

FINAL DRAINAGE REPORT FOR COLORADO CENTRE METROPOLITAN DISTRICT ADMINISTRATION BUILDING

PCD File # PPR-21-51

PREPARED BY

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RESPEC
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PREPARED FOR

Colorado Centre Metropolitan District
4770 Horizonview Drive
Colorado Springs, CO 80925

October 2022

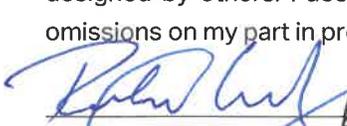
Project 247.07





ENGINEER'S STATEMENT

This report and plan for the drainage design of Colorado Centre Metropolitan District Administration Building, 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 according to the criteria established by the County for drainage reports and said report is in conformity with the master plan of the drainage basin. I understand that El Paso County 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.


Richard Gallegos, P.E.
Registered Professional Engineer State of Colorado No. 36247



11.02.2022
Date

DEVELOPER'S STATEMENT

Please update owner/developer statement

The Colorado Centre Metropolitan District hereby certifies that the drainage facilities for the

Owner/Developer's Statement:

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

[Name, Title]
[Business Name]
[Address]

Date

presented in this report. I
for the drainage facilities
County; and cannot, on
review will absolve the
of future liability for
not imply approval of my

Authorized Signature

Date

Printed Name

Owner

Address:

Title

EL PASO COUNTY STATEMENT

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

County Engineer/ECM Administrator

Date



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1.0 PURPOSE

This drainage report is for the design of the Colorado Centre Metropolitan District Administration Building. The site is located at 9696 Flagstone Street, Colorado Springs, Colorado in central El Paso County. See Vicinity Map in the Appendix below for reference. It is further described as the Northeast One-Quarter of the Southwest One-Quarter of Section 3, Township 15 South, Range 65 West of the 6th P.M.

One County-approved Drainage Report was found within the County's files that included the project site:

- *Drainage Report for Colorado Centro Metropolitan District Water Treatment Facility* by JDS-Hydro Consultants Inc. approved in August 2015.

This 7.73-acre site is located within the Jimmy Camp Creek – FOFO2000 basin. Work will include the construction of a 4,542 square foot (sf) administration building, asphalt driveway, and a parking lot. In order to accommodate an area of disturbance greater than 1 acre, a 0.137-acre-foot detention basin will be constructed in the southwest portion of the site to detain all flows directed to the south. No portion of the site is located within a FEMA designated 100-year floodplain per Map No. 08041C0769G that was effective on December 7th, 2018.

2.0 SOIL CONDITIONS

According to the El Paso County Area Soil Survey, the soil on the site is classified as follows:

SOIL #	SOIL TYPE	HYDROLOGIC CLASSIFICATION	PERCENT OF SITE
28	Ellicot Loamy Coarse Sand, 0 to 5 Percent Slopes	A	0.0%
101	Ustic Torrfluvents, Loamy	B	100.0%

The Ustic Torrfluvents soil can be described as having a high permeability, low surface runoff, and slight hazard of erosion. The Ellicot soils is described as having very high permeability and very low surface runoff. The hydrologic soil classification used for this study is 'B'. See Soils Map in the Appendix for reference.

3.0 HYDROLOGIC CRITERIA

The methodology utilized for this report is in accordance with the *El Paso County Drainage Criteria Manual*. All references from the *El Paso County Drainage Criteria Manual* can be found in Appendix C. The Rational Method for computation of runoff was used.



$Q = CIA$

Where

Q = maximum rate of runoff in cubic feet per second

c = runoff coefficient representing drainage area characteristics

i = average rainfall intensity, in inches per hour, for the duration required for the runoff to become established

a = drainage basin size in acres

The storm recurrence intervals used for this study were the 5-year storm and the 100-year storm. The detention discharge for the proposed 0.137-acre-foot Full Spectrum Extended Detention Basin is 0.4 cfs for the 5-year storm and 3.6 cfs for the 100-year storm. The Colorado Urban Hydrograph Procedure (CUHP) was used to route flows through the proposed private detention basin. This procedure is described in more detail in the *Mile High Flood District Urban Storm Drainage Criteria Manual Volume 1*, shown below in Appendix C – Colorado Urban Hydrograph Procedure Summary.

The Mile High Flood District – Detention Version 4.05 (January 2022) spreadsheet was used to determine the required detention basin storage volume and outlet structure design. ManningSolver Version 1.019, also, was used in this analysis to calculate the Manning's normal depth within the pond inlet channel.

4.0 EXISTING DRAINAGE CONDITIONS

The overall site consists of 7.73 acres. The site includes an existing 3725 sf water treatment plant and an asphalt driveway. The areas of the site not covered by the water treatment plant or asphalt driveway are covered with nearly bare ground. These undeveloped areas include slopes that range from 0.5% to 19.3%. The overall existing site is 5.6% impervious. See Existing Drainage Map in the Back Pocket for reference.

Flows from Sub-basin Aex through Sub-basin Dex are tributary to the Jimmy Camp Creek (FOFO2000) basin.

Sub-basin Aex contains 2.55 acres and drains south towards a grated inlet in the southwest corner of the site. This sub-basin produces existing flows of 0.6 cfs for the 5-year storm and 4.3 cfs for the 100-year storm. These flows sheetflow to the south.

Sub-basin Bex contains 0.17 acres and drains south along East Anvil Drive. This sub-basin produces existing flows of 1.0 cfs for the 5-year storm and 1.8 cfs for the 100-year storm. These flows move south into and along curb and gutter as channelized flow.

Sub-basin Cex contains 2.87 acres and drains east towards Jimmy Camp Creek. This sub-basin produces existing flows of 1.0 cfs for the 5-year storm and 5.4 cfs for the 100-year storm. These flows sheetflow to the east.



Sub-basin Dex contains 0.71 acres and drains east towards Jimmy Camp Creek. It produces flows of 0.2 cfs for the 5-year storm and 1.5 cfs for the 100-year storm. These flows sheetflow to the east, ultimately ending up in Jimmy Camp Creek.

The estimated runoff amounts produced for the project under Existing Conditions are shown in Table 1 below.

Sub-basin	Q ₅ (CFS)	Q ₁₀₀ (CFS)
Aex	0.6	4.3
Bex	1.0	1.8
Cex	1.0	5.4
Dex	0.2	1.5

5.0 DEVELOPED DRAINAGE CONDITIONS

The overall site consists of 7.73 acres, of which 2.65 acres will be disturbed as part of this project. A 4,542 sf administration building and asphalt driveway is proposed on the west side of the site. A 0.137-acre-foot Full Spectrum Extended Detention basin size will accommodate the area of disturbance greater than 1 acre. Proposed Conditions Map is located below in the Back Pocket for reference.

Proposed site imperviousness is 20.0%, tributary to the Jimmy Camp Creek Basin

Per ECM I.7.1.A all applicable development sites must have permanent stormwater quality control measure unless an exclusion applies.

Sub-basin A contains 3.28 acres and Detention Basin located in the southwest storm and 11.7 cfs for the 100-year storm acre-foot Full Spectrum Extended Detent

Provide an explanation and reference why WQ is not provided for basins B, C, & D. See ECM I.7.1.B. for applicable exclusion.

Sub-basin B contains 0.17 acres and drains south along East Anvil Drive. This sub-basin produces flows of 1.0 cfs for the 5-year storm and 1.8 cfs for the 100-year storm. These flows move south into and along curb and gutter as channelized flow.

Sub-basin C contains 2.14 acres and drains east towards Jimmy Camp Creek. This sub-basin produces flows of 0.8 cfs for the 5-year storm and 4.2 cfs for the 100-year storm. These flows sheetflow to the east.

Sub-basin D contains 0.65 acres and drains east towards Jimmy Camp Creek. It produces flows of 0.2 cfs for the 5-year storm and 1.4 cfs for the 100-year storm. These flows sheetflow to the east, draining into Jimmy Camp Creek.

The estimated runoff amounts produced for the project under Proposed Conditions are shown in Table 2 below.



Sub-basin	Q ₅ (CFS)	Q ₁₀₀ (CFS)
A*	4.4	11.7
B	1.0	1.8
C	0.8	4.2
D	0.2	1.4

*Note that detained flows are 0.6 cfs for the 5-year event and 3.0 cfs for the 100-year event

6.0 FOUR STEP PROCESS

The proposed development follows the “Four Step Process” as mandated by the *El Paso County Drainage Criteria Manual* as follows:

Step 1: Reduce runoff by disconnecting impervious area, eliminating “unnecessary” impervious area and encouraging infiltration into soils that are suitable.

Runoff has been reduced by disconnecting impervious areas where possible, eliminating “unnecessary” impervious areas and encouraging infiltration into suitable soils. IRF Spreadsheets utilized for design.

Step 2: Treat and slowly release the WQCV.

- All new developed flows have been routed to the water quality basin with impervious area less than one acre.
- Drain time for the water quality basin is as follows: Full Spectrum Extended Detention Basin (EDB) is 40 hours.

Step 3: Stabilize stream channels.

Although Jimmy Camp Creek drainageway is adjacent to the project, no work will be done in the drainageway.

- Site flows from the project have been directed to the concrete curb and gutters along the roadways and transported to public drainage facilities which direct them into the water quality/detention facility.
- All new and re-developed 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.

Step 4: Implement source controls.

Erosion control measures will be in place during initial construction to provide source control of sediment with landscaping placed within the proposed development and permanent seeding of all disturbed areas. No other potential pollutants are anticipated with this site post construction. The development of this site will have no adverse impact on downstream properties.



7.0 DETENTION BASIN

To accommodate the area of disturbance greater than 1 acre, a private 0.137-acre-foot Full Spectrum Detention Basin is proposed on the southwest corner of the site (See Proposed Drainage Plan in the Back Pocket). An existing swale beginning in the west end of Sub-basin A will direct flows towards the proposed private detention basin in the southwest corner of the site, as seen in Back Pocket – Proposed Drainage Plan. The detention basin, with a depth of 5.17ft and a volume of 0.137 acre-feet, will detain a flow of 1.3 cfs for the 5-year storm and 4.2 cfs for the 100-year storm in Sub-basin A (according to the CUHP procedure), seen below in Appendix B – Developed Detention for Colorado Centre.

A trapezoidal channel located on the west end of the site discharges flows into the 0137-acre-foot Full Spectrum Extended Detention Basin. These flows produce a velocity of 2.86 feet per second (fps) and a depth of 0.253 feet for the 5-year storm and a velocity of 4.01 fps and a depth of 0.452 feet for the 100-year storm within the channel. This is 2.2 feet of freeboard for the 5-year storm and 2.0 feet of freeboard for the 100-year storm within the channel. More details on the Manning's normal depth calculation for the inlet channel are provided below in Appendix B.

Doesnt match MHFD Spreadsheet or text above

proposed at outlet structure, will ultimately be tied into an existing line?

The detention basin will have post-detention peak flows of 0.8 cfs for the 5-year storm and 3.0 cfs for the 100-year storm. This detention basin will outlet 5-year flows through a series of orifices spaced at 0, 1, and 1.5 feet above the bottom of the basin. The detention basin will, conversely, outlet 100-year flows through an existing 24" diameter outlet pipe with a flow restrictor plate set at 4.7" above the pipe invert. More details can be found in the Appendix B – Outlet Structure Design. Basin drain times and stage versus volume figures are shown below in Appendix B – Developed Detention for Colorado Centre.

8.0 WATER QUALITY

Provide additional information on existing system and condition, ultimate outfall, capacity, outlet protection, etc.

Water quality for the site will be achieved through a 0.137-acre-foot proposed private Full Spectrum Extended Detention Basin (FS/EDB) and a private 'Type OS2' Outlet Structure tied into an existing private 24" corrugated metal pipe outlet provided for the private EDB (See *MHFD Detention Basin Stage-Storage Table Builder* in Appendix B for reference). The private EDB drains an area of 3.35 acres that is 32.80% impervious and will have a volume of 0.137-acre-ft. The Water Quality capture volume will be 0.036 acre-ft. Calculations for the private EDB and outlet structure design are included in Appendix B of this report.

9.0 EROSION CONTROL PLAN

The site construction consists of constructing a new administration building and asphalt drive, disturbing 2.65 acres of area. This requires an Erosion and Stormwater Quality Control Permit. The Grading and Erosion Control Plan will be submitted in separate Construction Plans.



10.0 FLOODPLAIN STATEMENT

No portion of the developed site is located within a designated FEMA 100-year floodplain according to the information published in the Federal Emergency Management Agency Flood Plain Map No. 08041C0769G dated December 7th, 2018.

11.0 DRAINAGE BASIN FEES

The proposed development is located within the Jimmy Camp Creek Drainage Basin.

2022 Jimmy Camp Creek Drainage Fees

Drainage fees are waived because Colorado Centre Metropolitan District owns and maintains the drainage infrastructure within its boundaries.

2022 Jimmy Camp Creek Bridge Fees

Bridge fees are waived because Colorado Centre Metropolitan District owns and maintains the bridges within its boundaries.

12.0 CONSTRUCTION COST OPINION

The private, non-reimbursable Control Measures (CM) Financial Assurances costs of construction are as follows:

Description	Quantity	Unit Cost	Amount
OUTLET STRUCTURE	1 EA	\$3,000	\$3,000
CONCRETE FOREBAY	1 LS	\$500	\$500
2' CONC. PAN	120 LF	\$20	\$2,400
FSD/EDB GRADING	1350 CY	\$10	\$13,500
CONCRETE STILLING BASIN	1 EA	\$2,500	\$2,500
RETAINING WALL	90 SF	\$20	\$1,800
		Sub-Total	\$23,700
		Engineering & Contingencies 10%	<u>\$2,370</u>
		Total	\$26,070

13.0 CONCLUSIONS

For this 7.73-acre site, work will include constructing a 4,542 sf administration building and asphalt driveway. Proposed detention allows flows to remain unchanged for the 5-year storm and decrease from 4.3 cfs to 3.0 cfs for the 100-year storm within Sub-basin A. In order to accommodate an area of disturbance greater than 1 acre, a 0.137-acre-foot Full Spectrum Extended Detention Basin is proposed that detains flows from Sub-basin A and releases 5-year storm and 100-year storm flows



through a Type OS2 Outlet Structure that is tied into an existing 24" corrugated metal pipe.

All areas disturbed by construction will be repaired, and erosion control measures will be installed during construction of the proposed site per the approved Grading and Erosion Control Plan to be submitted separately for review and approval. Site runoff, storm drains, and appurtenances associated with the development of the Colorado Centre Metropolitan District Administration building will not adversely affect the downstream and surrounding developments.

14.0 REFERENCES

Drainage Report for Colorado Centre Metropolitan District Water Treatment Facility, prepared by JDS-Hydro Consultants Inc in August 2015.

Flood Insurance Rate Map Number 08041C0769G, Federal Emergency Management Agency Floodplain Data, revised December 7, 2018

Municipal Code Corporation (2018). *Drainage Criteria Manual of El Paso County, Colorado (DPM)*

Urban Drainage and Flood Control District (June 2017). *Urban Storm Drainage Criteria Manual, Volume 1-3*.

USDA, NRCS. Soil Survey of El Paso County Area, Colorado.

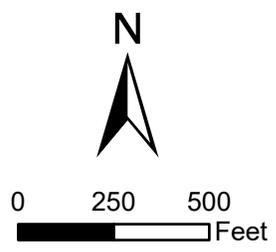
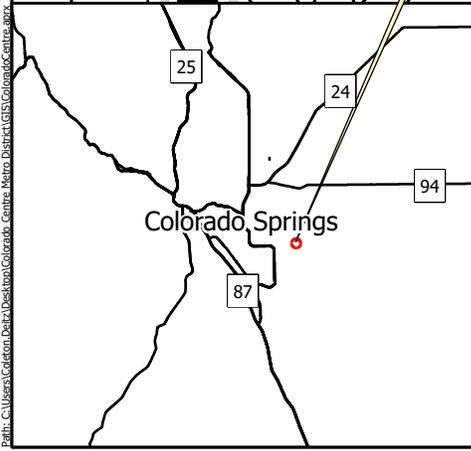
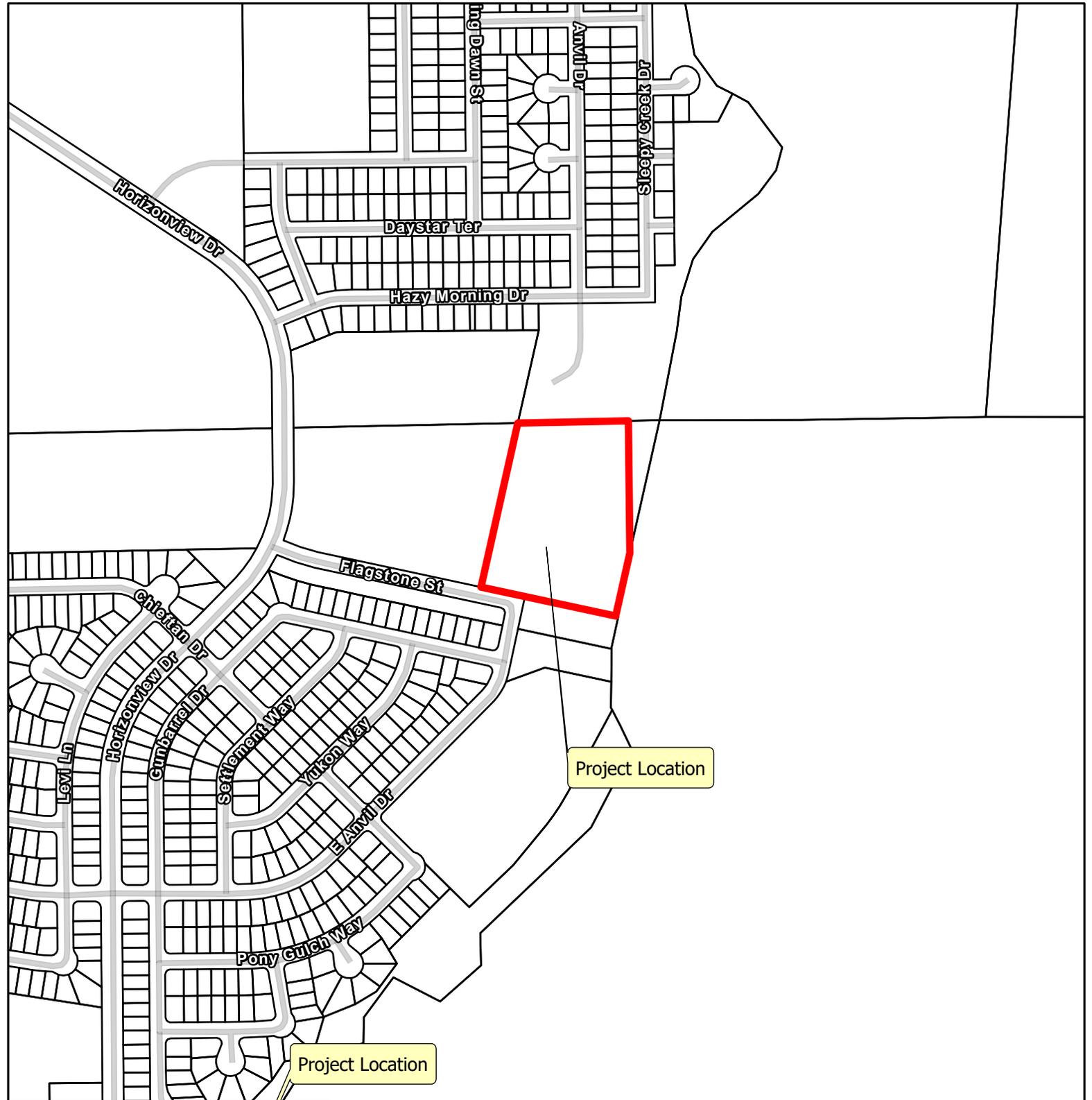


APPENDIX A
MAPS



APPENDIX A

MAPS



Prepared by:



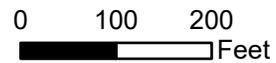
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 COLORADO SPRINGS, CO 80903
 WWW.RESPEC.COM (719) 266-5212

COLORADO CENTRE METROPOLITAN DISTRICT
 ADMINISTRATION BUILDING

VICINITY MAP

Esri Community Maps Contributors, © OpenStreetMap, Microsoft, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA

Path: C:\Users\Colson\Desktop\Colorado_Centre_Metro_District\GIS\Colorado_Centre.aprx



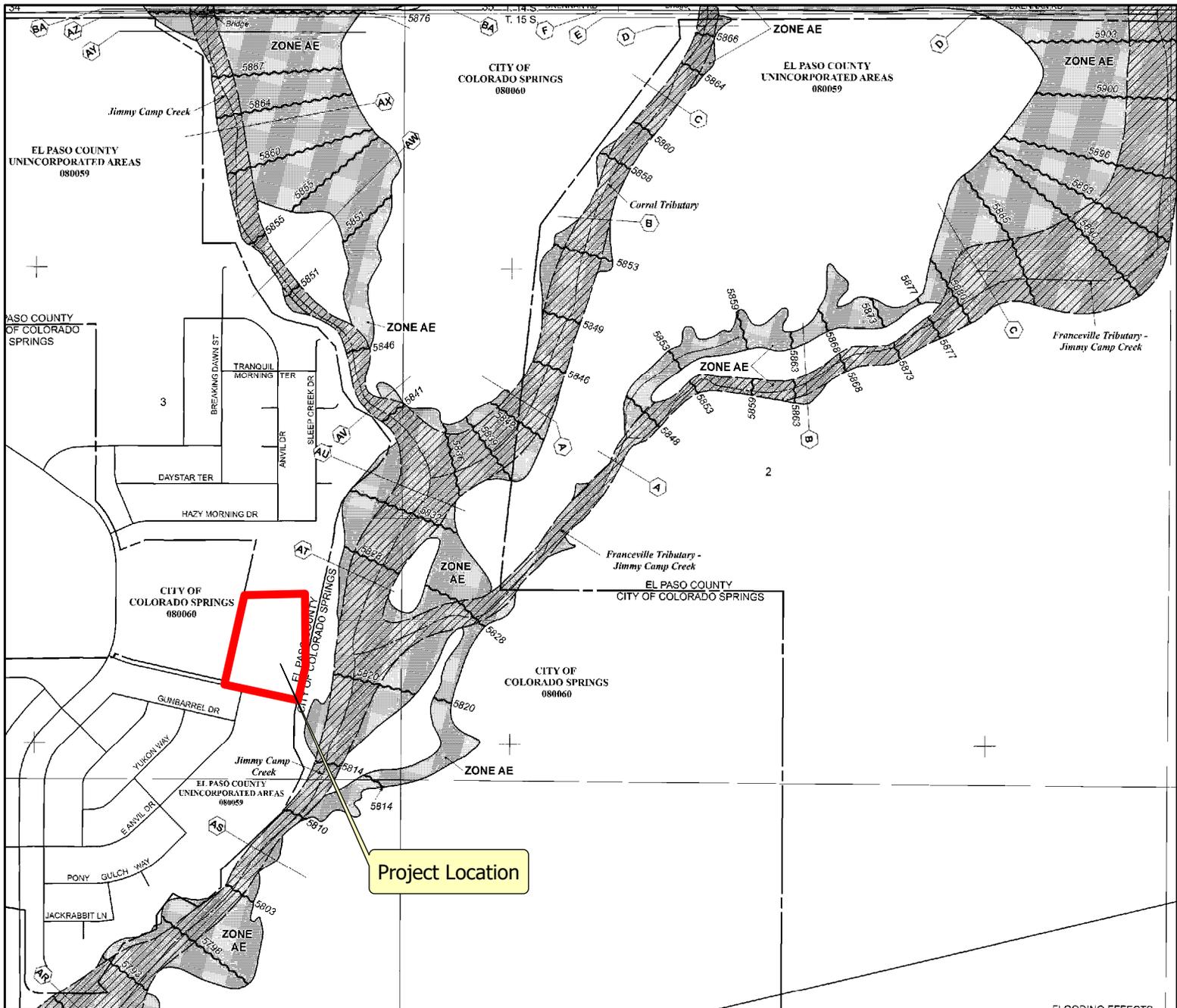
Map Unit Symbol	Map Unit Name	Rating	Percent of Site, %
28	Ellicot loamy coarse sand, 0 to 5 percent slopes	A	0
101	Ustic Torrfluvents, loamy	B	100.0

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COLORADO CENTRE METROPOLITAN DISTRICT
 ADMINISTRATION BUILDING
SOILS MAP



Project Location

FLOODING EFFECTS FROM JIMMY CAMP CREEK - EAST TRIBUTARY



0 500 1,000 Feet

NFP

PANEL 0769G

FIRM
FLOOD INSURANCE RATE MAP
EL PASO COUNTY,
COLORADO
AND INCORPORATED AREAS

PANEL 769 OF 1300
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
COLORADO SPRINGS, CITY OF	080060	0769	G
EL PASO COUNTY	080059	0769	G

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

MAP NUMBER
08041C0769G

MAP REVISED
DECEMBER 7, 2018

Federal Emergency Management Agency



Prepared by:



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COLORADO CENTRE METROPOLITAN DISTRICT
ADMINISTRATION BUILDING

FIRM MAP

Esri Community Maps Contributors, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, Esri, NASA, NGA, USGS, FEMA, Maxar



APPENDIX B

CALCULATIONS

Colorado Centre Metropolitan District Administration Building									
PROJ.247.07									
C FACTOR CALCULATION SHEET									
EXISTING CONDITIONS									
RUNOFF COEFICIENT									
TYPE A/B SOILS									
LAND USE		Imperv %	5 YR	100 YR					
UNDEV		0	0.08	0.35					
GRAVEL ROAD		80	0.59	0.7					
ASPHALT ROAD		100	0.9	0.96					
ROOFS		90	0.73	0.81					
EXISTING CONDITIONS									
	TOTAL	SURFACE CONDITION AREAS				CALCULATED C			
AREA	AREA	UNDEV	GRAVEL	ASPHALT	ROOFS	5	100	% IMPERVIOUS	
DESIG.	(acre)		ROAD	ROAD		YR	YR		
Aex	2.55	2.51	0.00	0.04	0.00	0.09	0.36		1.45
Bex	0.17	0.00	0.00	0.17	0.00	0.90	0.96		100.00
Cex	2.87	2.72	0.00	0.07	0.08	0.12	0.38		4.95
Dex	0.71	0.71	0.00	0.00	0.00	0.08	0.35		0.00
Site Percent Impervious, %		5.54							

PROPOSED CONDITIONS									
RUNOFF COEFICIENT									
TYPE A/B SOILS									
LAND USE		Imperv %	5 YR	100 YR					
UNDEV		0	0.08	0.35					
GRAVEL ROAD		80	0.59	0.7					
ASPHALT ROAD		100	0.9	0.96					
ROOFS		90	0.73	0.81					
PROPOSED CONDITIONS									
	TOTAL	SURFACE CONDITION AREAS				CALCULATED C			
AREA	AREA	UNDEV	GRAVEL	ASPHALT	ROOFS	5	100	% IMPERVIOUS	
DESIG.	(acre)		ROAD	ROAD		YR	YR		
A	3.28	2.11	0.00	1.05	0.12	0.37	0.56	35.39	
B	0.17	0.00	0.00	0.17	0.00	0.90	0.96	100.00	
C	2.14	1.99	0.00	0.07	0.08	0.13	0.39	6.85	
D	0.65	0.65	0.00	0.00	0.00	0.08	0.35	0.00	
Site Percent Impervious, %		23.67							

**Colorado Centre Metropolitan District
Proposed Full Spectrum Detention Basin
Stage-Area Curve**

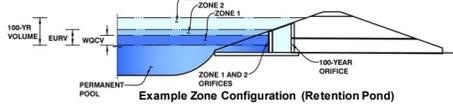
Elevation (ft)	Depth (ft)	Area (sf)	Area (ac)	Inc. Vol. (ac-ft)	Total Vol. (ac-ft)
5818.83	0	0	0	0.00	0.00
5819	5819	419	0.01	0.00	0.00
5820	5820	3075	0.07	0.04	0.04
5821	5821	4378	0.10	0.09	0.13
5822	5822	5338	0.12	0.11	0.24
5823	5823	6484	0.15	0.14	0.37
5824	5824	6940	0.16	0.15	0.53

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.05 (January 2022)

Project: Colorado Centre Metro District Admin Building

Basin ID: A



Example Zone Configuration (Retention Pond)

include elevations

Watershed Information

Selected BMP Type = **EDB**

Watershed Area = 3.28 acres

Watershed Length = 735 ft

Watershed Length to Centroid = 405 ft

Watershed Slope = 0.021 ft/ft

Watershed Imperviousness = 23.81% 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 = Denver - Capitol Building

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

Optional User Overrides

Water Quality Capture Volume (WQCV) = 0.036 acre-feet

Excess Urban Runoff Volume (EURV) = 0.079 acre-feet

2-yr Runoff Volume (P1 = 1.19 in.) = 0.082 acre-feet

5-yr Runoff Volume (P1 = 1.5 in.) = 0.143 acre-feet

10-yr Runoff Volume (P1 = 1.75 in.) = 0.199 acre-feet

25-yr Runoff Volume (P1 = 2 in.) = 0.289 acre-feet

50-yr Runoff Volume (P1 = 2.25 in.) = 0.354 acre-feet

100-yr Runoff Volume (P1 = 2.52 in.) = 0.444 acre-feet

500-yr Runoff Volume (P1 = 3.01 in.) = 0.577 acre-feet

Approximate 2-yr Detention Volume = 0.055 acre-feet

Approximate 5-yr Detention Volume = 0.080 acre-feet

Approximate 10-yr Detention Volume = 0.124 acre-feet

Approximate 25-yr Detention Volume = 0.149 acre-feet

Approximate 50-yr Detention Volume = 0.157 acre-feet

Approximate 100-yr Detention Volume = 0.190 acre-feet

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) = 0.036 acre-feet

Zone 2 Volume (EURV - Zone 1) = 0.043 acre-feet

Zone 3 Volume (100-year - Zones 1 & 2) = 0.111 acre-feet

Total Detention Basin Volume = 0.190 acre-feet

Initial Surcharge Volume (ISV) = user ft³

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 ft:V

Basin Length-to-Width Ratio (R_{L/W}) = user

Initial Surcharge Area (A_{ISV}) = user ft²

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 ft²

Volume of Basin Floor (V_{FLOOR}) = user ft³

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 ft²

Volume of Main Basin (V_{MAIN}) = user ft³

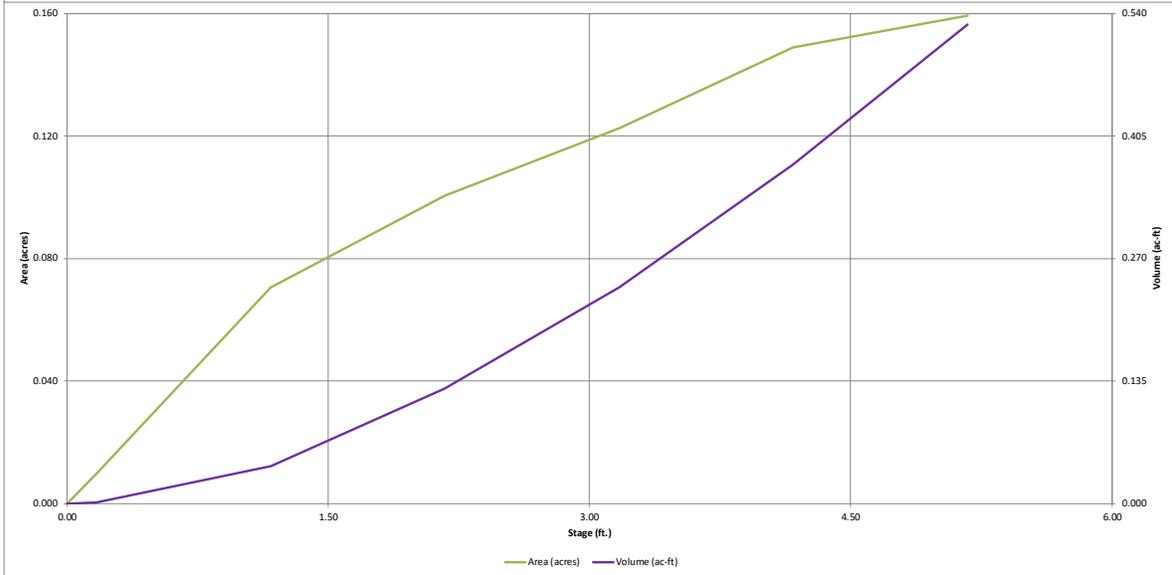
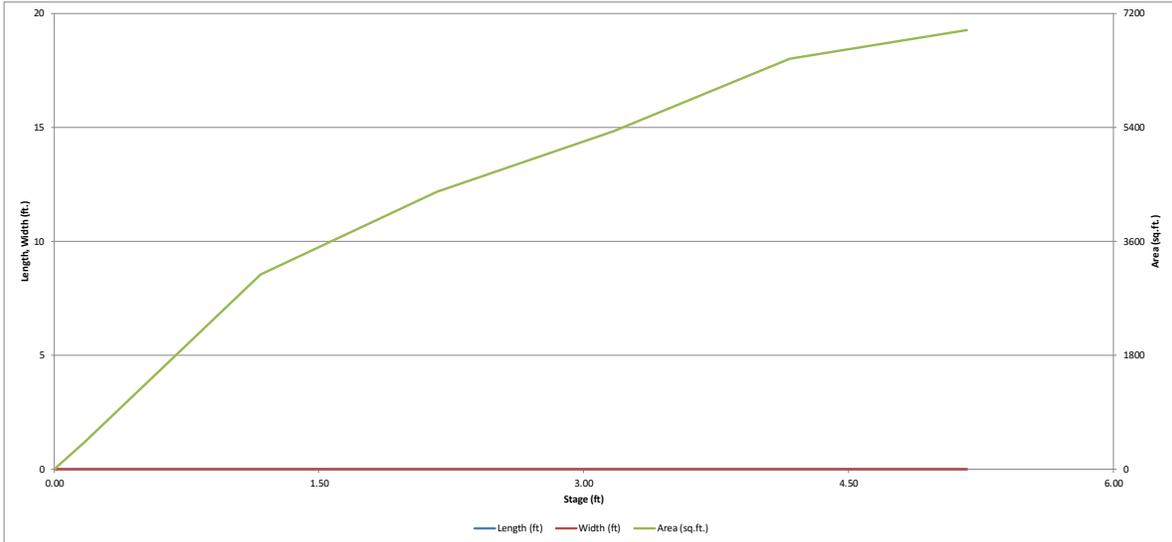
Calculated Total Basin Volume (V_{total}) = user acre-feet

Depth Increment = 0.10 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	--	--	--	0	0.000		
	--	0.17	--	--	--	419	0.010	36	0.001
	--	1.17	--	--	--	3,075	0.071	1,783	0.041
	--	2.17	--	--	--	4,378	0.101	5,509	0.126
	--	3.17	--	--	--	5,338	0.123	10,367	0.238
	--	4.17	--	--	--	6,484	0.149	16,278	0.374
	--	5.17	--	--	--	6,940	0.159	22,990	0.528

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

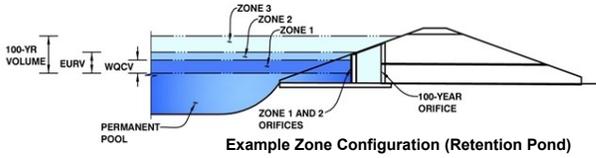
MHFD-Detention, Version 4.05 (January 2022)



DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD- Detention, Version 4.05 (January 2022)

Project: Colorado Centre Metro District Admin Building
Basin ID: A



	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	1.10	0.036	Orifice Plate
Zone 2 (EURV)	1.66	0.043	Orifice Plate
Zone 3 (100-year)	2.77	0.111	Weir&Pipe (Restrict)
Total (all zones)		0.190	

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 Diameter =	N/A	inches

Calculated Parameters for Underdrain		
Underdrain Orifice Area =	N/A	ft ²
Underdrain Orifice Centroid =	N/A	feet

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)
Depth at top of Zone using Orifice Plate =	2.40	ft (relative to basin bottom at Stage = 0 ft)
Orifice Plate: Orifice Vertical Spacing =	N/A	inches
Orifice Plate: Orifice Area per Row =	0.39	sq. inches (diameter = 11/16 inch)

Calculated Parameters for Plate		
WQ Orifice Area per Row =	2.708E-03	ft ²
Elliptical Half-Width =	N/A	feet
Elliptical Slot Centroid =	N/A	feet
Elliptical Slot Area =	N/A	ft ²

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	1.00	1.50					
Orifice Area (sq. inches)	0.39	0.39	0.39					
	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	
Invert of Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)
Vertical Orifice Diameter =	N/A	N/A	inches

Calculated Parameters for Vertical Orifice		
Vertical Orifice Area =	N/A	ft ²
Vertical Orifice Centroid =	N/A	feet

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	
Overflow Weir Front Edge Height, Ho =	1.70	N/A	ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length =	5.00	N/A	feet
Overflow Weir Grate Slope =	0.00	N/A	H:V
Horiz. Length of Weir Sides =	0.00	N/A	feet
Overflow Grate Type =	Type C Grate	N/A	
Debris Clogging % =	50%	N/A	%

Calculated Parameters for Overflow Weir		
Height of Grate Upper Edge, H _t =	1.70	N/A
Overflow Weir Slope Length =	0.00	N/A
Grate Open Area / 100-yr Orifice Area =	0.00	N/A
Overflow Grate Open Area w/o Debris =	0.00	N/A
Overflow Grate Open Area w/ Debris =	0.00	N/A

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

	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 Pipe Diameter =	24.00	N/A	inches
Restrictor Plate Height Above Pipe Invert =	4.70	N/A	inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate		
Outlet Orifice Area =	0.43	ft ²
Outlet Orifice Centroid =	0.23	feet
Half-Central Angle of Restrictor Plate on Pipe =	0.92	radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage =	2.70	ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length =	2.00	feet
Spillway End Slopes =	4.00	H:V
Freeboard above Max Water Surface =	1.00	feet

Calculated Parameters for Spillway		
Spillway Design Flow Depth =	0.58	feet
Stage at Top of Freeboard =	4.28	feet
Basin Area at Top of Freeboard =	0.15	acres
Basin Volume at Top of Freeboard =	0.39	acre-ft

Routed Hydrograph Results

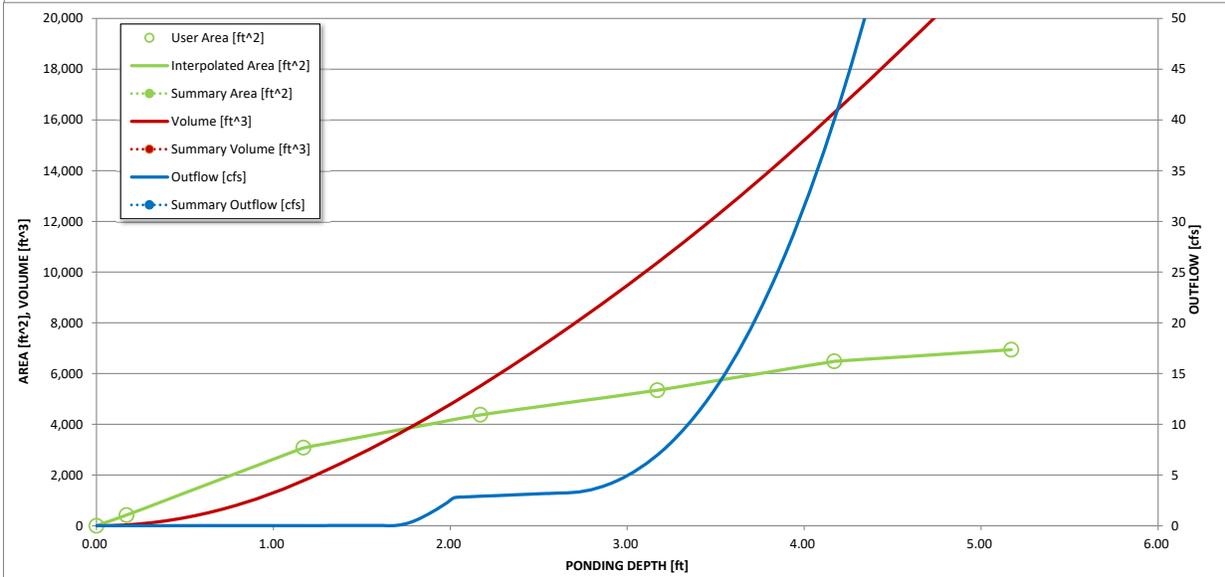
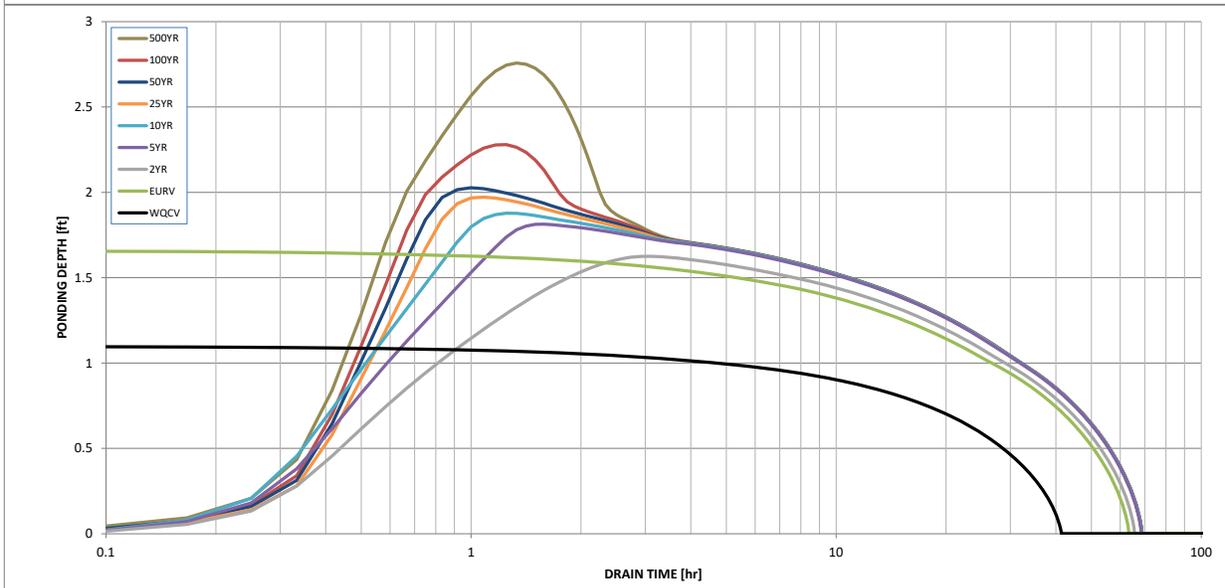
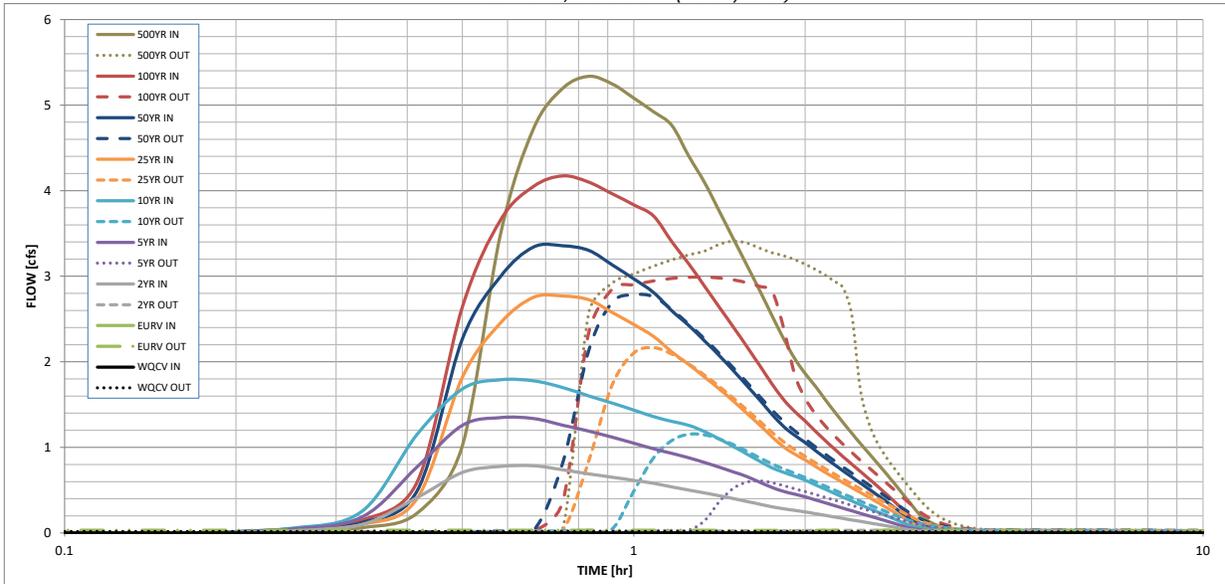
The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
Design Storm Return Period									
One-Hour Rainfall Depth (in)	N/A	N/A	1.19	1.50	1.75	2.00	2.25	2.52	3.01
CUHP Runoff Volume (acre-ft)	0.036	0.079	0.082	0.143	0.199	0.289	0.354	0.444	0.577
Inflow Hydrograph Volume (acre-ft)	N/A	N/A	0.082	0.143	0.199	0.289	0.354	0.444	0.577
CUHP Predevelopment Peak Q (cfs)	N/A	N/A	0.3	0.8	1.2	2.1	2.7	3.4	4.5
OPTIONAL Override Predevelopment Peak Q (cfs)	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre)	N/A	N/A	0.08	0.23	0.35	0.64	0.81	1.04	1.36
Peak Inflow Q (cfs)	N/A	N/A	0.8	1.3	1.8	2.8	3.4	4.2	5.3
Peak Outflow Q (cfs)	0.0	0.0	0.0	0.6	1.2	2.2	2.8	3.0	3.4
Ratio Peak Outflow to Predevelopment Q	N/A	N/A	N/A	0.8	1.0	1.0	1.0	0.9	0.8
Structure Controlling Flow	Plate	Plate	Plate	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Outlet Plate 1	Outlet Plate 1	Spillway
Max Velocity through Grate 1 (fps)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
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	58	60	60	58	54	52	49	45
Time to Drain 99% of Inflow Volume (hours)	40	61	63	65	64	62	61	60	58
Maximum Ponding Depth (ft)	1.10	1.66	1.62	1.81	1.88	1.97	2.03	2.28	2.76
Area at Maximum Ponding Depth (acres)	0.07	0.09	0.08	0.09	0.09	0.09	0.10	0.10	0.11
Maximum Volume Stored (acre-ft)	0.036	0.079	0.076	0.092	0.098	0.107	0.112	0.137	0.188

update

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.05 (January 2022)



S-A-V-D Chart Axis Override	X-axis	Left Y-Axis	Right Y-Axis
minimum bound			
maximum bound			

DETENTION BASIN OUTLET STRUCTURE DESIGN

Outflow Hydrograph Workbook Filename: _____

Inflow Hydrographs

The user can override the calculated inflow hydrographs from this workbook with inflow hydrographs developed in a separate program.

Time Interval	SOURCE	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP
	TIME	WQCV [cfs]	EURV [cfs]	2 Year [cfs]	5 Year [cfs]	10 Year [cfs]	25 Year [cfs]	50 Year [cfs]	100 Year [cfs]	500 Year [cfs]
5.00 min	0:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	0:15:00	0.00	0.00	0.03	0.04	0.06	0.04	0.05	0.05	0.06
	0:20:00	0.00	0.00	0.10	0.19	0.26	0.10	0.12	0.15	0.23
	0:25:00	0.00	0.00	0.41	0.77	1.15	0.40	0.50	0.60	1.02
	0:30:00	0.00	0.00	0.71	1.26	1.68	1.82	2.27	2.64	3.49
	0:35:00	0.00	0.00	0.78	1.35	1.79	2.45	3.00	3.66	4.72
	0:40:00	0.00	0.00	0.79	1.34	1.78	2.75	3.34	4.05	5.20
	0:45:00	0.00	0.00	0.74	1.26	1.70	2.77	3.36	4.17	5.34
	0:50:00	0.00	0.00	0.69	1.19	1.60	2.73	3.30	4.10	5.25
	0:55:00	0.00	0.00	0.65	1.12	1.52	2.58	3.13	3.96	5.08
	1:00:00	0.00	0.00	0.61	1.05	1.44	2.44	2.97	3.83	4.92
	1:05:00	0.00	0.00	0.58	0.98	1.36	2.30	2.81	3.70	4.76
	1:10:00	0.00	0.00	0.54	0.93	1.30	2.11	2.60	3.40	4.40
	1:15:00	0.00	0.00	0.50	0.88	1.26	1.97	2.42	3.14	4.09
	1:20:00	0.00	0.00	0.47	0.82	1.18	1.82	2.24	2.88	3.75
	1:25:00	0.00	0.00	0.43	0.77	1.09	1.68	2.07	2.63	3.42
	1:30:00	0.00	0.00	0.40	0.71	1.01	1.53	1.89	2.40	3.12
	1:35:00	0.00	0.00	0.37	0.66	0.92	1.39	1.72	2.17	2.82
	1:40:00	0.00	0.00	0.34	0.59	0.84	1.26	1.55	1.95	2.54
	1:45:00	0.00	0.00	0.31	0.53	0.76	1.12	1.39	1.74	2.27
	1:50:00	0.00	0.00	0.28	0.49	0.71	1.01	1.24	1.56	2.04
	1:55:00	0.00	0.00	0.26	0.45	0.66	0.92	1.14	1.42	1.86
	2:00:00	0.00	0.00	0.25	0.42	0.62	0.85	1.06	1.31	1.72
	2:05:00	0.00	0.00	0.23	0.39	0.56	0.78	0.97	1.19	1.56
	2:10:00	0.00	0.00	0.21	0.35	0.51	0.71	0.88	1.08	1.42
	2:15:00	0.00	0.00	0.19	0.32	0.46	0.65	0.80	0.98	1.29
	2:20:00	0.00	0.00	0.17	0.29	0.42	0.59	0.72	0.89	1.16
	2:25:00	0.00	0.00	0.15	0.26	0.37	0.53	0.65	0.80	1.05
	2:30:00	0.00	0.00	0.14	0.23	0.33	0.47	0.58	0.72	0.94
	2:35:00	0.00	0.00	0.12	0.20	0.29	0.42	0.52	0.64	0.83
	2:40:00	0.00	0.00	0.10	0.17	0.25	0.37	0.45	0.56	0.73
	2:45:00	0.00	0.00	0.09	0.15	0.22	0.32	0.39	0.48	0.62
	2:50:00	0.00	0.00	0.07	0.12	0.18	0.26	0.33	0.40	0.52
	2:55:00	0.00	0.00	0.06	0.10	0.14	0.21	0.26	0.32	0.42
	3:00:00	0.00	0.00	0.05	0.07	0.11	0.16	0.20	0.25	0.32
	3:05:00	0.00	0.00	0.03	0.05	0.08	0.12	0.14	0.18	0.23
	3:10:00	0.00	0.00	0.02	0.04	0.07	0.08	0.10	0.12	0.16
	3:15:00	0.00	0.00	0.02	0.03	0.05	0.06	0.07	0.09	0.12
	3:20:00	0.00	0.00	0.02	0.03	0.04	0.04	0.06	0.06	0.09
	3:25:00	0.00	0.00	0.01	0.02	0.04	0.03	0.04	0.05	0.07
	3:30:00	0.00	0.00	0.01	0.02	0.03	0.03	0.03	0.03	0.05
	3:35:00	0.00	0.00	0.01	0.02	0.02	0.02	0.03	0.02	0.03
	3:40:00	0.00	0.00	0.01	0.01	0.02	0.02	0.02	0.02	0.02
	3:45:00	0.00	0.00	0.01	0.01	0.02	0.01	0.02	0.01	0.02
	3:50:00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.02
	3:55:00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01
4:00:00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	
4:05:00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.01	
4:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	
4:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
4:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
4:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
4:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
4:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
4:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
4:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
4:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
4:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
5:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
5:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
5:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
5:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
5:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
5:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
5:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
5:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
5:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
5:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
5:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
5:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
6:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

Manning Formula: Pond Inlet Channel - 5 Year Flow

Irregular Section

Input

Flow 3.7 cfs
 Slope 0.044 ft/ft

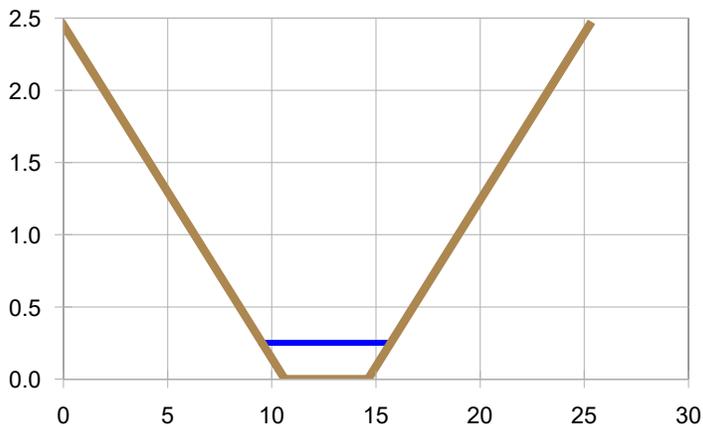
Sta	Elev	n	Sta	Elev	n	Sta	Elev	n	Sta	Elev	n
0	2.45	0.04	10.62	0	0.04	14.62	0	0.04	25.24	2.45	0.04

Output

WSElev 0.253 ft
 Flow Area 1.29 sf
 Velocity 2.86 fps
 Velocity Head 0.127 ft
 Top Width 6.20 ft
 Froude Number 1.11
 Critical WSElev 0.269 ft
 Critical Slope ft/ft

permanent check dams do not seem necessary with flows like this. please explain why rock checks are proposed

Update the section or the grading plan to match. The grading plan shows a v-ditch channel.



Manning Formula: Pond Inlet Channel - 100 Year Flow

Irregular Section

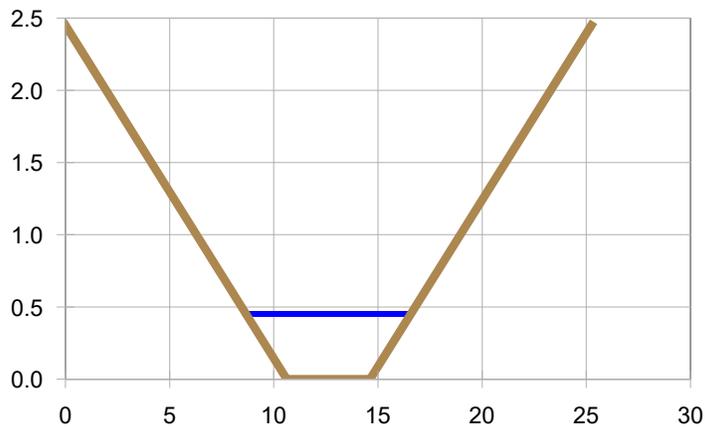
Input

Flow 10.8 cfs
Slope 0.044 ft/ft

Sta	Elev	n	Sta	Elev	n	Sta	Elev	n	Sta	Elev	n
0	2.45	0.04	10.62	0	0.04	14.62	0	0.04	25.24	2.45	0.04

Output

WSElev 0.452 ft
Flow Area 2.69 sf
Velocity 4.01 fps
Velocity Head 0.250 ft
Top Width 7.92 ft
Froude Number 1.21
Critical WSElev 0.504 ft
Critical Slope ft/ft





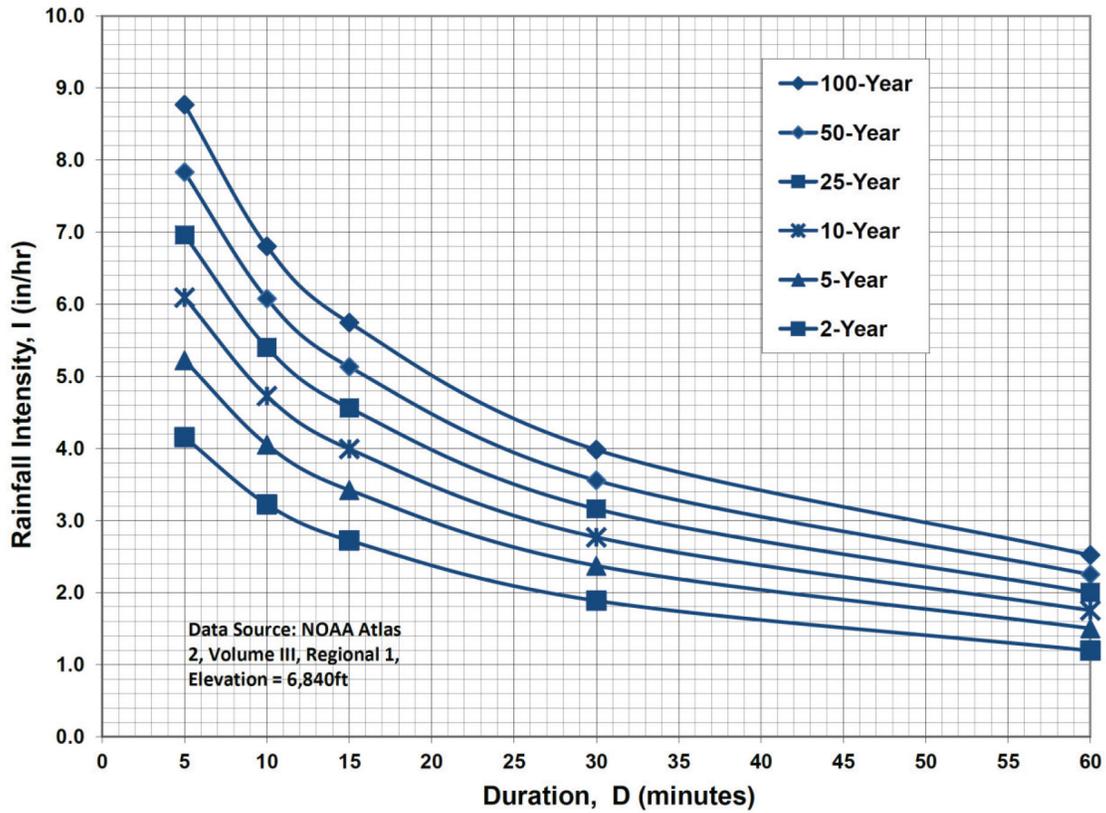
APPENDIX C

DESIGN CHARTS



Historic Flow Analysis—Greenbelts, Agriculture	2	0.03	0.05	0.09	0.16	0.17	0.26	0.26	0.38	0.31	0.45	0.36	0.51
Pasture/Meadow	0	0.02	0.04	0.08	0.15	0.15	0.25	0.25	0.37	0.30	0.44	0.35	0.50
Forest	0	0.02	0.04	0.08	0.15	0.15	0.25	0.25	0.37	0.30	0.44	0.35	0.50
Exposed Rock	100	0.89	0.89	0.90	0.90	0.92	0.92	0.94	0.94	0.95	0.95	0.96	0.96
Offsite Flow Analysis (when landuse is undefined)	45	0.26	0.31	0.32	0.37	0.38	0.44	0.44	0.51	0.48	0.55	0.51	0.59
Streets													
Paved	100	0.89	0.89	0.90	0.90	0.92	0.92	0.94	0.94	0.95	0.95	0.96	0.96
Gravel	80	0.57	0.60	0.59	0.63	0.63	0.66	0.66	0.70	0.68	0.72	0.70	0.74
Drive and Walks	100	0.89	0.89	0.90	0.90	0.92	0.92	0.94	0.94	0.95	0.95	0.96	0.96
Roofs	90	0.71	0.73	0.73	0.75	0.75	0.77	0.78	0.80	0.80	0.82	0.81	0.83
Lawns	0	0.02	0.04	0.08	0.15	0.15	0.25	0.25	0.37	0.30	0.44	0.35	0.50

Figure 6-5. Colorado Springs Rainfall Intensity Duration Frequency



IDF Equations

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

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

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

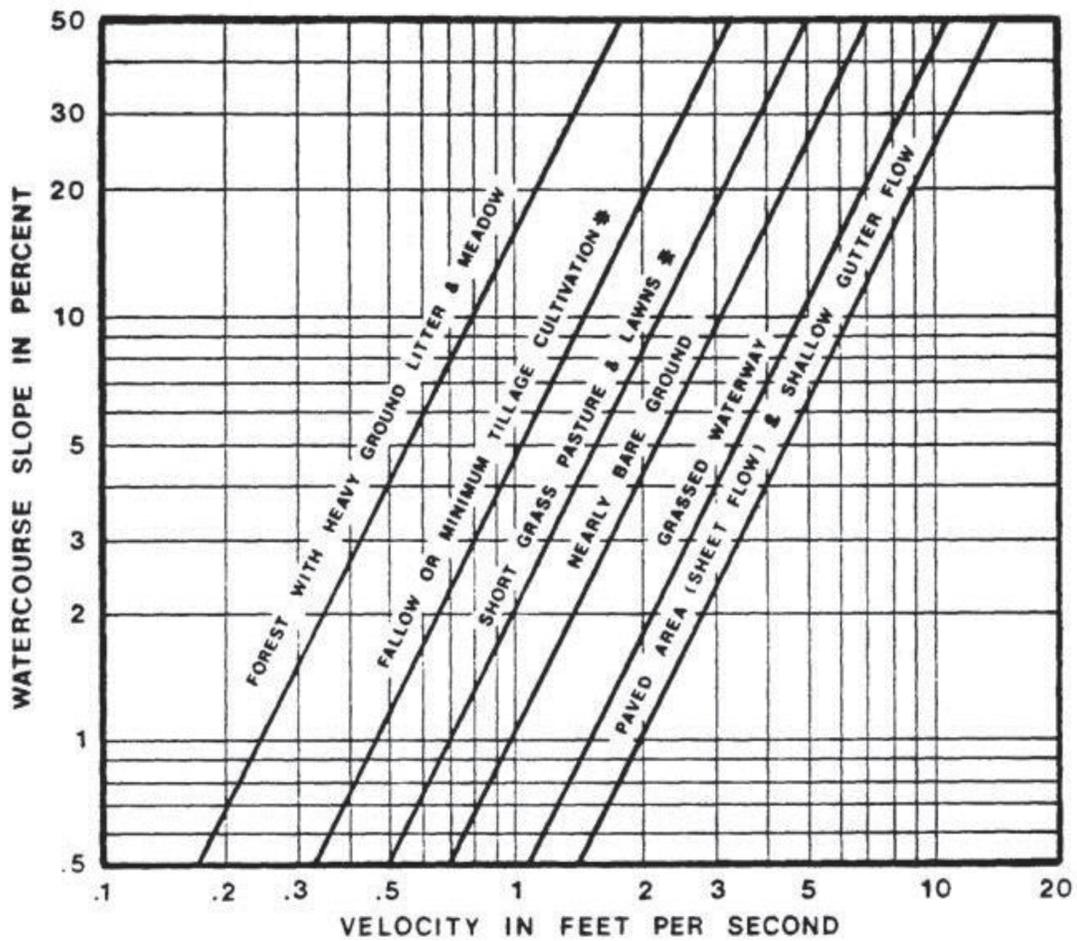
$$I_{10} = -1.75 \ln(D) + 8.847$$

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

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

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

Figure 6-25. Estimate of Average Concentrated Shallow Flow



3.0 Colorado Urban Hydrograph Procedure

3.1 Background

The Colorado Urban Hydrograph Procedure (CUHP) is a method of hydrologic analysis based upon the unit hydrograph principle. A unit hydrograph is defined as the hydrograph of one inch of direct runoff from the tributary area resulting from a storm of a given duration. The unit hydrograph thus represents the integrated effects of factors such as tributary area, shape, street pattern, channel capacities, and street and land slopes. The basic premise of the unit hydrograph is that individual hydrographs resulting from the successive increments of excess rainfall that occur throughout a storm period will be proportional in discharge throughout their runoff period. Thus, the hydrograph of total storm discharge is obtained by summing the ordinates of the individual sub-hydrographs.

CUHP has been developed and calibrated using rainfall-runoff data collected in Colorado (mostly in the Denver/Boulder metropolitan area). This section provides a general background in the use of the computer version of CUHP to perform stormwater runoff calculations. A detailed description of the CUHP method and the assumptions and equations used, including a hand calculation example, are provided in the CUHP User Manual. The latest version of the CUHP 2005 macro-enabled Excel workbook and User Manual are available for download from www.udfed.org.

3.2 Effective Rainfall for CUHP

Effective rainfall is that portion of precipitation during a storm event that runs off the land to streams. Those portions of precipitation that do not reach a stream are called abstractions and include interception by vegetation, evaporation, infiltration, storage in all surface depressions, and extended duration surface retention. The total design rainfall depth for use with CUHP should be obtained from the *Rainfall* chapter of the USDCM. This chapter illustrates a method for estimating the amount of rainfall that actually becomes surface runoff whenever a design rainstorm is used.

3.2.1 Pervious-Impervious Areas

As described in Section 2.5.1, the urban landscape is comprised of pervious and impervious surfaces. The degree of imperviousness is the primary variable that affects the volumes and rates of runoff calculated using CUHP. When analyzing a watershed for design purposes, the probable future percent of impervious area must first be estimated. A complete tabulation of recommended values of total percentage imperviousness is provided in Table 6-3 and Figures 6-1 through 6-3. References to impervious area and all calculations in this chapter are based on the input of total impervious areas. The pervious-impervious area relationship can be further refined for use in CUHP as follows:

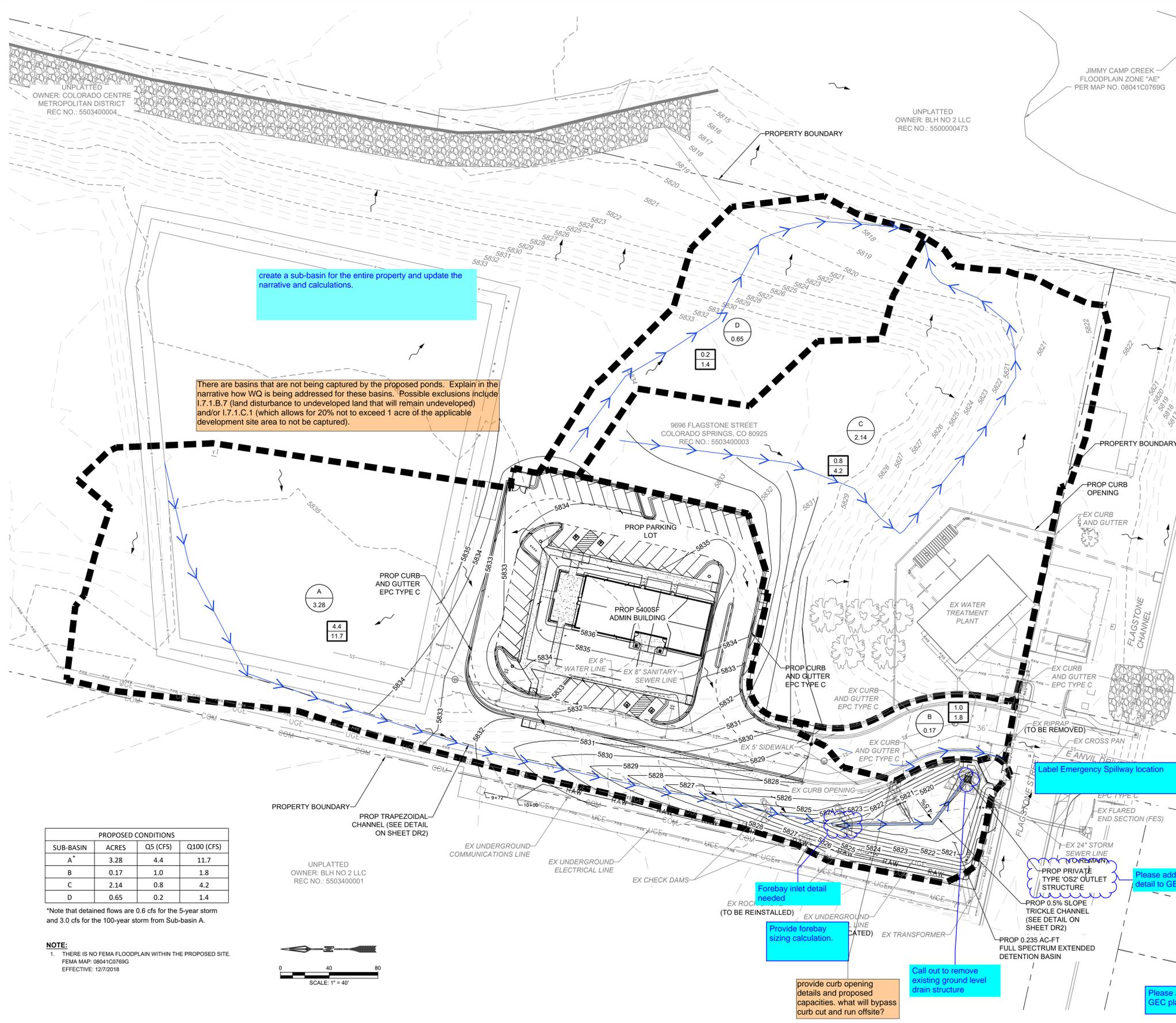
- **DCIA:** Impervious area portion directly connected to the drainage system.
- **UIA:** Impervious area portion that drains onto or across pervious surfaces.
- **RPA:** The portion of pervious area receiving runoff from impervious portions.
- **SPA:** The separate pervious area portion not receiving runoff from impervious surfaces.

This further refinement is explained in more detail in the CUHP User Manual and in Chapter 3 of the USDCM Volume 3.



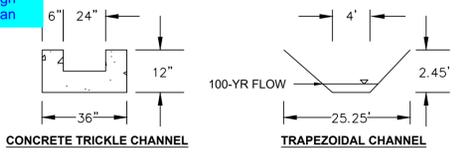
BACK POCKET

2022/11/01 2:13 PM By: Colston, Deitz N:\Projects\247 Colorado Centre Building Support\Drawings\Working\Drainage\DWG\Proposed Drainage Plan.dwg



- BENCHMARKS**
- SURVEY CONTROL POINT AS SHOWN HERON. ELEVATIONS ARE BASED UPON CITY OF COLORADO SPRINGS "FIMS" VERTICAL DATUM. FIMS MONUMENT "TM_5" ELEVATION = 5824.02 (NGVD 29). "FIMS" ALUMINUM CAP STAMPED "TM-5" IN A ROAD BOX ON THE EAST SIDE OF MARKSHEFFEL ROAD, ABOUT 1/2 MILE SOUTH OF DRENNAN ROAD.
 - SURVEY CONTROL POINT AS SHOWN HERON. ELEVATIONS ARE BASED UPON CITY OF COLORADO SPRINGS "FIMS" VERTICAL DATUM. FIMS MONUMENT "TM_4" ELEVATION = 5856.50 (NGVD 29). "FIMS" ALUMINUM CAP STAMPED "TM-4" IN A ROAD BOX 26 FEET NORTH OF A FENCE CORNER AT THE SOUTHEAST CORNER OF MARKSHEFFEL ROAD AND DRENNAN ROAD.

- LEGEND**
- (A1A) PROPOSED BASIN DESIGNATION
 - XX PROPOSED BASIN AREA, ACRES
 - XX PROPOSED 5 YEAR STORM, CFS
 - XX PROPOSED 100 YEAR STORM, CFS
 - XX XX.X XX.X PROPOSED DESIGN POINT
 - XX.X XX.X XX.X PROPOSED 5 YEAR ACCUMULATED FLOW, CFS
 - XX.X XX.X XX.X PROPOSED 100 YEAR ACCUMULATED FLOW, CFS
 - PROPOSED DIRECTION OF DRAINAGE FLOW
 - PROPOSED SUB-BASIN BOUNDARY
 - 7290 PROPOSED MAJOR CONTOUR
 - 7291 PROPOSED MINOR CONTOUR
 - 7290 EXISTING MAJOR CONTOUR
 - 7291 EXISTING MINOR CONTOUR
 - PROPOSED TIME OF CONCENTRATION PATH
 - PROPOSED CHANNEL FLOWLINE
 - RAW PROPOSED NON-POTABLE WATERLINE
 - W EXISTING WATER MAIN
 - SS EXISTING SANITARY MAIN SEWER
 - RAW EXISTING NON-POTABLE WATERLINE
 - UGE EXISTING UNDERGROUND ELECTRIC
 - COM EXISTING TELECOMMUNICATION LINE
 - EXISTING FENCE
 - EXISTING PROPERTY BOUNDARY



PROPOSED CONDITIONS			
SUB-BASIN	ACRES	Q5 (CFS)	Q100 (CFS)
A	3.28	4.4	11.7
B	0.17	1.0	1.8
C	2.14	0.8	4.2
D	0.65	0.2	1.4

*Note that detained flows are 0.6 cfs for the 5-year storm and 3.0 cfs for the 100-year storm from Sub-basin A.

NOTE:
1. THERE IS NO FEMA FLOODPLAIN WITHIN THE PROPOSED SITE.
FEMA MAP: 08041C0769G
EFFECTIVE: 12/7/2018

create a sub-basin for the entire property and update the narrative and calculations.

There are basins that are not being captured by the proposed ponds. Explain in the narrative how WQ is being addressed for these basins. Possible exclusions include 1.7.1.B.7 (land disturbance to undeveloped land that will remain undeveloped) and/or 1.7.1.C.1 (which allows for 20% not to exceed 1 acre of the applicable development site area to not be captured).

Label Emergency Spillway location

Forebay inlet detail needed

Provide forebay sizing calculation.

provide curb opening details and proposed capacities. what will bypass curb cut and run offsite?

Call out to remove existing ground level drain structure

Please add design detail to GEC Plan

Please add pond design details to GEC plan

JDS-HYDRO a Division of **RESPEC**
5540 TECH CENTER DR., SUITE 100
COLORADO SPRINGS, COLORADO 80919
(719) 227-0072

UNPLANNED THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS. ANY ERRORS OR OMISSIONS SHALL BE REPORTED TO JDS-HYDRO, A DIVISION OF RESPEC. JDS-HYDRO ASSUMES NO LIABILITY FOR UNAUTHORIZED CHANGES AND/OR REVISIONS MADE TO PLANS.

COLORADO CENTRE METROPOLITAN DISTRICT
ADMINISTRATION BUILDING
PROPOSED DRAINAGE PLAN

NO.	DESCRIPTION	BY	APP.	DATE
1				
2				
3				
4				
5				
6				
7				

Project No.: 247.07
Date: 09/2022
Design: CTD
Drawn: CTD
Check: RGG

DR2
SHEET 2 OF 2