	$Q_{PEAK\ REQUIRED}$ =	10.3	22.9	cfs

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

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

Project: **ROCK CREEK MESA**
Inlet ID: **DP13 INLET**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	16.5	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.034	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	16.5	16.5	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	7.7	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☑	

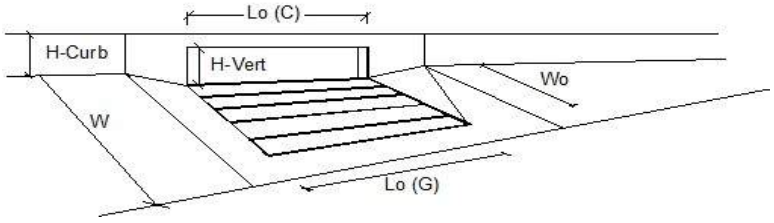
MINOR STORM Allowable Capacity is based on Depth Criterion
MAJOR STORM Allowable Capacity is based on Depth Criterion

	Minor Storm	Major Storm	
Q_{allow} =	**21.0**	**37.1**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 5.40 cfs on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design peak flow of 10.00 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 6.00 (August 2025)



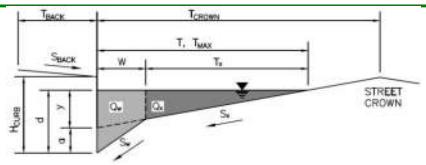
Design Information (Input)		MINOR	MAJOR	
Type of Inlet (CDOT Type R Curb Opening)	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	2	2	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	

Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q_a =**	**5.4**	**10.0**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.0**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**100**	**100**	**%**

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

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

Project: **ROCK CREEK MESA**
Inlet ID: **DP14 INLET**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	16.5	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.034	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	16.5	16.5	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	7.7	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☑	

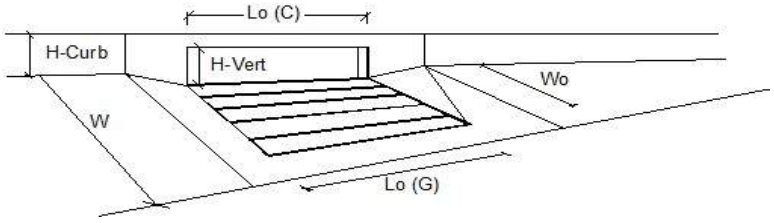
MINOR STORM Allowable Capacity is based on Depth Criterion
MAJOR STORM Allowable Capacity is based on Depth Criterion

	Minor Storm	Major Storm	
Q_{allow} =	**21.0**	**37.1**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 9.33 cfs on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design peak flow of 27.99 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 6.00 (August 2025)



Design Information (Input)		MINOR	MAJOR	
Type of Inlet (CDOT Type R Curb Opening)	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	3	3	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	

Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q_a =**	**9.3**	**28.0**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.0**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**100**	**100**	**%**

Rock Creek Mesa
Hydraulic Analysis Report of Site Swales

Project Data

Project Title: ROCK CREEK MESA

Designer: MATRIX

Project Date: Tuesday, March 3, 2026

Project Units: U.S. Customary Units

Notes: CALCULATIONS ARE FOR PRELIMINARY DRAINAGE REPORT(PDR) AND MAY BE UPDATED WITH THE FINAL DRAINAGE REPORT (FDR) SUBMITTAL.

Channel Analysis: SWALE SE (DP9+DET-OUT)

Notes: FLOW INDICATED IS THE SUM OF FLOWS FROM THE DESIGN POINTS DP9 AND DET-OUT

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 2.4000 ft/ft

Side Slope 2 (Z2): 2.4000 ft/ft

Channel Width 5.00 ft

Longitudinal Slope: 0.0930 ft/ft

Manning's n: 0.0741

Flow 127.3500 cfs

Result Parameters

Depth 1.9033 ft

Area of Flow 18.2104 ft^2

Wetted Perimeter 14.8971 ft

Hydraulic Radius 1.2224 ft

Average Velocity 6.9932 ft/s

Top Width 14.1358 ft

Froude Number: 1.0858

Critical Depth 1.9877 ft

Critical Velocity 6.5575 ft/s

Critical Slope: 0.0780 ft/ft

Critical Top Width 14.54 ft

Calculated Max Shear Stress 11.0452 lb/ft^2

Calculated Avg Shear Stress 7.0939 lb/ft^2

Channel Lining Analysis: CLDA - SE (DP9 + POND OUT)

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 610.00 mm => 24-INCH RIP RAP (TYPE VH)

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1

Calculated Safety Factor: 1.50016

Lining Results

Angle of Repose: 42.1 degrees

Relative Flow Depth: 0.643703 ft

Manning's n method: Bathurst

Manning's n: 0.0740783

Channel Bottom Shear Results

V*: 2.38738

Reynold's Number: 392596

Shield's Parameter: 0.15

Shear stress on channel bottom: 11.0452 lb/ft^2

Permissible shear stress for channel bottom: 16.8193 lb/ft^2

Channel bottom is stable

Stable D50: 600.938 mm

Channel Side Shear Results

K1: 0.8284

K2: 1

Kb: 0

Shear stress on side of channel: 11.0452 lb/ft^2

Permissible shear stress for side of channel: 16.8193 lb/ft^2

Stable Side D50: 1.63326 lb/ft^2

Side of channel is stable

Channel Lining Stability Results 2

The channel is stable

Channel Summary

Name of Selected Channel: SWALE SE (DP9+POND OUT)

Channel Analysis: SWALE OS-TP4

Notes:

Input Parameters

Channel Type: Triangular

Side Slope 1 (Z1): 10.0000 ft/ft

Side Slope 2 (Z2): 3.0000 ft/ft

Longitudinal Slope: 0.0060 ft/ft

Manning's n: 0.0580

Flow 26.0000 cfs

Result Parameters

Depth 1.5534 ft

Area of Flow 15.6855 ft^2

Wetted Perimeter 20.5242 ft

Hydraulic Radius 0.7642 ft

Average Velocity 1.6576 ft/s

Top Width 20.1946 ft

Froude Number: 0.3314

Critical Depth 1.0695 ft

Critical Velocity 3.4967 ft/s

Critical Slope: 0.0439 ft/ft

Critical Top Width 19.58 ft

Calculated Max Shear Stress 0.5816 lb/ft^2

Calculated Avg Shear Stress 0.2861 lb/ft^2

Channel Lining Analysis: CLDA - OS-TP4

Notes:

Lining Input Parameters

Channel Lining Type: Vegetation

Specific Weight of Water: 62.4 lb/ft^3

Height of Vegetation: 0.333 ft

Vegetation Condition is good

Growth Form of Vegetation is mixed

Cf: 0.75

See HEC-15, Table 4.5 (default: 0.75 for Good cover factor and Mixed growth form)

soil is noncohesive

D75: 2.54 mm

Safety Factor: 1

Lining Results

Cn: 0.165205

Permissible Soil Shear Stress: 0.04 lb/ft^2

Mean Boundary Shear Stress: 0.286133 lb/ft^2

Maximum Shear Stress on the Channel Bottom: 0.581606 lb/ft^2

Manning's n: 0.0580464

Soil Grain Roughness: 0.0177136

Effective Shear Stress: 0.0110473 lb/ft^2

Permissible Shear Stress on Vegetation: 1.71814 lb/ft^2

This value is compared with the maximum shear stress times the safety factor to determine lining stability

This value is compared with the maximum shear stress times the safety factor to determine lining stability

Channel bottom is stable

Channel Lining Stability Results 2

The channel is stable

Channel Summary

Name of Selected Channel: SWALE OS-TP4

APPENDIX B

STANDARD DESIGN CHARTS AND TABLES

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

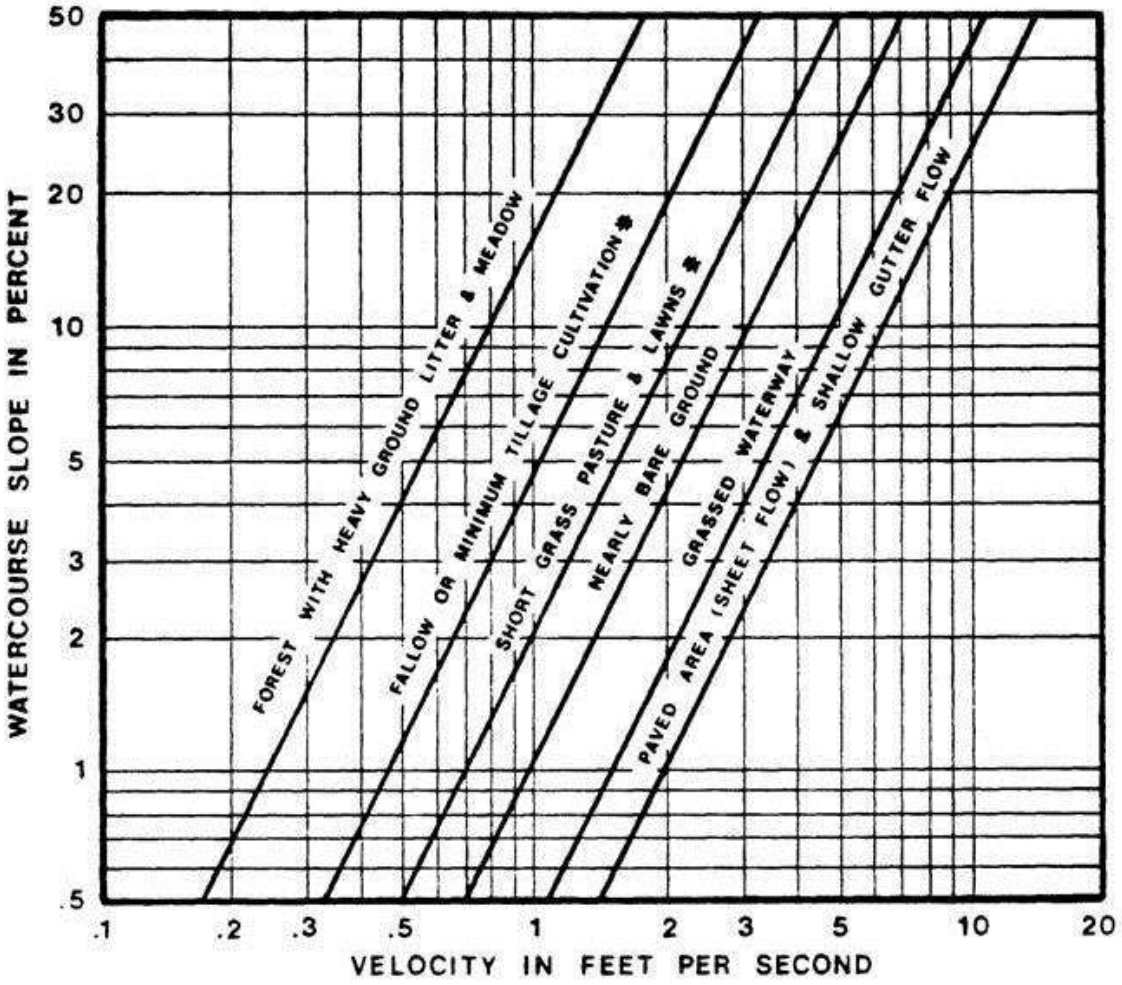
Land Use or Surface Characteristics	Percent Impervious	Runoff Coefficients											
		2-year		5-year		10-year		25-year		50-year		100-year	
		HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D
Business													
Commercial Areas	95	0.79	0.80	0.81	0.82	0.83	0.84	0.85	0.87	0.87	0.88	0.88	0.89
Neighborhood Areas	70	0.45	0.49	0.49	0.53	0.53	0.57	0.58	0.62	0.60	0.65	0.62	0.68
Residential													
1/8 Acre or less	65	0.41	0.45	0.45	0.49	0.49	0.54	0.54	0.59	0.57	0.62	0.59	0.65
1/4 Acre	40	0.23	0.28	0.30	0.35	0.36	0.42	0.42	0.50	0.46	0.54	0.50	0.58
1/3 Acre	30	0.18	0.22	0.25	0.30	0.32	0.38	0.39	0.47	0.43	0.52	0.47	0.57
1/2 Acre	25	0.15	0.20	0.22	0.28	0.30	0.36	0.37	0.46	0.41	0.51	0.46	0.56
1 Acre	20	0.12	0.17	0.20	0.26	0.27	0.34	0.35	0.44	0.40	0.50	0.44	0.55
Industrial													
Light Areas	80	0.57	0.60	0.59	0.63	0.63	0.66	0.66	0.70	0.68	0.72	0.70	0.74
Heavy Areas	90	0.71	0.73	0.73	0.75	0.75	0.77	0.78	0.80	0.80	0.82	0.81	0.83
Parks and Cemeteries	7	0.05	0.09	0.12	0.19	0.20	0.29	0.30	0.40	0.34	0.46	0.39	0.52
Playgrounds	13	0.07	0.13	0.16	0.23	0.24	0.31	0.32	0.42	0.37	0.48	0.41	0.54
Railroad Yard Areas	40	0.23	0.28	0.30	0.35	0.36	0.42	0.42	0.50	0.46	0.54	0.50	0.58
Undeveloped Areas													
Historic Flow Analysis--Greenbelts, Agriculture	2	0.03	0.05	0.09	0.16	0.17	0.26	0.26	0.38	0.31	0.45	0.36	0.51
Pasture/Meadow	0	0.02	0.04	0.08	0.15	0.15	0.25	0.25	0.37	0.30	0.44	0.35	0.50
Forest	0	0.02	0.04	0.08	0.15	0.15	0.25	0.25	0.37	0.30	0.44	0.35	0.50
Exposed Rock	100	0.89	0.89	0.90	0.90	0.92	0.92	0.94	0.94	0.95	0.95	0.96	0.96
Offsite Flow Analysis (when landuse is undefined)	45	0.26	0.31	0.32	0.37	0.38	0.44	0.44	0.51	0.48	0.55	0.51	0.59
Streets													
Paved	100	0.89	0.89	0.90	0.90	0.92	0.92	0.94	0.94	0.95	0.95	0.96	0.96
Gravel	80	0.57	0.60	0.59	0.63	0.63	0.66	0.66	0.70	0.68	0.72	0.70	0.74
Drive and Walks	100	0.89	0.89	0.90	0.90	0.92	0.92	0.94	0.94	0.95	0.95	0.96	0.96
Roofs	90	0.71	0.73	0.73	0.75	0.75	0.77	0.78	0.80	0.80	0.82	0.81	0.83
Lawns	0	0.02	0.04	0.08	0.15	0.15	0.25	0.25	0.37	0.30	0.44	0.35	0.50

3.2 Time of Concentration

One of the basic assumptions underlying the Rational Method is that runoff is a function of the average rainfall rate during the time required for water to flow from the hydraulically most remote part of the drainage area under consideration to the design point. However, in practice, the time of concentration can be an empirical value that results in reasonable and acceptable peak flow calculations.

For urban areas, the time of concentration (t_c) consists of an initial time or overland flow time (t_i) plus the travel time (t_t) in the storm sewer, paved gutter, roadside drainage ditch, or drainage channel. For non-urban areas, the time of concentration consists of an overland flow time (t_i) plus the time of travel in a concentrated form, such as a swale or drainageway. The travel portion (t_t) of the time of concentration can be estimated from the hydraulic properties of the storm sewer, gutter, swale, ditch, or drainageway. Initial time, on the other hand, will vary with surface slope, depression storage, surface cover, antecedent rainfall, and infiltration capacity of the soil, as well as distance of surface flow. The time of concentration is represented by Equation 6-7 for both urban and non-urban areas.

Figure 6-25. Estimate of Average Concentrated Shallow Flow



APPENDIX C

REPORT REFERENCES

United States Department of Agriculture

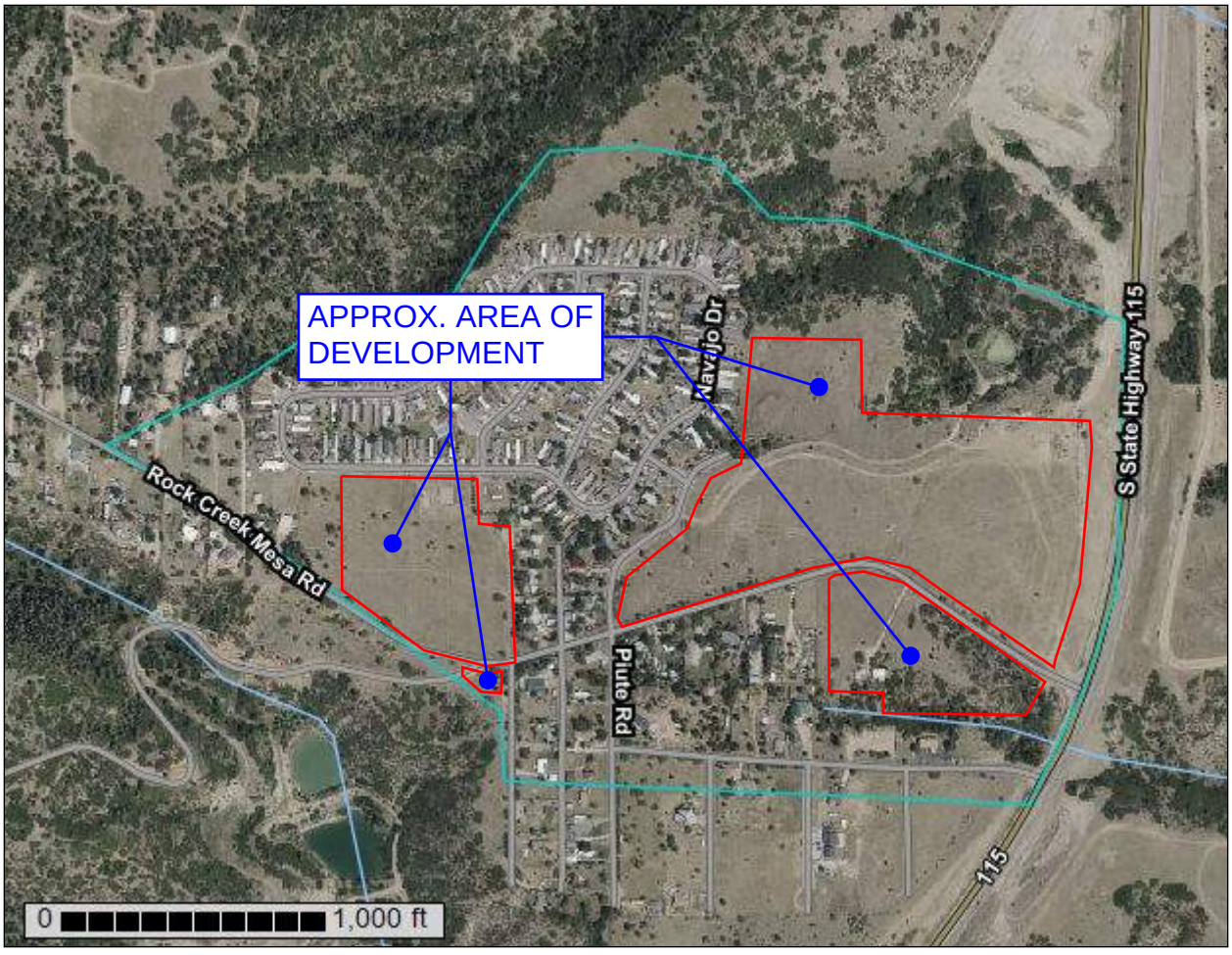
NRCS

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

Rock Creek Mesa and Surrounding Areas



December 17, 2025

Preface

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

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

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

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

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

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

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Contents

How Soil Surveys Are Made

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

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

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

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

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

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

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

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

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

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

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

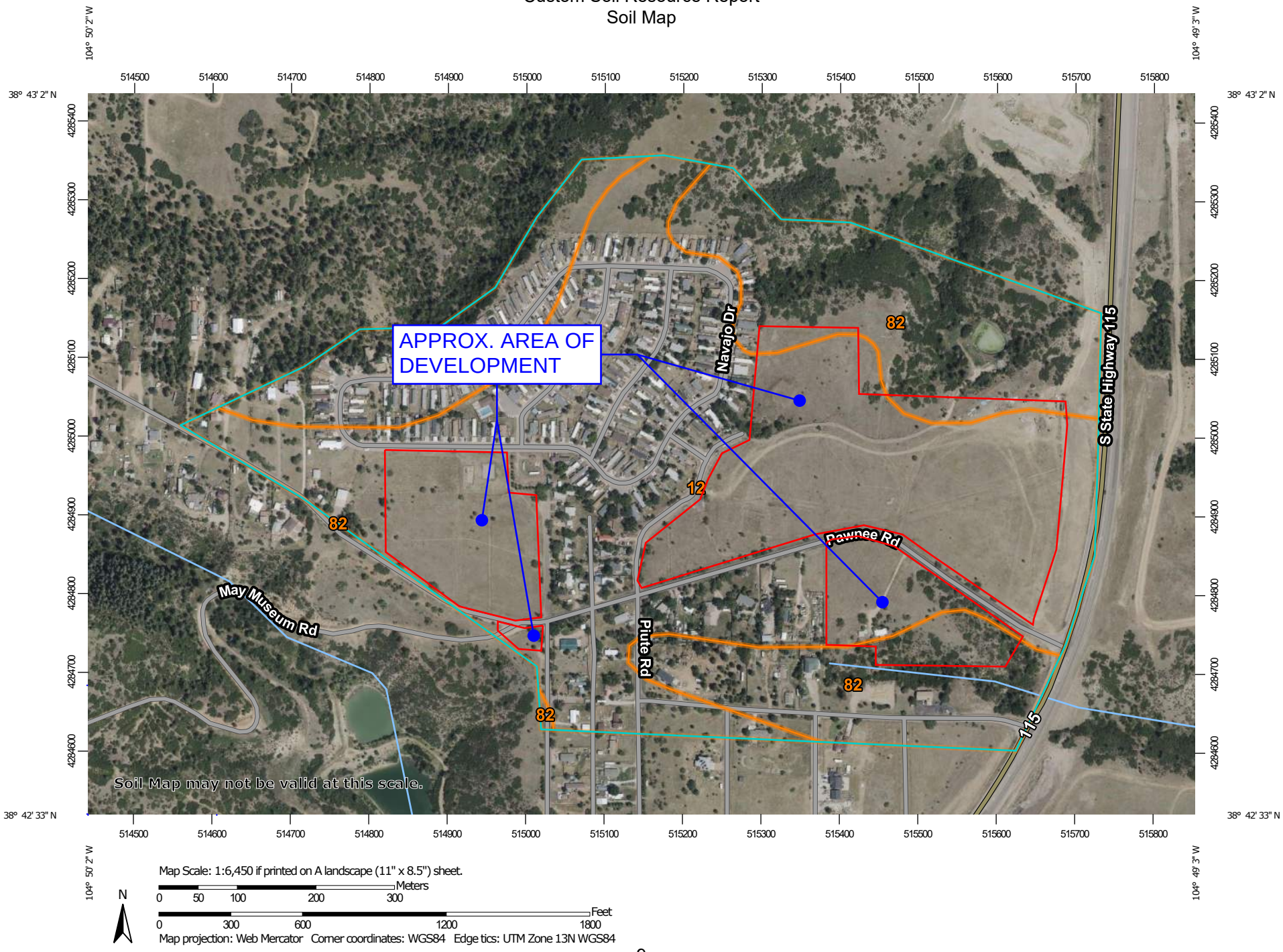
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

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

Soil Map

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

Custom Soil Resource Report
Soil Map



Map Scale: 1:6,450 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 50 100 200 300

Feet
0 300 600 1200 1800

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
12	Bresser sandy loam, cool, 3 to 5 percent slopes	93.0	65.1%
38	Jarre-Tecolote complex, 8 to 65 percent slopes	12.5	8.7%
82	Schamber-Razor complex, 8 to 50 percent slopes	37.4	26.2%
Totals for Area of Interest		**142.9**	**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

12—Bresser sandy loam, cool, 3 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2tlpd
Elevation: 6,300 to 6,800 feet
Mean annual precipitation: 13 to 19 inches
Mean annual air temperature: 46 to 50 degrees F
Frost-free period: 125 to 140 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Bresser, cool, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bresser, Cool

Setting

Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Tertiary aged alluvium derived from arkose

Typical profile

Ap - 0 to 5 inches: sandy loam
Bt1 - 5 to 8 inches: sandy loam
Bt2 - 8 to 27 inches: sandy clay loam
Bt3 - 27 to 36 inches: sandy loam
C - 36 to 80 inches: loamy coarse sand

Properties and qualities

Slope: 3 to 5 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 (0.60 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to very slightly saline (0.1 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 5.4 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: B
Ecological site: R049XB210CO - Sandy Foothill
Hydric soil rating: No

Minor Components

Truckton

Percent of map unit: 10 percent
Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R049XB210CO - Sandy Foothill
Hydric soil rating: No

Yoder

Percent of map unit: 5 percent
Landform: Alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R049XY214CO - Gravelly Foothill
Hydric soil rating: No

38—Jarre-Tecolote complex, 8 to 65 percent slopes

Map Unit Setting

National map unit symbol: 368c
Elevation: 6,700 to 7,500 feet
Frost-free period: 90 to 125 days
Farmland classification: Not prime farmland

Map Unit Composition

Jarre and similar soils: 45 percent
Tecolote and similar soils: 40 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Jarre

Setting

Landform: Alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

A - 0 to 5 inches: gravelly sandy loam
Bt - 5 to 22 inches: gravelly sandy clay loam
2C - 22 to 60 inches: very gravelly sandy loam

Properties and qualities

Slope: 8 to 30 percent
Depth to restrictive feature: More than 80 inches

Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Ecological site: R048AY222CO - Loamy Park
Hydric soil rating: No

Description of Tecolote

Setting

Landform: Alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

A - 0 to 3 inches: very stony loam
E - 3 to 12 inches: very gravelly loamy sand
Bt - 12 to 45 inches: extremely gravelly sandy clay loam
C - 45 to 60 inches: extremely gravelly loamy sand

Properties and qualities

Slope: 8 to 65 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: High
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
Available water supply, 0 to 60 inches: Very low (about 2.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B
Ecological site: R048AY255CO - Pine Grasslands
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit: 15 percent
Hydric soil rating: No

82—Schamber-Razor complex, 8 to 50 percent slopes

Map Unit Setting

National map unit symbol: 369y
Elevation: 5,500 to 6,500 feet
Mean annual precipitation: 12 to 14 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 135 to 170 days
Farmland classification: Not prime farmland

Map Unit Composition

Schamber and similar soils: 55 percent
Razor and similar soils: 43 percent
Minor components: 2 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Schamber

Setting

Landform: Breaks
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite and/or colluvium derived from granite and/or eolian deposits derived from granite

Typical profile

A - 0 to 5 inches: gravelly loam
AC - 5 to 15 inches: very gravelly loam
C - 15 to 60 inches: very gravelly sand

Properties and qualities

Slope: 8 to 50 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: A
Ecological site: R069XY064CO - Gravel Breaks

Hydric soil rating: No

Description of Razor

Setting

Landform: Breaks
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Clayey slope alluvium over residuum weathered from shale

Typical profile

A - 0 to 3 inches: clay loam
Bw - 3 to 9 inches: clay loam
Bk - 9 to 31 inches: clay
Cr - 31 to 35 inches: weathered bedrock

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Gypsum, maximum content: 5 percent
Maximum salinity: Moderately saline to strongly saline (8.0 to 16.0 mmhos/cm)
Sodium adsorption ratio, maximum: 15.0
Available water supply, 0 to 60 inches: Low (about 5.5 inches)

Interpretive groups

Land capability classification (irrigated): 6e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Ecological site: R069XY047CO - Alkaline Plains
Other vegetative classification: ALKALINE PLAINS (069AY047CO)
Hydric soil rating: No

Minor Components

Other soils

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

Pleasant

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

Soil Information for All Uses

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Physical Properties

Soil Physical Properties are measured or inferred from direct observations in the field or laboratory. Examples of soil physical properties include percent clay, organic matter, saturated hydraulic conductivity, available water capacity, and bulk density.

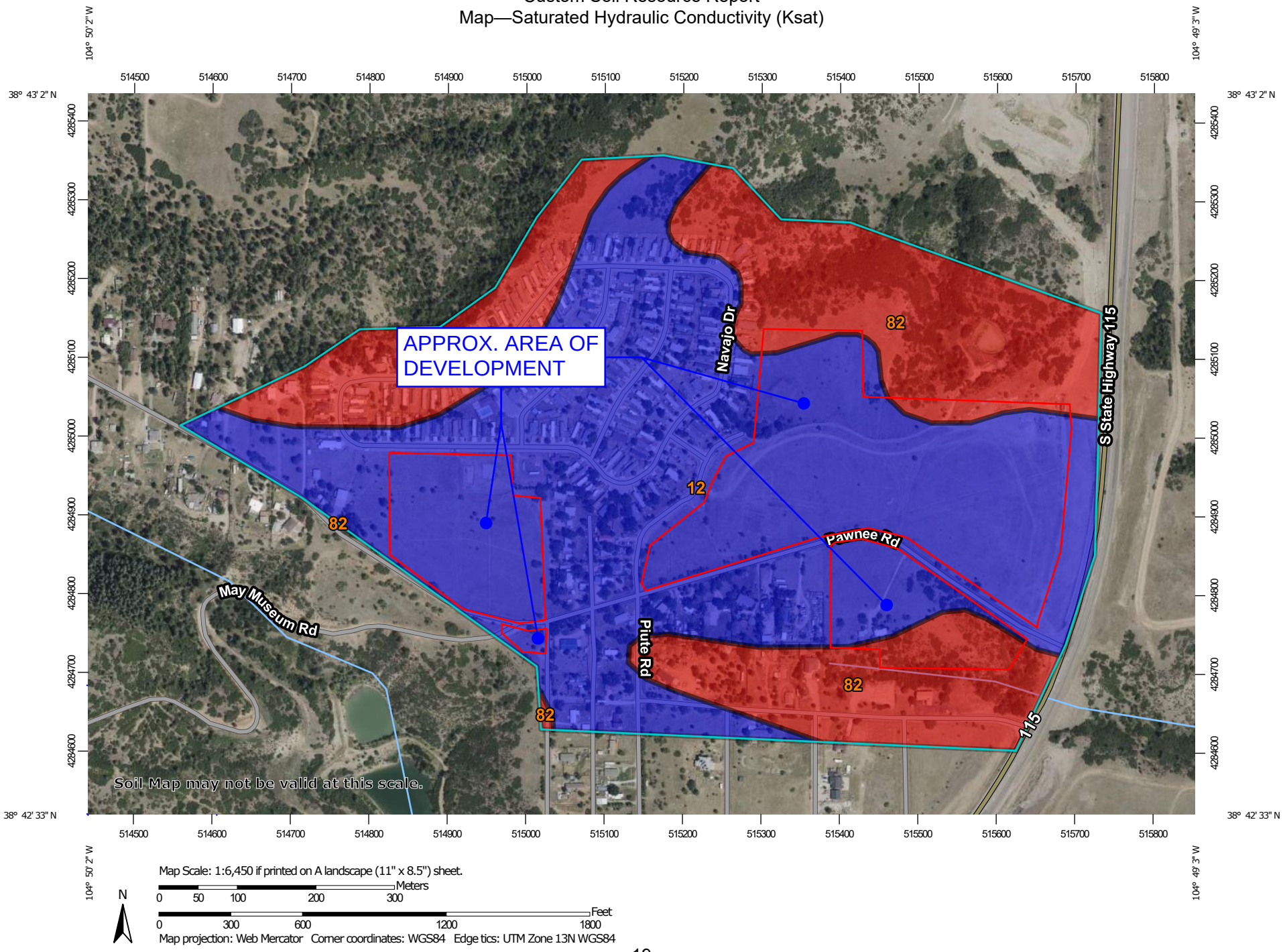
Saturated Hydraulic Conductivity (Ksat)

Saturated hydraulic conductivity (Ksat) refers to the ease with which pores in a saturated soil transmit water. The estimates are expressed in terms of micrometers per second. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Saturated hydraulic conductivity is considered in the design of soil drainage systems and septic tank absorption fields.

For each soil layer, this attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

The numeric Ksat values have been grouped according to standard Ksat class limits.

Map—Saturated Hydraulic Conductivity (Ksat)



Map Scale: 1:6,450 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 50 100 200 300

Feet
0 300 600 1200 1800

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

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- <= 28.0000
- > 28.0000 and <= 28.2250
- Not rated or not available

Soil Rating Lines

- <= 28.0000
- > 28.0000 and <= 28.2250
- Not rated or not available

Soil Rating Points

- <= 28.0000
- > 28.0000 and <= 28.2250
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

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

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

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

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

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

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 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.

Table—Saturated Hydraulic Conductivity (Ksat)

Map unit symbol	Map unit name	Rating (micrometers per second)	Acres in AOI	Percent of AOI
12	Bresser sandy loam, cool, 3 to 5 percent slopes	28.2250	93.0	65.1%
38	Jarre-Tecolote complex, 8 to 65 percent slopes	28.0000	12.5	8.7%
82	Schamber-Razor complex, 8 to 50 percent slopes	28.0000	37.4	26.2%
Totals for Area of Interest			**142.9**	**100.0%**

Rating Options—Saturated Hydraulic Conductivity (Ksat)

Units of Measure: micrometers per second

Aggregation Method: Dominant Component

Component Percent Cutoff: None Specified

Tie-break Rule: Fastest

Interpret Nulls as Zero: No

Layer Options (Horizon Aggregation Method): Surface Layer (Not applicable)

Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Hydrologic Soil Group

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

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

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

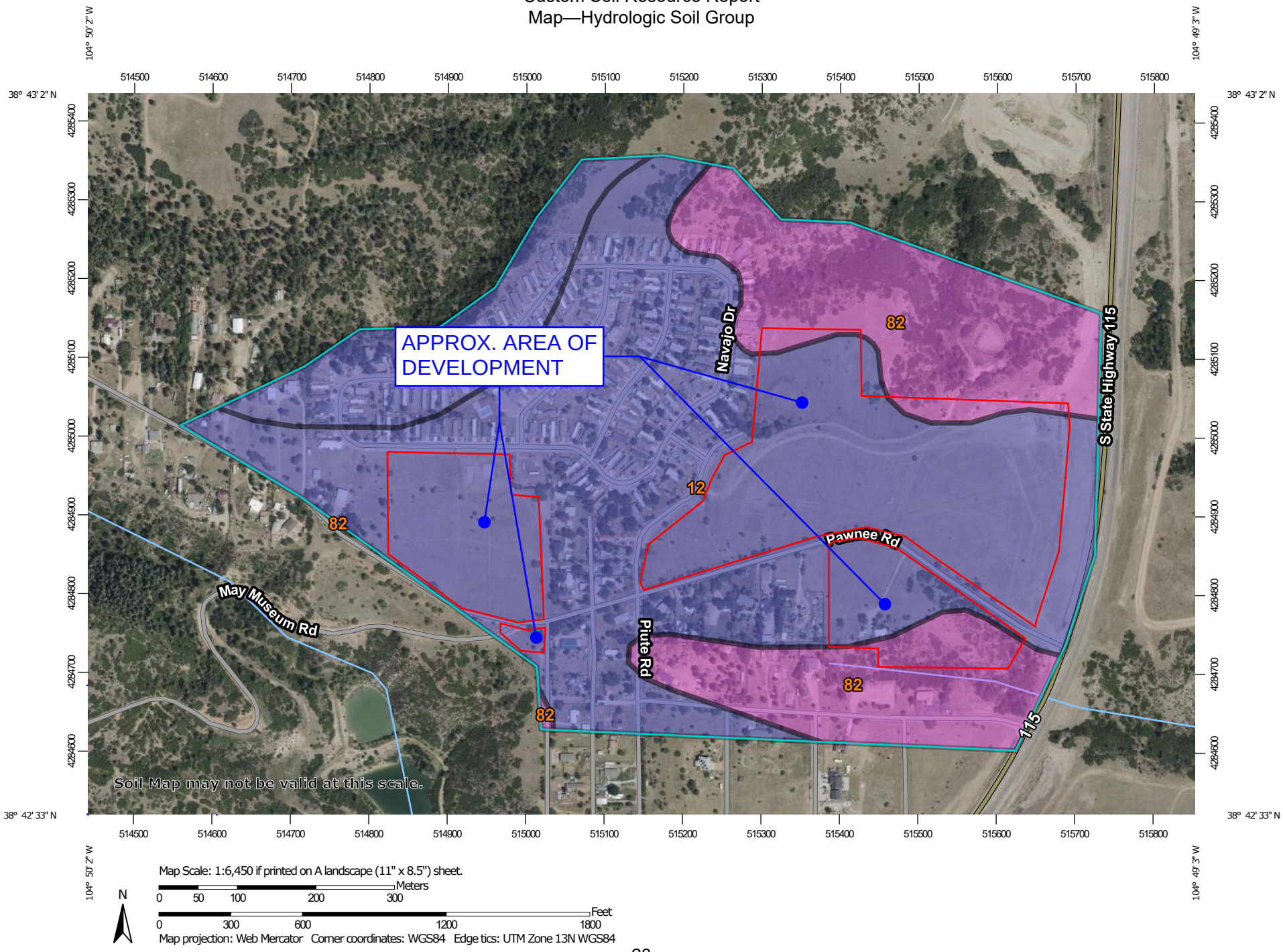
Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

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

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

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

Map—Hydrologic Soil Group



Map Scale: 1:6,450 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 50 100 200 300

Feet
0 300 600 1200 1800

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

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

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

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

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

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

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 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.

Table—Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
12	Bresser sandy loam, cool, 3 to 5 percent slopes	B	93.0	65.1%
38	Jarre-Tecolote complex, 8 to 65 percent slopes	B	12.5	8.7%
82	Schamber-Razor complex, 8 to 50 percent slopes	A	37.4	26.2%
Totals for Area of Interest			**142.9**	**100.0%**

Rating Options—Hydrologic Soil Group

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

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NOAA Atlas 14, Volume 8, Version 2
Location name: Colorado Springs, Colorado, USA*
Latitude: 38.7126°, Longitude: -104.8219°
Elevation: 6260 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	**0.247** (0.200-0.307)	**0.295** (0.239-0.367)	**0.379** (0.306-0.473)	**0.455** (0.364-0.571)	**0.568** (0.441-0.754)	**0.662** (0.499-0.892)	**0.763** (0.553-1.06)	**0.870** (0.601-1.25)	**1.02** (0.676-1.52)	**1.14** (0.732-1.72)
10-min	**0.362** (0.293-0.449)	**0.432** (0.349-0.537)	**0.555** (0.448-0.693)	**0.666** (0.534-0.836)	**0.832** (0.646-1.10)	**0.970** (0.731-1.31)	**1.12** (0.809-1.55)	**1.27** (0.880-1.83)	**1.50** (0.989-2.22)	**1.68** (1.07-2.52)
15-min	**0.441** (0.357-0.548)	**0.526** (0.426-0.655)	**0.677** (0.546-0.845)	**0.812** (0.651-1.02)	**1.02** (0.788-1.35)	**1.18** (0.892-1.59)	**1.36** (0.987-1.89)	**1.55** (1.07-2.23)	**1.83** (1.21-2.71)	**2.04** (1.31-3.08)
30-min	**0.644** (0.522-0.800)	**0.772** (0.625-0.960)	**0.997** (0.804-1.24)	**1.20** (0.961-1.51)	**1.50** (1.17-1.99)	**1.75** (1.32-2.36)	**2.02** (1.46-2.80)	**2.30** (1.59-3.31)	**2.71** (1.79-4.02)	**3.03** (1.94-4.56)
60-min	**0.826** (0.670-1.03)	**0.971** (0.786-1.21)	**1.24** (1.00-1.55)	**1.49** (1.20-1.88)	**1.89** (1.48-2.53)	**2.23** (1.69-3.02)	**2.60** (1.89-3.63)	**3.01** (2.08-4.34)	**3.59** (2.38-5.36)	**4.08** (2.60-6.13)
2-hr	**1.01** (0.822-1.24)	**1.17** (0.953-1.45)	**1.48** (1.20-1.84)	**1.79** (1.44-2.23)	**2.28** (1.80-3.04)	**2.70** (2.07-3.66)	**3.18** (2.33-4.43)	**3.71** (2.60-5.33)	**4.48** (3.00-6.65)	**5.12** (3.30-7.65)
3-hr	**1.10** (0.900-1.35)	**1.26** (1.03-1.55)	**1.58** (1.28-1.95)	**1.90** (1.54-2.36)	**2.44** (1.94-3.27)	**2.92** (2.25-3.95)	**3.47** (2.56-4.83)	**4.08** (2.88-5.87)	**4.99** (3.36-7.40)	**5.75** (3.73-8.56)
6-hr	**1.26** (1.04-1.54)	**1.43** (1.18-1.75)	**1.78** (1.46-2.19)	**2.15** (1.75-2.65)	**2.77** (2.23-3.71)	**3.34** (2.60-4.51)	**3.99** (2.98-5.54)	**4.73** (3.37-6.78)	**5.83** (3.97-8.61)	**6.76** (4.43-10.0)
12-hr	**1.45** (1.20-1.76)	**1.66** (1.37-2.02)	**2.09** (1.72-2.54)	**2.52** (2.06-3.09)	**3.23** (2.61-4.28)	**3.88** (3.03-5.18)	**4.60** (3.46-6.33)	**5.42** (3.89-7.70)	**6.64** (4.56-9.71)	**7.65** (5.06-11.2)
24-hr	**1.67** (1.39-2.02)	**1.94** (1.61-2.34)	**2.45** (2.03-2.96)	**2.95** (2.43-3.59)	**3.75** (3.04-4.90)	**4.47** (3.50-5.90)	**5.26** (3.97-7.15)	**6.14** (4.43-8.62)	**7.43** (5.14-10.8)	**8.50** (5.68-12.4)
2-day	**1.93** (1.62-2.31)	**2.24** (1.87-2.68)	**2.83** (2.36-3.41)	**3.41** (2.82-4.12)	**4.31** (3.51-5.57)	**5.10** (4.02-6.67)	**5.97** (4.54-8.05)	**6.94** (5.05-9.66)	**8.35** (5.83-12.0)	**9.51** (6.42-13.8)
3-day	**2.11** (1.77-2.51)	**2.46** (2.06-2.93)	**3.12** (2.61-3.73)	**3.75** (3.11-4.51)	**4.73** (3.86-6.08)	**5.59** (4.42-7.27)	**6.53** (4.98-8.75)	**7.56** (5.53-10.5)	**9.07** (6.37-13.0)	**10.3** (7.00-14.9)
4-day	**2.27** (1.91-2.69)	**2.64** (2.22-3.14)	**3.34** (2.80-3.98)	**4.00** (3.34-4.80)	**5.04** (4.12-6.45)	**5.94** (4.72-7.70)	**6.92** (5.30-9.25)	**8.01** (5.88-11.1)	**9.58** (6.75-13.7)	**10.9** (7.42-15.6)
7-day	**2.70** (2.28-3.18)	**3.09** (2.61-3.65)	**3.83** (3.22-4.54)	**4.53** (3.79-5.41)	**5.63** (4.63-7.15)	**6.58** (5.26-8.48)	**7.63** (5.88-10.1)	**8.78** (6.49-12.0)	**10.4** (7.42-14.8)	**11.8** (8.12-16.9)
10-day	**3.07** (2.60-3.61)	**3.49** (2.96-4.11)	**4.28** (3.61-5.06)	**5.01** (4.21-5.96)	**6.16** (5.07-7.77)	**7.14** (5.72-9.13)	**8.20** (6.35-10.8)	**9.38** (6.96-12.8)	**11.1** (7.90-15.6)	**12.5** (8.60-17.7)
20-day	**4.09** (3.49-4.78)	**4.67** (3.98-5.46)	**5.68** (4.83-6.67)	**6.58** (5.56-7.76)	**7.88** (6.49-9.76)	**8.95** (7.19-11.3)	**10.1** (7.82-13.1)	**11.3** (8.40-15.2)	**12.9** (9.28-18.0)	**14.3** (9.95-20.1)
30-day	**4.92** (4.22-5.73)	**5.66** (4.84-6.59)	**6.88** (5.86-8.04)	**7.91** (6.71-9.30)	**9.36** (7.70-11.5)	**10.5** (8.44-13.1)	**11.7** (9.08-15.0)	**12.9** (9.62-17.1)	**14.5** (10.4-20.0)	**15.7** (11.1-22.2)
45-day	**5.99** (5.15-6.94)	**6.90** (5.92-8.00)	**8.36** (7.16-9.74)	**9.56** (8.14-11.2)	**11.2** (9.20-13.6)	**12.4** (10.0-15.4)	**13.6** (10.6-17.4)	**14.9** (11.1-19.6)	**16.4** (11.9-22.5)	**17.6** (12.4-24.7)
60-day	**6.90** (5.95-7.97)	**7.95** (6.84-9.19)	**9.61** (8.25-11.2)	**10.9** (9.34-12.8)	**12.7** (10.5-15.3)	**14.0** (11.3-17.2)	**15.3** (11.9-19.4)	**16.5** (12.4-21.7)	**18.1** (13.1-24.6)	**19.2** (13.6-26.8)

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

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

Please refer to NOAA Atlas 14 document for more information.

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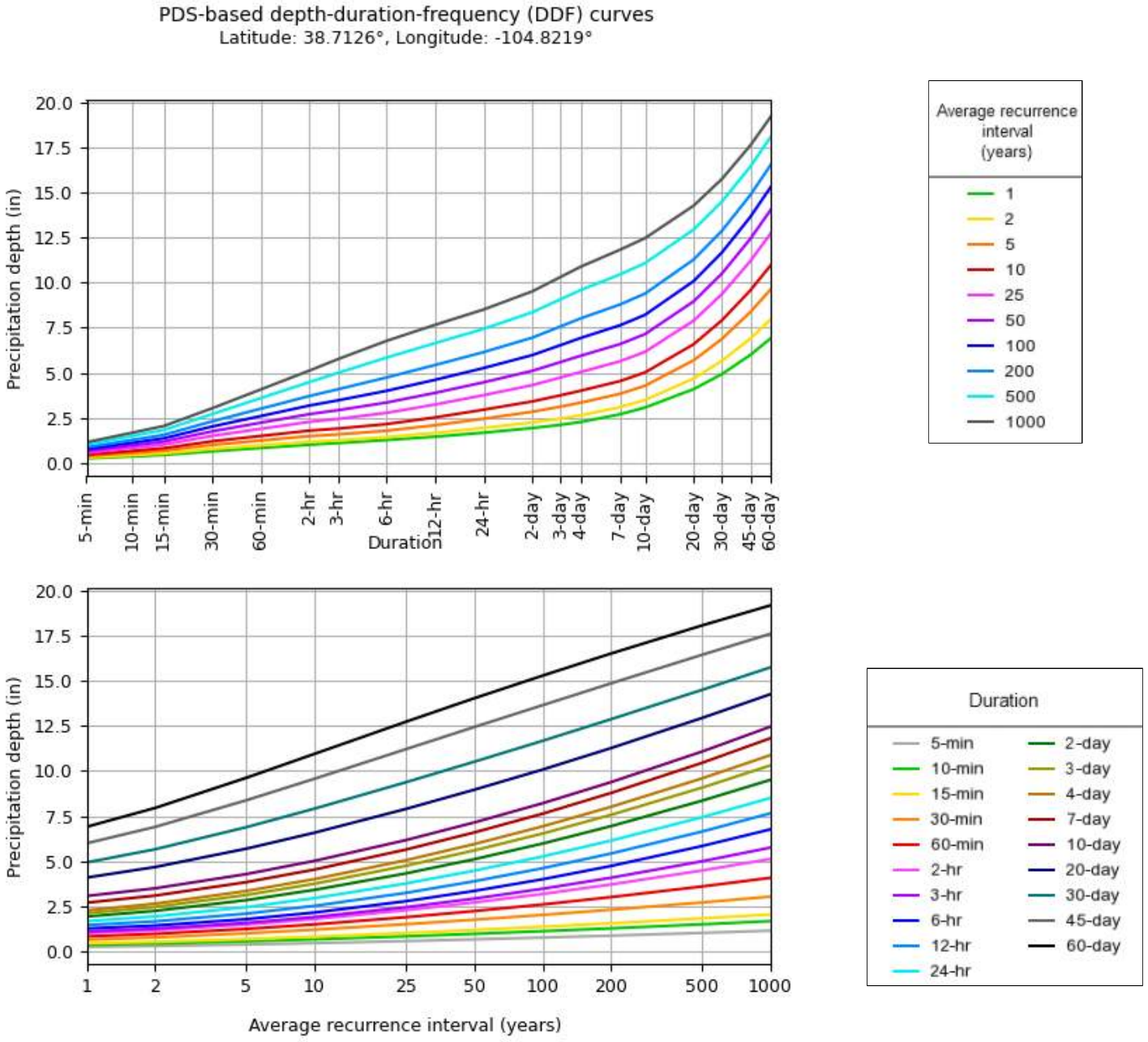
PF graphical



NOAA Atlas 14, Volume 8, Version 2

Created (GMT): Wed Oct 8 15:53:58 2025

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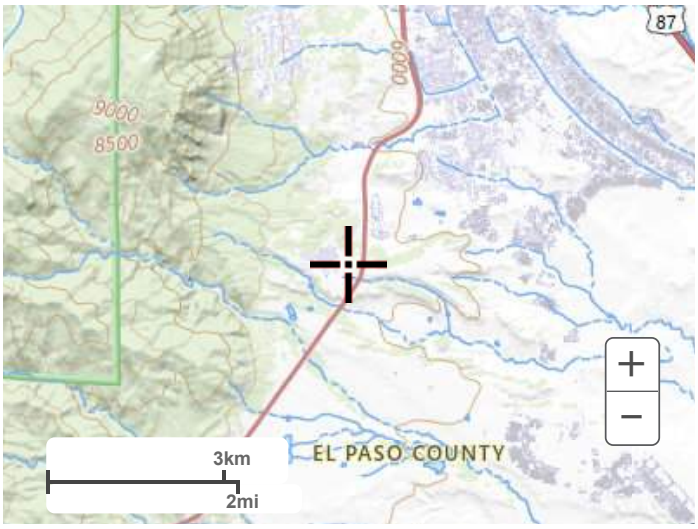
Maps & aerials

Small scale terrain



Large scale terrain

Large scale map

Large scale aerial

Back to Top

US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 13. The **horizontal datum** was NAD83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the **North American Vertical Datum of 1988 (NAVD88)**. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, MD 20910-3282

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242 or visit its website at http://www.ngs.noaa.gov/.

Base Map information shown on this FIRM was provided in digital format by El Paso County, Colorado Springs Utilities, and Anderson Consulting Engineers, Inc. These data are current as of 2008.

This map reflects more detailed and up-to-date **stream channel configurations and floodplain delineations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map. The profile baselines depicted on this map represent the hydraulic modeling baselines that match the flood profiles and Floodway Data Tables if applicable, in the FIS report. As a result, the profile baselines may deviate significantly from the new base map channel representation and may appear outside of the floodplain.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact **FEMA Map Service Center** (MSC) via the FEMA Map Information eXchange (FMIX) 1-877-336-2627 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. The MSC may also be reached by Fax at 1-800-358-9620 and its website at http://www.msc.fema.gov/.

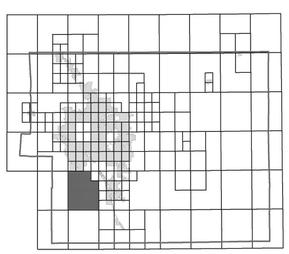
If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip.

El Paso County Vertical Datum Offset Table

Flooding Source	Vertical Datum Offset (ft)

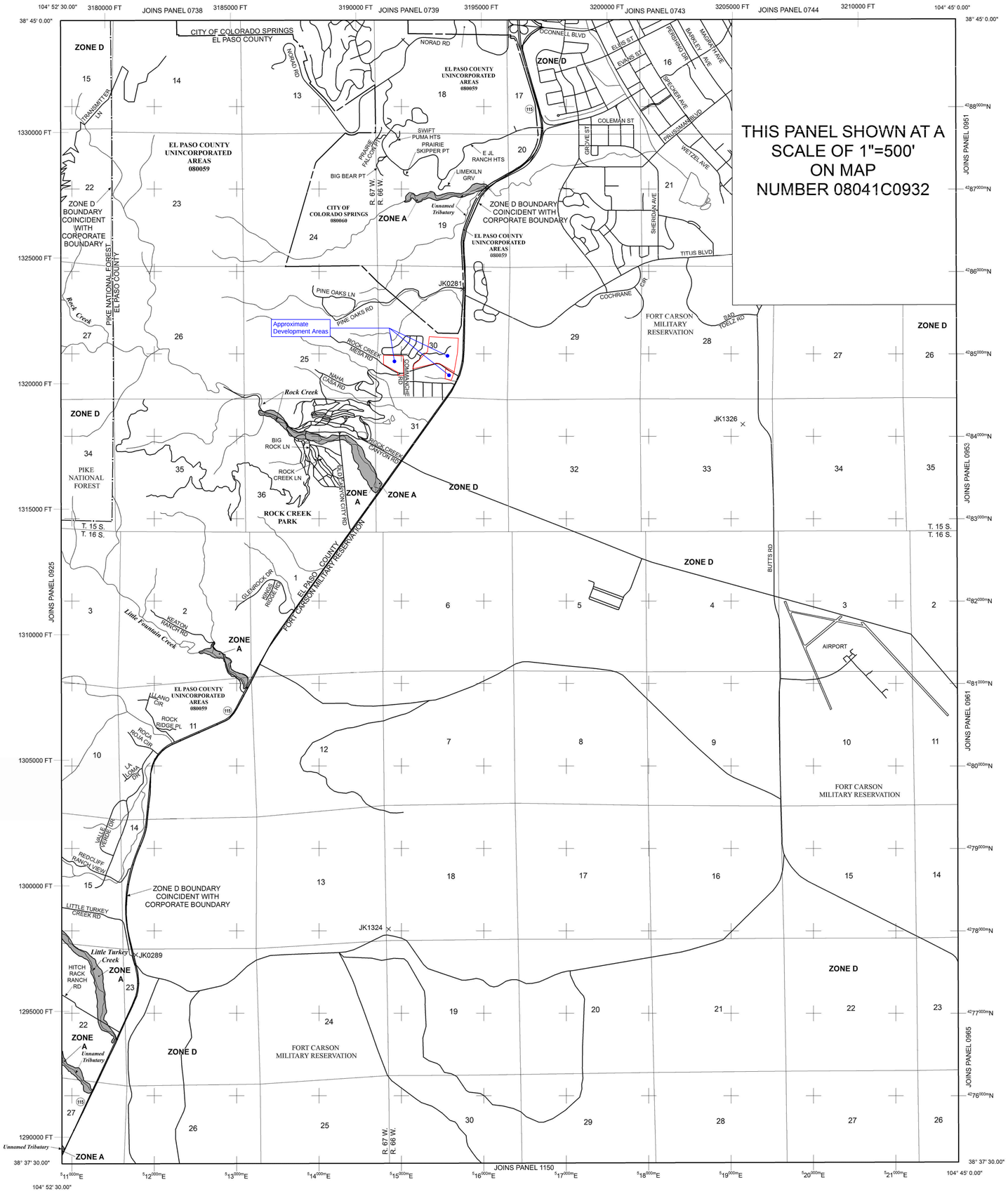
REFER TO SECTION 3.3 OF THE EL PASO COUNTY FLOOD INSURANCE STUDY FOR STREAM BY STREAM VERTICAL DATUM CONVERSION INFORMATION

Panel Location Map



This Digital Flood Insurance Rate Map (DFIRM) was produced through a Cooperating Technical Partner (CTP) agreement between the State of Colorado Water Conservation Board (CWCB) and the Federal Emergency Management Agency (FEMA).

Additional Flood Hazard information and resources are available from local communities and the Colorado Water Conservation Board.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAS) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A No Base Flood Elevations determined.

ZONE AE Base Flood Elevations determined.

ZONE AH Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.

ZONE AO Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

ZONE AR Special Flood Hazard Area Formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.

ZONE A99 Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.

ZONE V Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.

ZONE VE Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- Floodplain boundary
- Floodway boundary
- Zone D Boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

- A–A — Cross section line
- 23–23 — Transect line
- 97° 07' 30.00" / 32° 22' 30.00" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
- 4275000mN — 1000-meter Universal Transverse Mercator grid ticks, zone 13
- 6000000 FT — 5000-foot grid ticks: Colorado State Plane coordinate system, central zone (FIPSZONE 0502), Lambert Conformal Conic Projection
- DX5510 × — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 — River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
MARCH 17, 1997

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
DECEMBER 7, 2018 - to update corporate limits, to change Base Flood Elevations and Special Flood Hazard Areas, to update map format, to add roads and road names, and to incorporate previously issued Letters of Map Revision.

For community map revision history prior to countywide mapping, refer to the Community Map History Table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 2000'

1000 0 2000 4000 FEET

600 0 600 1200 METERS

NFIP

PANEL 0950G

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

EL PASO COUNTY, COLORADO AND INCORPORATED AREAS

PANEL 950 OF 1300

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
COLORADO SPRINGS, CITY OF	080060	0950	G
EL PASO COUNTY	080059	0950	G

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER 08041C0950G

MAP REVISED DECEMBER 7, 2018

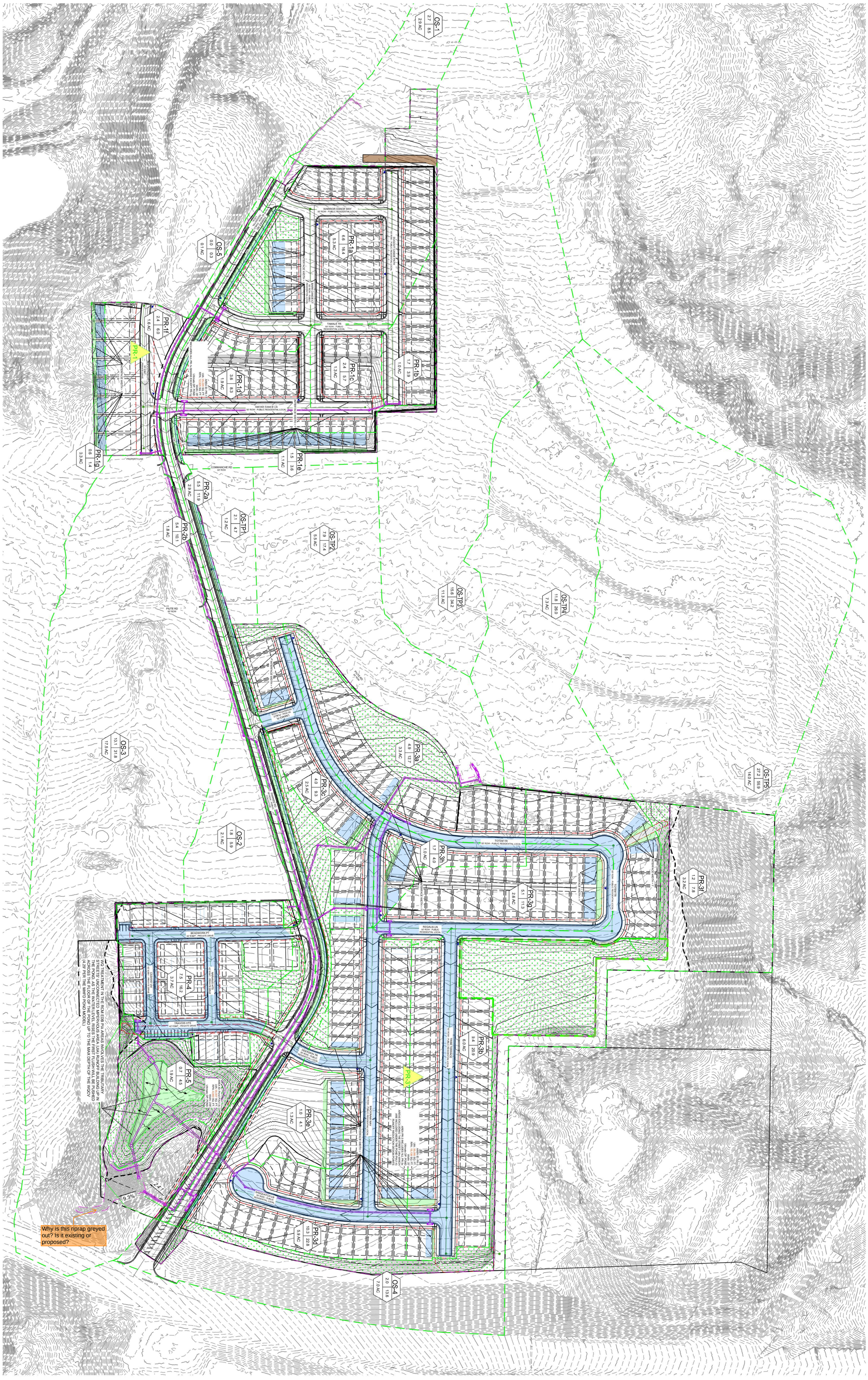
Federal Emergency Management Agency

APPENDIX D

MAPS

Vicinity Map:

Rock Creek Mesa



CALCULATED SITE RESULTS (sums results from all columns in worksheet)

Total Area (ft²)	2,150,049
Total Impervious Area (ft²)	1,171,440
WQCV (ft³)	49,810
WQCV Reduction (ft³)	4,813
WQCV Reduction (%)	10%
Untreated WQCV (ft³)	43,997

Green Infrastructure Summary
(Disturbed Area)
Rock Creek Mesa

Total site area, ac	54.46
Total disturbance area, ac	49.32
Total impervious area, ac	24.7
Total site percent impervious	45.33%
Unconnected Impervious area, ac	6.4
PIA, ac	28.8
WQCV, cf	48810
Stormwater volume reduction, cf	4813

NOTES:
1. 1 FOOT HAS BEEN USED FOR THE INTERFACE WIDTH AT EACH DOWNSPOUT
2. ALL PIA AREAS WILL BE PRIVATELY OWNED AND MAINTAINED BY THE METRO DISTRICT.

LEGEND

- LIMITS OF DISTURBANCE
- UNCONNECTED IMPERVIOUS AREA
- RECEIVING PERVIOUS AREA
- PERVIOUS AREA
- PROPOSED PROPERTY BOUNDARY

GRAPHIC SCALE
(IN FEET)
1 inch = 100 ft.
100' 0' 100' 200'

REFERENCE DRAWINGS
X-MDG30x42
X-25.002547-PR-UTIL
X-25.002547-PR-SITE_EAST
X-25.002547-PR-SITE_WEST
X-25.002828-PR-SITE
X-25.002547-EX-SITE

No.	DATE	DESCRIPTION	BY
####	####	####	####
####	####	####	####
####	####	####	####
####	####	####	####
####	####	####	####
####	####	####	####

REVISIONS

COMPUTER FILE MANAGEMENT
FILE NAME: S:\25.002547.00 Rock Creek Mesa Development Plan\200 Design\220 Drainage-WR\222 Reports\PDR\DWG\GI - ROCK CREEK MESA.dwg
CTB FILE: ----
PLOT DATE: March 19, 2026 5:36:51 PM
THIS DRAWING IS CURRENT AS OF PLOT DATE AND MAY BE SUBJECT TO CHANGE.

SHEET KEY

PREPARED BY:
Matrix
Excellence by Design

SEAL
PRELIMINARY
THIS DRAWING HAS NOT BEEN APPROVED BY GOVERNING AGENCIES AND IS SUBJECT TO CHANGE

FOR AND ON BEHALF OF
MATRIX DESIGN GROUP, INC.
PROJECT No. 25.002547.00

MARCH 2026

ROCK CREEK MESA
PRELIMINARY DRAINAGE REPORT

GREEN INFRASTRUCTURE PLAN

DESIGNED BY:		SCALE	DATE ISSUED: DECEMBER 2025	DRAWING No.
DRAWN BY:	WAN	HORIZ. 1" = 100'		
CHECKED BY:	JTS	VERT. N/A	SHEET 1 OF 1	GI01

LEGEND

- EXISTING BASIN BOUNDARY
- 5975 EXISTING CONTOUR
- PROPERTY LINE
- EXISTING FLOW DIRECTION
- EXISTING FLOW PATH
- DESIGN POINT
- EX-2 SUB BASIN DESIGNATION
  - ##### 5-YEAR STORM EVENT PEAK FLOW (CFS)
  - XX.XX 100-YEAR STORM EVENT PEAK FLOW (CFS)
  - XXX SUB BASIN AREA (AC.)

1. EX DENOTES EXISTING ITEMS.
2. NO FEMA DESIGNATED REGULATORY FLOODPLAIN ON OR ADJACENT TO PROJECT SITE.

N

GRAPHIC SCALE
(IN FEET)
1 inch = 110 ft.
110' 0' 110' 220'

Existing Design Point Summary
ROCK CREEK MESA

Design Point	Sub-Basins	Total Area (ac.)	Q(5) (cfs)	Q(100) (cfs)
EX1	A	1.64	0.8	4.2
EX2	B	70.11	47.7	159.5
EX3	C	24.66	26.0	67.0
EX4	D & E	20.99	5.5	34.1

ROCK CREEK MESA
Existing Conditions
Sub-basin Summary

Basin	Area	Q5	Q100
	acres	cfs	cfs
A	1.64	0.8	4.2
B	70.11	47.7	159.5
C	24.66	26.3	67.9
D	17.78	4.2	25.6
E	3.21	1.2	8.0

OWNER: CITY OF COLORADO SPRINGS REC. NO. 6500000169
OWNER: CHEYENNE MOUNTAIN ESTATES MHC LLC REC. NO. 6530310001
OWNER: CITY OF COLORADO SPRINGS REC. NO. 6500000203
OWNER: SCOTT KENUI S ESTATE REC NO. 6530400002
OWNER: KIM DAE SIK REC NO. 6530400010
OWNER: ROCK CREEK RESIDENTIAL LLC REC. NO. 6500000208
OWNER: SOVEREIGN GRACE CHAPEL INC REC. NO. 6530400006
OWNER: STAYANG LORI REC NO. 6530306031
OWNER: TAMAYO CHRYSTAL REC NO. 6530306036
OWNER: WARREN FRANK E REC NO. 6530306023
OWNER: TAYLOR PHYLLIS A REC NO. 6530306023
OWNER: MOYLES JOAN C REC NO. 6530306021
OWNER: KORUM KAREN L REC NO. 6530306002
OWNER: GRANTHAM VONNA REC NO 6530306037
OWNER: RODNEY JOHN REC NO. 6530305047
OWNER: FONSECA GABRIEL REC NO. 6530303044
OWNER: BECKER LARRY J REC NO. 6530303047
OWNER: GRILLO FELICIA A REC NO. 6530305049
OWNER: ROCK CREEK MESA WATER DISTRICT REC NO. 6530300014
OWNER: SOUTHWEST HIGHWAY 115 FIRE PROTECTION DISTRICT REC NO. 6530300021
OWNER: EAGLE RANCH LLC REC. NO. 6530300027
OWNER: GOLDEN GRACE CHAPEL INC REC. NO. 6530400006

EX-A: 1.6 | 0.8 | 4.2
EX-B: 70.1 | 47.7 | 159.5
EX-C: 24.7 | 26.3 | 67.9
EX-D: 17.8 | 25.6 | 42
EX-E: 3.2 | 8.0 | 12

COMMANCHE RD (PUBLIC)
PAWNEE RD (PUBLIC)
PIUTE RD (PUBLIC)
HIGHWAY 115 (PUBLIC-CDOT)
60' ROW
EX. 30' UTILITY EASEMENT
EX. ACCESS ROAD
EX. 36" CMP STORM (PUBLIC CDOT)
210' CDOT ROW
10.0%
9.3%
0.6%

REFERENCE DRAWINGS
X-25.002547-EX-SITE
X-25.002547-EX-UTIL
X-25.002547-PR-SITE_EAST
X-25.002547-PR-SITE_WEST
X-25.002547-PR-UTIL
X-MDG30x42

No.	DATE	DESCRIPTION	BY

REVISIONS

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PLOT DATE: March 19, 2026 11:22:31 AM
THIS DRAWING IS CURRENT AS OF PLOT DATE AND MAY BE SUBJECT TO CHANGE.

SHEET KEY

PREPARED BY:
Matrix
Excellence by Design

SEAL
PRELIMINARY
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FOR AND ON BEHALF OF MATRIX DESIGN GROUP, INC.
PROJECT No. 25.002547.00

CITY OF COLORADO SPRINGS

ROCK CREEK MESA
PRELIMINARY DRAINAGE REPORT

EXISTING DRAINAGE MAP

DESIGNED BY: JTS
DRAWN BY: BJL
CHECKED BY: JTS
SCALE: HORIZ. 1" = 110' VERT. N/A
DATE ISSUED: MARCH 2026
SHEET 1 OF 2
DRAWING No. DR01

Proposed Design Point Summary				
ROCK CREEK MESA				
Design Point	Sub-Basins	Total Area (ac.)	Q(5) (cfs)	Q(100) (cfs)
DP1	PR-1a & OS-1	8.14	9.6	25.4
PR-1b	NORTHEAST PORTION OF WEST DEVELOPMENT AREA	1.00	1.7	3.9
DP2	PR-1c & PR-1d	3.12	5.1	11.7
DP3	PR-1b, PR-1c, & PR-1d	4.12	5.9	13.4
DP4	OS-1, PR-1a, PR-1b, PR-1c, & PR-1d	12.26	15.3	38.4
PR-1f	WEST DEVELOPMENT AREA SOUTH OF PAWNEE NORTH HALF	1.57	2.4	5.9
DP5	PR-1a, PR-1b, PR-1c, PR-1d, & PR-1f	13.83	16.8	42.1
DPTP	OS-TP2 & OS-TP3	16.84	21.5	47.2
PR-3a	WEST PORTION OF EAST DEVELOPMENT AREA DETAINED	3.32	4.6	12.1
DP6	PR-3a	3.32	4.6	12.1
PR-3h	SOUTHCENTRAL SECTION OF EAST DEVELOPMENT AREA	0.99	1.7	4.0
DP7	PR-3a, PR-3h	4.30	6.0	15.4
PR-3g	NORTH CENTRAL SECTION OF EAST DEVELOPMENT AREA	2.64	5.1	11.3
DP8a	PR-3a, PR-3h, & PR-3g	6.94	11.0	26.4
PR-3c	SOUTH PORTION OF EAST DEVELOPMENT AREA DETAINED	2.48	4.0	9.3
DP8b	PR-3a, PR-3c, PR-3g, & PR-3h	9.42	15.2	36.1
OS-2	OS-2	2.06	1.8	5.8
DP9	OS-2, OS-TP2, & OS-TP3	18.90	25.1	56.9
DP10	PR-3b	6.00	9.4	20.8
PR-3e	SOUTHEAST PORTION OF EAST DEVELOPMENT AREA. PARK DETAINED	1.34	0.9	4.0
DP11	PR-3b & PR-3e	7.34	8.5	20.0
PR-3d	WEST PORTION OF EAST DEVELOPMENT AREA DETAINED	5.94	10.3	22.9
DP12	PR-3b, PR-3d, & PR-3e	13.28	16.1	37.1
DP13	PR-2b	1.84	5.4	10.0
DP14	OS-TP1, PR-2a & PR-1e	5.18	9.1	20.0
DP15	OS-TP1, PR-2a, PR-2b, & PR-1e	7.02	14.4	29.9

Proposed Design Point Summary				
ROCK CREEK MESA				
Design Point	Sub-Basins	Total Area (ac.)	Q(5) (cfs)	Q(100) (cfs)
DP16	OS-TP1, PR-1c, PR-2a, PR-2b, PR-3a, PR-3b, PR-3c, PR-3d, PR-3e, & PR-3g	43.55	59.0	137.1
PR-4	EASTERN AREA SOUTH OF PAWNEE	3.65	7.5	16.2
DET-IN	OS-TP1, PR-1c, PR-2a, PR-2b, PR-3a, PR-3b, PR-3c, PR-3d, PR-3e, PR-3g, PR-4, & PR-5	49.08	70.1	164.8
DET-OUT	OS-TP1, PR-1c, PR-2a, PR-2b, PR-3a, PR-3b, PR-3c, PR-3d, PR-3e, PR-3g, PR-4, & PR-5	49.08	1.0	70.4
SW	PR-1g & OS5	0.45	0.7	1.7
SE	DET-OUT & OS3	85.51	36.2	159.2
N	OS-TP4, OS-TP5, & PR-3f	24.52	25.3	59.0
NE	OS-4	6.94	1.8	13.2

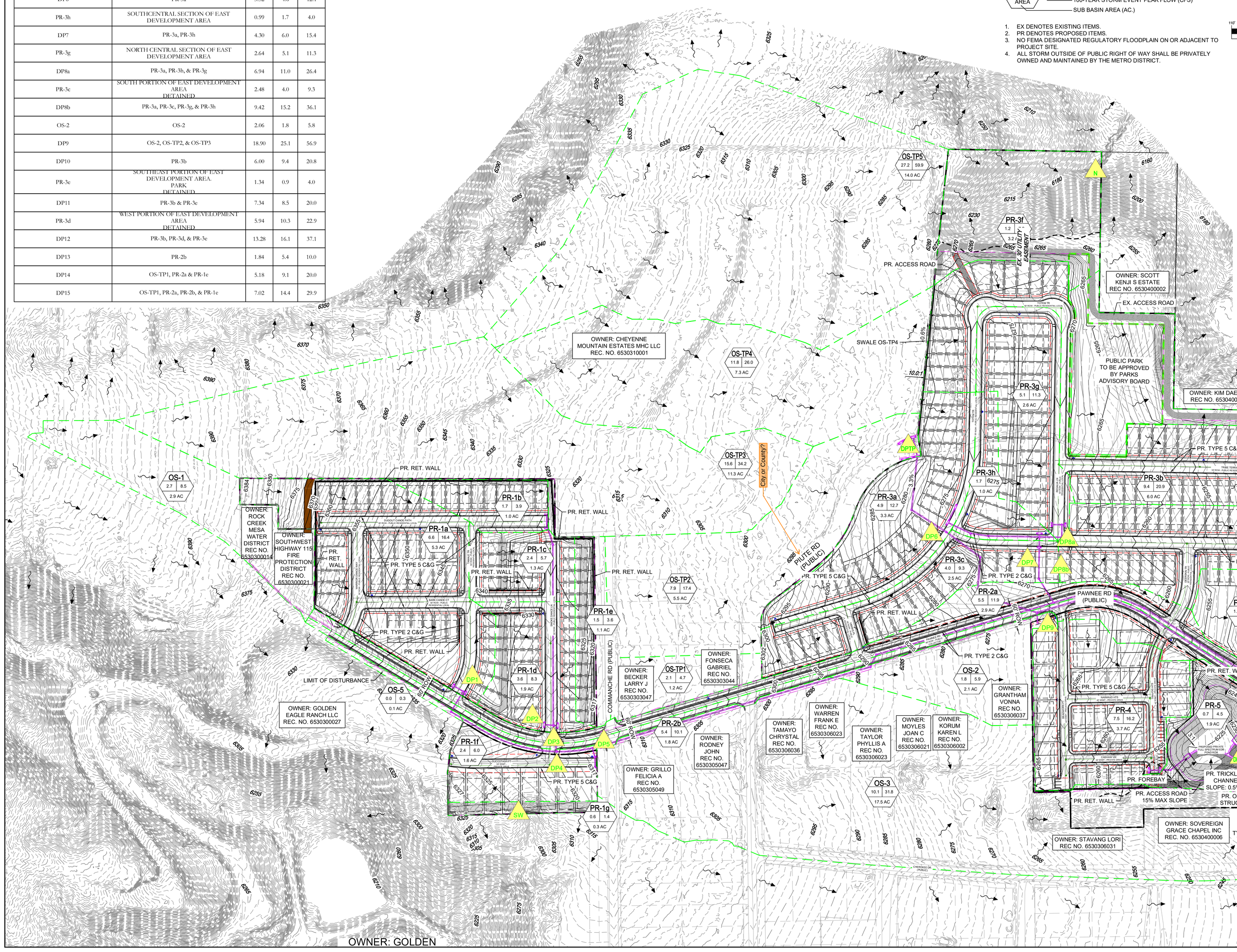
LEGEND

- PROPOSED BASIN BOUNDARY
- 5975 EXISTING CONTOUR
- 7050 PROPOSED CONTOUR
- PROPOSED STORM DRAIN PIPE
- PROPOSED STORM STRUCTURES
- PROPERTY LINE
- PROPOSED LOT LINE
- PROPOSED DRAINAGE SWALE
- PROPOSED FLOW DIRECTION
- PROPOSED FLOW PATH
- 2 DESIGN POINT
- BASIN / Q5 | Q100 / AREA SUB BASIN DESIGNATION
- 5-YEAR STORM EVENT PEAK FLOW (CFS)
- 100-YEAR STORM EVENT PEAK FLOW (CFS)
- SUB BASIN AREA (AC.)

1. EX DENOTES EXISTING ITEMS.
2. PR DENOTES PROPOSED ITEMS.
3. NO FEMA DESIGNATED REGULATORY FLOODPLAIN ON OR ADJACENT TO PROJECT SITE.
4. ALL STORM OUTSIDE OF PUBLIC RIGHT OF WAY SHALL BE PRIVATELY OWNED AND MAINTAINED BY THE METRO DISTRICT.

GRAPHIC SCALE
110' 0' 110' 220'
(IN FEET)
1 inch = 110 ft.

ROCK CREEK MESA Proposed Conditions Sub-basin Summary			
Basin	Area	Q5	Q100
	acres	cfs	cfs
PR-1a	5.25	6.6	16.3
PR-1b	1.00	1.7	3.9
PR-1c	1.26	2.4	5.7
PR-1d	1.86	3.6	8.3
PR-1e	1.05	1.5	3.6
PR-1f	1.57	2.4	5.9
PR-1g	0.31	0.6	1.4
PR-2a	2.94	5.5	11.8
PR-2b	1.84	5.4	10.0
PR-3a	3.32	4.6	12.1
PR-3b	6.00	9.4	20.8
PR-3c	2.48	4.0	9.3
PR-3d	5.94	10.3	22.9
PR-3e	1.34	0.9	4.0
PR-3f	3.18	1.0	7.5
PR-3g	2.64	5.1	11.3
PR-3h	0.99	1.7	4.0
PR-4	3.65	7.5	16.2
PR-5	1.88	0.6	4.4
OS-TP1	1.19	2.1	4.7
OS-TP2	5.53	7.9	17.4
OS-TP3	11.30	15.6	34.2
OS-TP4	7.34	11.8	26.0
OS-TP5	14.00	27.2	59.9
OS-1	2.89	2.7	8.4
OS2	2.06	1.8	5.8
OS3	17.53	10.1	31.8
OS4	6.94	1.8	13.2
OS5	0.13	0.0	0.3



CITY OF COLORADO SPRINGS

ROCK CREEK MESA
PRELIMINARY DRAINAGE REPORT

PROPOSED DRAINAGE MAP

DRAWING No. DR02
DATE ISSUED: MARCH 2026
SHEET: 2 OF 4
SCALE: HORIZ. 1" = 110' VERT. N/A
DESIGNED BY: JTS
DRAWN BY: BJL
CHECKED BY: JTS

SEAL

PRELIMINARY
THIS DRAWING HAS NOT BEEN APPROVED BY GOVERNING AGENCIES AND IS SUBJECT TO CHANGE

FOR AND ON BEHALF OF MATRIX DESIGN GROUP, INC.
PROJECT No. 25.002547.000

PREPARED BY: Matrix Excellence by Design

SHEET KEY

No.	DATE	DESCRIPTION	BY
		REVISIONS	

COMPUTER FILE MANAGEMENT
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THIS DRAWING IS CURRENT AS OF PLOT DATE AND MAY BE SUBJECT TO CHANGE

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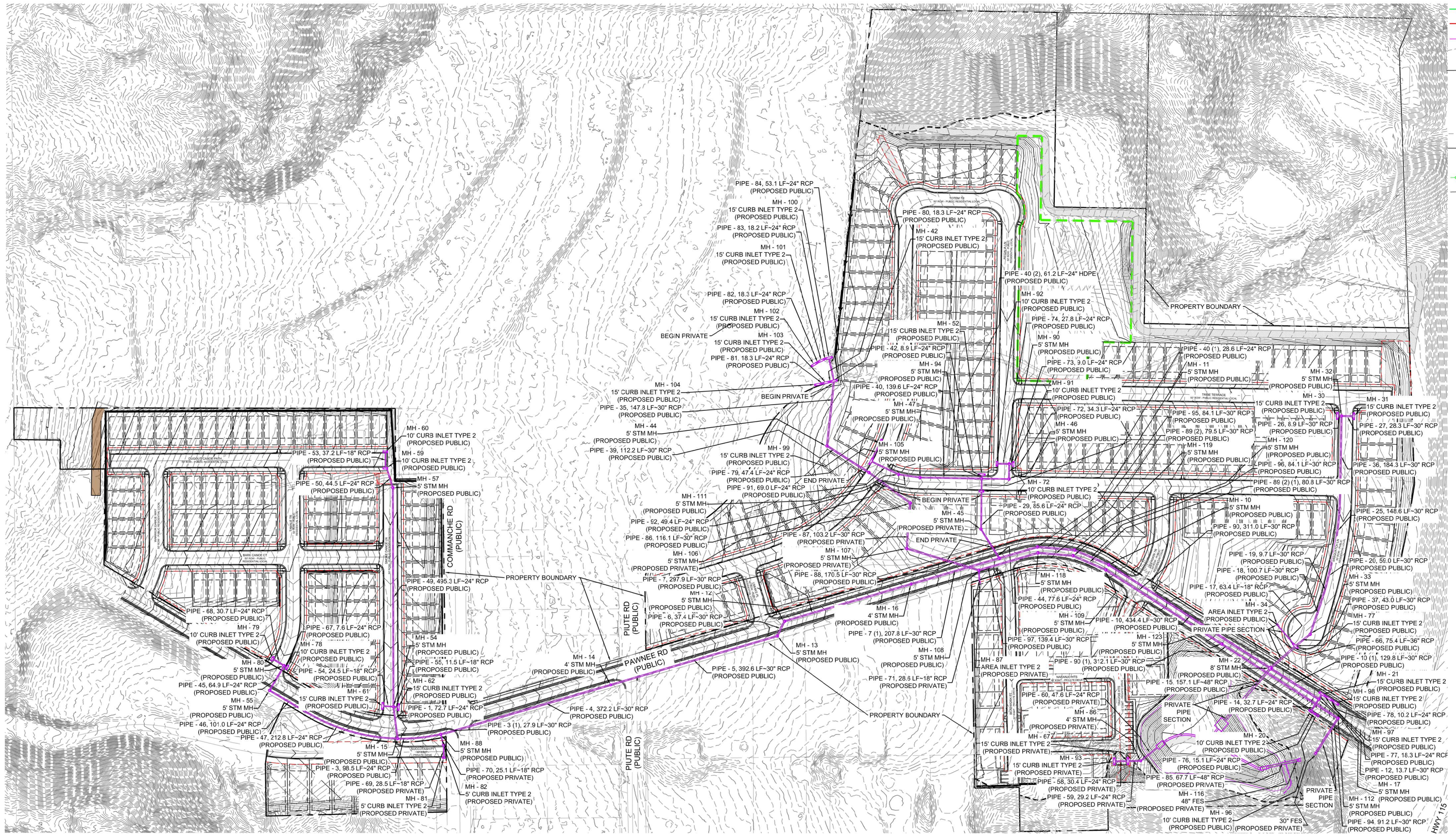
X-S:\25.002547.000\EX-SITE_WEST
X-S:\25.002547.000\PR-SITE
X-M0D0Dm2



STRUCTURE TABLE	
STRUCTURE NAME	STRUCTURE TYPE
MH - 10	5' STM MH
MH - 11	5' STM MH
MH - 12	5' STM MH
MH - 13	5' STM MH
MH - 14	4' STM MH
MH - 15	5' STM MH
MH - 16	4' STM MH
MH - 17	5' STM MH
MH - 20	10' CURB INLET TYPE 2
MH - 21	15' CURB INLET TYPE 2
MH - 22	8' STM MH
MH - 30	15' CURB INLET TYPE 2
MH - 31	15' CURB INLET TYPE 2
MH - 32	5' STM MH
MH - 33	5' STM MH
MH - 34	AREA INLET TYPE 2
MH - 42	15' CURB INLET TYPE 2
MH - 44	5' STM MH
MH - 45	5' STM MH
MH - 46	5' STM MH
MH - 47	5' STM MH
MH - 52	15' CURB INLET TYPE 2
MH - 54	5' STM MH
MH - 55	5' STM MH
MH - 57	5' STM MH
MH - 59	10' CURB INLET TYPE 2
MH - 60	10' CURB INLET TYPE 2
MH - 61	15' CURB INLET TYPE 2
MH - 62	15' CURB INLET TYPE 2
MH - 67	15' CURB INLET TYPE 2

STRUCTURE TABLE	
STRUCTURE NAME	STRUCTURE TYPE
MH - 72	10' CURB INLET TYPE 2
MH - 77	15' CURB INLET TYPE 2
MH - 78	10' CURB INLET TYPE 2
MH - 79	10' CURB INLET TYPE 2
MH - 80	5' STM MH
MH - 81	5' CURB INLET TYPE 2
MH - 82	5' CURB INLET TYPE 2
MH - 86	4' STM MH
MH - 87	AREA INLET TYPE 2
MH - 88	5' STM MH
MH - 90	5' STM MH
MH - 91	10' CURB INLET TYPE 2
MH - 92	10' CURB INLET TYPE 2
MH - 93	15' CURB INLET TYPE 2
MH - 94	5' STM MH
MH - 96	10' CURB INLET TYPE 2
MH - 97	15' CURB INLET TYPE 2
MH - 98	15' CURB INLET TYPE 2
MH - 99	15' CURB INLET TYPE 2
MH - 100	15' CURB INLET TYPE 2
MH - 101	15' CURB INLET TYPE 2
MH - 102	15' CURB INLET TYPE 2
MH - 103	15' CURB INLET TYPE 2
MH - 104	15' CURB INLET TYPE 2
MH - 105	5' STM MH
MH - 106	5' STM MH
MH - 107	5' STM MH
MH - 108	5' STM MH
MH - 109	5' STM MH
MH - 110	15' CURB INLET TYPE 2

STRUCTURE TABLE	
STRUCTURE NAME	STRUCTURE TYPE
MH - 111	5' STM MH
MH - 112	5' STM MH
MH - 115	30" FES
MH - 116	48" FES
MH - 118	5' STM MH
MH - 119	5' STM MH
MH - 120	5' STM MH
MH - 123	5' STM MH
MH - 124	5' STM MH

PIPE SUMMARY TABLE			
PIPE NAME	PIPE DESCRIPTION	PIPE LENGTH	RADIUS
PIPE - 1	24" RCP	72.74	0.00
PIPE - 3	24" RCP	98.46	413.33
PIPE - 3 (1)	30" RCP	27.86	413.38
PIPE - 4	30" RCP	372.24	0.00
PIPE - 5	30" RCP	392.54	0.00
PIPE - 6	30" RCP	37.41	0.00
PIPE - 7	30" RCP	297.92	0.00
PIPE - 7 (1)	30" RCP	207.77	0.00
PIPE - 7 (1) (1)	30" RCP	90.15	0.00
PIPE - 10	30" RCP	434.41	0.00
PIPE - 10 (1)	30" RCP	129.84	0.00
PIPE - 12	30" RCP	13.67	0.00
PIPE - 14	24" RCP	32.67	0.00
PIPE - 15	48" RCP	157.12	0.00
PIPE - 17	18" RCP	63.41	0.00
PIPE - 18	30" RCP	100.74	0.00
PIPE - 19	30" RCP	9.70	0.00
PIPE - 20	30" RCP	59.03	0.00
PIPE - 25	30" RCP	148.65	710.27
PIPE - 26	30" RCP	8.91	0.00
PIPE - 27	30" RCP	28.25	0.00
PIPE - 29	24" RCP	85.62	0.00
PIPE - 31	30" RCP	0.00	0.00
PIPE - 35	30" RCP	147.80	0.00
PIPE - 36	30" RCP	184.28	0.00
PIPE - 37	30" RCP	43.04	0.00
PIPE - 39	30" RCP	112.18	0.00
PIPE - 40	24" RCP	139.60	0.00
PIPE - 40 (1)	24" RCP	28.56	0.00
PIPE - 40 (2)	24" HDPE	61.23	0.00
PIPE - 42	24" RCP	8.88	0.00
PIPE - 44	24" RCP	77.59	0.00

PIPE SUMMARY TABLE			
PIPE NAME	PIPE DESCRIPTION	PIPE LENGTH	RADIUS
PIPE - 45	24" RCP	64.94	0.00
PIPE - 46	24" RCP	100.95	0.00
PIPE - 47	24" RCP	212.77	413.04
PIPE - 49	24" RCP	495.34	0.00
PIPE - 50	24" RCP	44.52	0.00
PIPE - 53	18" RCP	37.16	0.00
PIPE - 54	18" RCP	24.54	0.00
PIPE - 55	18" RCP	11.46	0.00
PIPE - 58	24" RCP	30.36	0.00
PIPE - 59	24" RCP	29.16	0.00
PIPE - 60	24" RCP	47.60	0.00
PIPE - 66	36" RCP	75.35	0.00
PIPE - 67	24" RCP	7.58	0.00
PIPE - 68	24" RCP	30.75	0.00
PIPE - 69	18" RCP	28.50	0.00
PIPE - 70	18" RCP	25.10	0.00
PIPE - 71	18" RCP	28.55	0.00
PIPE - 72	24" RCP	34.31	0.00
PIPE - 73	24" RCP	8.58	0.00
PIPE - 74	24" RCP	27.76	0.00
PIPE - 76	24" RCP	15.08	0.00
PIPE - 77	24" RCP	18.34	0.00
PIPE - 78	24" RCP	10.17	0.00
PIPE - 79	24" RCP	47.44	0.00
PIPE - 80	24" RCP	18.34	0.00
PIPE - 81	24" RCP	18.34	0.00
PIPE - 82	24" RCP	18.30	0.00
PIPE - 83	24" RCP	18.23	0.00
PIPE - 84	24" RCP	53.15	0.00
PIPE - 85	48" RCP	67.72	0.00
PIPE - 86	30" RCP	116.13	0.00
PIPE - 87	30" RCP	103.18	0.00

PIPE SUMMARY TABLE			
PIPE NAME	PIPE DESCRIPTION	PIPE LENGTH	RADIUS
PIPE - 88	30" RCP	170.53	0.00
PIPE - 89 (2)	30" RCP	79.49	0.00
PIPE - 89 (2) (1)	30" RCP	80.85	0.00
PIPE - 90	30" RCP	311.01	0.00
PIPE - 90 (1)	30" RCP	312.07	0.00
PIPE - 91	24" RCP	68.95	0.00
PIPE - 92	24" RCP	49.37	0.00
PIPE - 94	30" RCP	91.21	0.00
PIPE - 95	30" RCP	84.06	0.00
PIPE - 96	30" RCP	84.06	0.00
PIPE - 97	30" RCP	139.40	0.00

GRAPHIC SCALE
100' 0' 100' 200'
(IN FEET)
1 inch = 100 ft.

CITY OF COLORADO SPRINGS
ROCK CREEK MESA
PRELIMINARY DRAINAGE REPORT
PROPOSED CONDITIONS STORM MAP
DRAWING No. DR03
DESIGNED BY: CAP
DRAWN BY: WAK
CHECKED BY: JTS
SCALE HORIZ: 1" = 100'
VERT: N/A
DATE ISSUED: MARCH 2026
SHEET 3 OF 3
SEAL
PRELIMINARY
THIS DOCUMENT IS NOT RELEASED FOR THE GOVERNING AGENCIES AND IS SUBJECT TO CHANGE
FOR AND ON BEHALF OF MATRIX DESIGN GROUP, INC.
PROJECT No. 25.002547.00
PREPARED BY: Matrix Excellence by Design
SHEET KEY
REVISIONS
NO. DATE DESCRIPTION
COMPUTER FILE MANAGEMENT
FILE NAME: S:\25.002547.00 Rock Creek Mesa Development Plan\200 Design\220 Drainage-WR\222 Reports\PDR\DWG\DR - Rock Creek Mesa - STM.dwg
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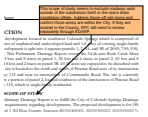
PLOT DATE: March 19, 2026 2:55:10 PM
THIS DRAWING IS CURRENT AS OF PLOT DATE AND MAY BE SUBJECT TO CHANGE
REFERENCE DRAWINGS
MASTER DRAINAGE PLAN
X-25.002547-PR-SITE_EAST
X-25.002547-PR-SITE_WEST
X-25.002547-EX-SITE

V3._Prelim Drainage Report_Rock Creek.pdf Markup Summary

dothartford (10)



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Page Label: 5
Date: 6/1/2026 2:14:54 PM
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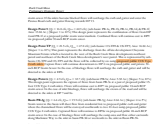
Layer:
Space:

This scope of study seems to exclude roadway work outside of the subdivision itself or the storm drain installation offsite. Address those off-site items and confirm those areas are within the City. If they are located in the County, EPC will need to review separately through EDARP.



Author: dothartford
Subject: SW - Highlight
Page Label: 10
Date: 6/1/2026 2:18:22 PM
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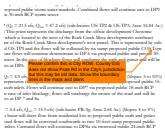
Layer:
Space:

proposed public COS Type 2 curb inlets.



Author: dothartford
Subject: SW - Textbox with Arrow
Page Label: 10
Date: 6/1/2026 2:19:10 PM
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Color:
Layer:
Space:

Please confirm this is City ROW. County GIS does not show Piute Rd in the City's jurisdiction but this may be old data. Show the boundary lines in the maps and plans

Please confirm this is City ROW. County GIS does not show Piute Rd in the City's jurisdiction but this may be old data. Show the boundary lines in the maps and plans

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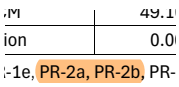

Author: dothartford
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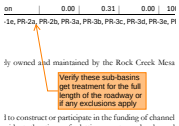
PR-2a, PR-2b



Author: dothartford
Subject: SW - Textbox with Arrow
Page Label: 16
Date: 6/1/2026 1:17:08 PM
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Color:
Layer:
Space:

Verify these sub-basins get treatment for the full length of the roadway or if any exclusions apply

Verify these sub-basins get treatment for the full length of the roadway or if any exclusions apply

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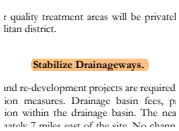

Author: dothartford
Subject: SW - Highlight
Page Label: 16
Date: 6/1/2026 1:17:22 PM
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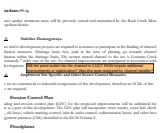
Stabilize Drainageways.



Author: dothartford
Subject: SW - Textbox
Page Label: 16
Date: 6/1/2026 1:18:10 PM
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Layer:
Space:

Will the pond outfall into the channel in CDOT ROW require additional improvements or stabilization? Was this area analyzed for channel stability?

Author: dothartford
Subject: SW - Textbox
Page Label: 143
Date: 6/1/2026 10:56:36 AM
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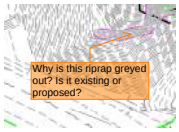
Color:
Layer:
Space:

The roadway areas that are being improved should be within the "project vicinity" areas. This map excludes portions of the project.



Author: dothartford
Subject: SW - Textbox with Arrow
Page Label: 144
Date: 6/1/2026 1:19:24 PM
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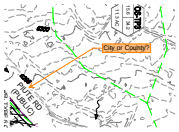
Layer:
Space:

Why is this riprap greyed out? Is it existing or proposed?



Author: dothartford
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Page Label: 146
Date: 6/1/2026 2:17:57 PM
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Color:
Layer:
Space:

City or County?