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Preliminary Drainage Report
Meadow Lake Industrial Phase 1
El Paso County, Colorado

April 2024

HR Green Project No: 2202774

Prepared For:

Meadowlake Developments, LLC

Contact: Kevin O'Neil

PO Box 1385

Colorado Springs, CO 80901

Prepared By:

HR Green Development, LLC

Contact: Colleen Monahan, P.E., LEED AP

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(719) 394-2433

PCD File No. SP236

Engineer's Statement

The attached drainage plan and report were prepared under my direction and supervision and are correct to the best of my knowledge and belief. Said drainage report has been prepared according to the criteria established by the County for drainage reports and said report is in conformity with the applicable master plan of the drainage basin. I accept responsibility for any liability caused by any negligent acts, errors or omissions on my part in preparing this report.

_____

Colleen Monahan, P.E., LEED AP Date

State of Colorado No. 56067

For and on behalf of HR Green Development, LLC

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.

By: _____ _____

Authorized Signature Date

Address: Meadowlake Developments, LLC

PO Box 1385

Colorado Springs, CO 80901

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.

_____

Joshua Palmer, P.E. Date

County Engineer/ECM Administrator

Conditions:

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APPENDICES

I. General Purpose, Location and Description

a. Purpose

The purpose of the Preliminary Drainage Report (PDR) for Meadow Lake Industrial Phase 1 is to describe the onsite and offsite drainage patterns, size drainage infrastructure to safely capture and convey developed runoff to water quality and detention facilities, and to safely route detained stormwater to adequate outfalls.

b. General Location

Meadow Lake Industrial is 254 acres of undeveloped land. Meadow Lake Industrial Phase 1, referred to as 'the site' herein, is a 51.3-acre portion of the overall 254 acres that is zoned for Industrial and will be developed as an industrial subdivision. The remaining area will be undeveloped.

The site lies within a part of the east half of Section 9, Township 13 South, Range 64 West of the 6th P.M., El Paso County, Colorado. The site is bound to the north and west by undeveloped unplatted land, to the east by Curtis Road, and to the south by Falcon Highway. There are A vicinity map is presented in Appendix A.

c. Description of Property

The property is currently undeveloped and unplatted. Meadow Lake Industrial Phase 1 will plat 27 industrial lots and two drainage tracts on approximately 51.3 acres. The site is generally bisected by a ridge that directs stormwater east towards Curtis Road and west towards an unnamed tributary. The unnamed tributary runs north-south through the site, however; all development will occur east of the tributary.

The site is part of two major drainage basins: Haegler Ranch Basin and Solberg Ranch Basin. The basins are depicted on the drainage maps in Appendix E.

There are no existing utilities and no known irrigation facilities on the site. Onsite vegetation consists primarily of native grasses and weeds. The topography is gently sloping with 2-4% grades. Per a NRCS web soil survey, the site's soil is comprised of Type A soils: Blakeland loamy sand, Truckton loamy sand and Columbine gravelly sandy loam, Type B soil Stapleton sandy loam, and Type D soil Fluvaquentic Haplaquolls. A NRCS soil survey is presented in Appendix A.

d. Floodplain Statement

Based on FEMA FIRM 08041C0558G & 08041C0566G, revised December 7, 2018, there are no floodplains (Zone A or Zone X) within the Phase 1 boundary. Zone A areas determined to be within the 1.0% annual chance flood but do not have base flood elevations established. Zone X are areas determined to be outside the 0.2% annual chance flood. The FIRM is presented in Appendix A.

II. Drainage Design Criteria

a. Drainage Criteria

Hydrologic data and calculations were performed using the El Paso County Drainage Criteria Manual Volume 1 & 2 (EPCDCM), with current revisions.

Onsite drainage improvements are designed for the 5-year storm (minor event) and 100-year storm (major event) using rainfall values from CCSDCM Table 6-2. Runoff was calculated per CCSDCM Section 6.3.0 - Rational Method. Full spectrum pond design was completed using the latest version of Mile High Flood District's (MHFD) UD-Detention per CCSDCM Section 13.3.2.1. The detention pond allowable release rate will be limited to less than historic rates.

Table 6-2: Rainfall Depths for El Paso County		
Return Period (yr)	5	100
1-hr Rainfall Depth (in)	1.50	2.52

Inlets were sized per the methods described in EPCDCM Section III Chapter 7 – Street Drainage and Storm Water Inlets. Storm sewer was sized per the methods described in EPCDCM Section III Chapter 8 – Storm Drains and Appurtenances.

III. Drainage Basins and Subbasins

a. Major Basin Descriptions

The site is part of two major drainage basins: Haegler Ranch Basin and Solberg Ranch Basin. The basins are depicted on the drainage maps in Appendix E. Of the 51.3 acres of Meadow Lake Industrial Phase 1, approximately 8.75 acres of the north part of the site drains to an existing roadside swale in Curtis Road that then travels northerly as part of Haegler Ranch Basin, ultimately draining to Chico Creek. The remainder of the south side of site, 42.55 acres, lies within Solberg Ranch Drainage Basin and drains to the unnamed tributary on the site to a culvert on the north side of Falcon Highway to under Falcon Highway and ultimately to Chico Creek.

The Haegler Ranch drainage basin was studied in the “Haegler Ranch Basin Drainage Basin Planning Study” in May 2009. The Solberg Ranch Basin does not have an associated Drainage Basin Planning Study.

b. Previous Drainage Studies

A portion of the site was previously studied as part of the Haegler Ranch Basin Drainage Basin Planning Study (DBPS), dated May 2009, by URS. Haegler Ranch is an unnamed tributary, eventually tributary to Black Squirrel Creek. The overall Haegler Ranch Basin flows to the southeast from north of Eastonville Road to McDaniels Road with a total of 16.6 sq mi in El Paso County, Colorado. Much of the existing basin consists of 2- and 5- acre residential lots surrounded by open space range land with gently rolling topography used for agriculture and later parcels with homes. Some higher density residential is planned in the northern part of the basin. The study did not identify any drainage concerns or recommendations for the site.

A portion of the site lies within Solberg Ranch Basin. Solberg Ranch does not have a Drainage Basin Planning Study (DBPS) on file with El Paso County.

c. Existing Subbasin Description

Basin EX1 is 8.75 acres of undeveloped area and paved roadway. Stormwater (Q_5 = 3.4 cfs Q_{100} = 18.3 cfs) flows east offsite in a roadside ditch adjacent to Curtis Road to DP2.

Basin EX2 is 30.77 acres of undeveloped area and paved roadway. Stormwater (Q_5 = 9.5 cfs Q_{100} = 57.8 cfs) flows south in a roadside ditch adjacent to Curtis Road to DP4.

Basin EX3 is 13.39 acres of undeveloped area and paved roadway. Stormwater (Q_5 = 4.5 cfs Q_{100} = 25.4 cfs) flows south in a roadside ditch adjacent to Curtis Road to DP6.

Basin EX4 is 7.03 acres of undeveloped area. Stormwater (Q_5 = 2.1 cfs Q_{100} = 14.3 cfs) flows west towards OS4 at DP8.

Basin OS1 is 2.83 acres of undeveloped area. Stormwater (Q_5 = 1.0 cfs Q_{100} = 6.7 cfs) flows east towards EX1 at DP1.

Basin OS2.1 is 5.34 acres of undeveloped area. Stormwater (Q_5 = 1.8 cfs Q_{100} = 11.9 cfs) flows north towards EX2 at DP3.

Basin OS2.2 is 0.37 acres of undeveloped area. Stormwater (Q_5 = 0.1 cfs Q_{100} = 0.9 cfs) flows north towards EX3 at DP5.

Basin OS3 is 3.96 acres of undeveloped area and paved roadway. Stormwater (Q_5 = 2.1 cfs Q_{100} = 9.2 cfs) flows south in a roadside ditch adjacent to Curtis Road to DP7.

Basin OS4 is 40.63 acres of undeveloped area and paved roadway. Stormwater (Q_5 = 10.7 cfs Q_{100} = 64.7 cfs) flows south towards an existing public box culvert and offsite at DP9.

please clarify where flows from DP 7 are conveyed to. Is it conveyed to DP9?

d. Proposed Subbasin Description

Basin A is 5.78 acres of roadway and undeveloped area. Stormwater (Q_5 = 8 ured at DP1 in a public 10' Type R sump inlet. In the event of inlet failure at DP1, a n Greenfield Avenue to Pond A. Basin A will be detained in Pond A.

Basin B is 1.10 acres of roadway and lot area. Stormwater (Q_5 = 3.6 cfs Q_{100} = 6.6 cfs) is captured at DP2 in a public 5' Type R sump inlet. In the event of inlet failure at DP2, an overflow path is provided in Greenfield Avenue to Pond A. Basin B will be detained in Pond A.

Added clarification to all basins.

Basin C is 3.01 acres of industrial lots and roadway. Stormwater (Q_5 = 7.0 cfs Q_{100} = 13.9 cfs) is captured at DP3 in a private 20' Type R on-grade inlet in Wild Iris Way. Basin C will be detained in Pond A. In the event of inlet failure at DP3, an overflow path is provided in Wild Iris Way to Pond A.

Basin D is 3.05 acres of industrial lots and roadway. Stormwater (Q_5 = 7.3 cfs Q_{100} = 14.6 cfs) is captured at DP4 in a private 20' Type R on-grade inlet in Wild Iris Way. Basin D will be detained in Pond A. In the event of inlet failure at DP3, an overflow path is provided in Wild Iris Way to Pond A.

Basin E is 3.68 acres of industrial lots and roadway. Stormwater (Q_5 = 8.8 cfs Q_{100} = 17.5 cfs) is captured at DP5 in a private 15' Type R sump inlet in Wild Iris Way. Basin E will be detained in Pond A. In the event of inlet failure at DP3, an overflow path is provided in Wild Iris Way to Pond A by overtopping the curb and gutter at the knuckle.

Basin F is 1.10 acres of industrial lots and roadway. Stormwater (Q_5 = 2.8 cfs Q_{100} = 5.2 cfs) is captured at DP6 in a private 15' Type R sump inlet in Wild Iris Way. Basin F will be detained in Pond A. In the event of inlet failure at DP3, an overflow path is provided in Wild Iris Way to Pond A by overtopping the curb and gutter at the knuckle.

DP6

Revised.

Basin G is 6.75 acres of industrial lots and undeveloped area. Stormwater (Q_5 = 2.0 cfs Q_{100} = 13.5 cfs) will remain undisturbed in this phase of development. Basin G will drain north offsite as part of the Haegler major drainage basin.

Basin H is 3.71 acres of industrial lots and undeveloped area. Stormwater (Q_5 = 7.7 captured at DP8 and conveyed in a swale to Pond A. Basin H will be detained in Po

Basin I is 1.12 acres of industrial lots and undeveloped area. Stormwater (Q_5 = 2.1 c captured at DP9 and conveyed in a swale to Pond A. Basin G will be detained in Po

Please clarify as there appears to be a storm pipe that collects flow from swale and then conveyed to the pond in the drainage plan.

Added clarification.

road

Revised.

Basin N has been split up.

Basin J is 3.14 acres and contains Pond A. Stormwater (Q_5 = 3.0 cfs Q_{100} = 9.6 cfs) sheet flows directly to Pond A. Basin J will be detained in Pond A.

Basin K is 0.24 acres of roadway. Stormwater (Q_5 = 1.0 cfs Q_{100} = 1.9 cfs) is captured at DP11 in a public 10' Type R sump inlet in Sagebrush Street. In the event of inlet failure at DP11, an overflow path is provided to Curtis Street. Basin K will be detained in Pond B.

Basin L is 0.24 acres of roadway. Stormwater (Q_5 = 1.0 cfs Q_{100} = 1.9 cfs) is captured at DP12 in a public 10' Type R sump inlet in Sagebrush Street. In the event of inlet failure at DP12, an overflow path is provided to Curtis Street. Basin K will be detained in Pond B.

Basin M and DP14 have been omitted as they are a ved. In order to keep all calculations consistent within this r gn points have not changed and remain sequential.

Basin N should be broken up into multiple basins as a portion of the basin flows to DP15, another flows to swale B, and another to basin R.

Basin N is 6.07 acres of industrial lots and roadway. Stormwater (Q_5 = 14.5 cfs Q_{100} = 28.9 cfs) is captured at DP15 in a public 15' Type R on-grade inlet in Mariposa Lily Court. Basin N will be detained in Pond B. In the event of inlet failure at DP15, an overflow path is provided in within the adjacent public roadway and access road that drain due south directly to Pond B.

Basin O is 3.04 acres of industrial lots and roadway. Stormwater (Q_5 = 7.2 cfs Q_{100} = 14.2 cfs) is captured at DP16 in a private 10' Type R on-grade inlet in Wildflower Court. Basin O will be detained in Pond B. In the event of inlet failure at DP16, an overflow path is provided in within the adjacent public roadway and access road that drain due south directly to Pond B.

Basin P is 3.20 acres of industrial lots and roadway. Stormwater (Q_5 = 7.8 cfs Q_{100} = 15.5 cfs) is captured at DP17 in a private 10' Type R on-grade inlet in Wildflower Court. Basin P will be detained in Pond B. In the event of inlet failure at DP17, an overflow path is provided within the adjacent public roadway and access road that drain due south directly to Pond B.

Basin Q is 1.01 acres of roadway. Stormwater (Q_5 = 4.0 cfs Q_{100} = 7.6 cfs) is captured at DP18 in a public 5' Type R sump inlet in Greenfield Avenue. In the event of inlet failure at DP18, flows will overtop the sump and flow to Pond B along the maintenance access road. Basin Q will be detained in Pond B. In the event of inlet failure at DP18, an overflow path is provided within the public roadway and access road that drain due south directly to Pond B.

Basin R is 1.42 acres of roadway. Stormwater (Q_5 = 2.5 cfs Q_{100} = 7.9 cfs) is captured at DP19 in a public 10' Type R sump inlet in Greenfield Avenue. In the event of inlet failure at DP19, flows will overtop the sump and flow to Pond B along the maintenance access road. Basin R will be detained in Pond B. In the event of inlet failure at DP19, an overflow path is provided within the public roadway and access road that drain due south directly to Pond B.

Basin S is 0.85 acres of grass swale. Stormwater (Q_5 = 0.3 cfs Q_{100} = 1.9 cfs) is captured at DP21 and conveyed in a swale to Pond B. Basin S will be detained in Pond B.

Basin T is 1.40 acres and contains Pond B. Stormwater (Q_5 = 0.5 cfs Q_{100} = 3.2 cfs) sheet flows directly to Pond B. Basin T will be detained in Pond B.

Basin OS1 2.83 acres of undeveloped land. Stormwater (Q_5 = 1.0 cfs Q_{100} = 6.7 cfs) flows east into subbasin G at DP E1.

Accounted for and added description.

Please account for the Curtis road improvements (widening and turn lane) required by this development. Coordinate with the traffic engineer. Be sure to address increase in flows/detention and water quality for these improvements

Basin ROW1 is 1.95 acres of right of way. Stormwater (Q_5 = 1.4 cfs Q_{100} = 5.0 cfs) flows north in a roadside ditch adjacent to Curtis Road to DP E2.

Basin ROW2 is 2.99 acres of right of way. Stormwater (Q_5 = 1.9 cfs Q_{100} = 7.1 cfs) flows south in a roadside ditch adjacent to Curtis Road to DP E7.

Basin ROW3 is 6.44 acres of right of way. Stormwater (Q_5 = 2.4 cfs Q_{100} = 11.8 cfs) flows south in a roadside ditch adjacent to Curtis Road to DP E9.

Basin OS4 is 40.11 acres of undeveloped land. Stormwater (Q_5 = 10.5 cfs Q_{100} = 63.9 cfs) flows south in the unnamed tributary to E9.

A total flow summary of existing vs. proposed design points is below. Flows to all existing design points drainage offsite will not be increased.

Table 1 – DP Flow Comparison

DESIGN POINT	EX Q_5 (cfs)	PR Q_5 (cfs)	EX Q_{100} (cfs)	PR Q_{100} (cfs)
E1	1.0	1.0	6.7	6.7
E2	4.2	2.8	23.9	23.8
E4	10.9	2.6	67.6	21.4
E7	13.2	8.1	77.4	32.4
E8	2.1	0.5	14.3	14.3
E9	22.6	18.6	135.2	109.2

IV. Drainage Facility Design

a. General Concept

For all Meadow Lake Phase 1 lots draining to Solberg Ranch Drainage Basin, storm water will be collected and conveyed by a series of inlets, swales and storm sewer to two full spectrum water quality and detention ponds. The full spectrum water quality and detention ponds will discharge at less than historic rates.

For all Meadow Lake Phase 1 lots draining to Haegler Ranch Drainage Basin, onsite water quality and detention shall be the responsibility of the future property owner and shall be designed at the time of site development plan application.

b. Water Quality & Detention

Lots 1 & 15 (Basin G) - Haegler Ranch Drainage Basin - Lots 1 and 15 (Basin G on proposed conditions map) will provide their own detention and water quality treatment at time of Site Development Plan that will discharge to the Haegler Ranch Drainage Basin as it has gone historically.

Added note.

please also indicate that hydraulic analysis and design of the ditch will be provided with the final drainage report

Pond A - Solberg Ranch Drainage Basin

Water quality and detention for Basins A – F, and H - J is provided in a full spectrum water quality and detention pond: Pond A. Pond A is located in Tract A. A total of 24.94 acres at 65% imperviousness will be detained in the pond. The WQCV is 0.528 ac-ft, the EURV is 1.954 ac-ft, and the 100-year volume is 2.961 ac-ft. The WQCV, EURV and 100-year storms are released in 40, 69 and 72 hours, respectively. A forebay is located at the outfall into the pond and a 40" trickle channel conveys flow towards the outlet structure. A 15' wide ramp at a slope no greater than 12% slope is provided to the bottom of the pond to facilitate future maintenance. A 45' emergency overflow spillway is provided that conveys the developed, peak 100-yr flow rate with 1.0' of freeboard towards Curtis Road. The spillway will be lined with Type L riprap. The outfall for the pond drains into the existing roadside swale adjacent to Curtis Street. The total flow to this outfall point (DP E4) will remain at or less than existing flowrates for the minor and major storms. Pond design calculations are presented in Appendix D.

Pond B - Solberg Ranch Drainage Basin

Water quality and detention for Basins K - T is provided in a full spectrum water quality and detention pond: Pond B. Pond B is located in Tract B. A total of 17.47 acres at 73% imperviousness will be detained in the pond. The WQCV is 0.421 ac-ft, the EURV is 1.458 ac-ft, and the 100-year volume is 2.230 ac-ft. The WQCV, EURV and 100-year storms are released in 40, 69 and 71 hours, respectively. A forebay is located at the outfall into the pond and a 40" trickle channel conveys flow towards the outlet structure. A 15' wide ramp at a slope no greater than 12% slope is provided to the bottom of the pond to facilitate future maintenance. A 50' emergency overflow spillway is provided that conveys the developed, peak 100-yr flow rate with 1.0' of freeboard towards Curtis Road. The spillway will be lined with Type L riprap. The outfall for Pond B will be into a level spreader at DP8. The level spreader has been designed to drain runoff discharging from Pond B the same as existing conditions. Runoff draining from Pond B will be restricted so that there is no increase in the total runoff discharging to design point E8. Pond design calculations

please also identify the ultimate outfall of the pond (i.e. the un-named tributary)

c. Inspection and Maintenance

The private detention ponds are to be owned and maintained by a n
the project. Maintenance access for the full spectrum detention faci
drainage easements and tracts. A maintenance agreement with the County is required and will be provided with Final Drainage Report for this project.

Added.

d. Four Step Method to Minimize Adverse Impacts of Urbanization

Step 1 – Reducing Runoff Volumes: Low impact development (LID) practices are utilized to reduce runoff at the source. In general, stormwater discharges are routed across pervious areas prior to capture in storm sewer. This practice promotes infiltration and reduces peak runoff rates.

Step 2 – Treat and slowly release the WQCV: This step utilizes full spectrum water quality and detention to capture the WQCV and slowly release runoff from the site. Two onsite full spectrum detention ponds provide water quality treatment for the majority of the site. The WQCV is released over a period of 40 hours.

Lots 1 and 15 (Basin G on proposed conditions map) will provide their own detention and water quality treatment at time of Site Development Plan that will discharge to the Haegler Ranch Drainage Basin as it has gone historically.

Noted.

FYI: Please be aware that fees actual fees will be based on the year that the final plat is submitted

Step 3 – Stabilize stream channels: This step establishes practices to stabilize drainageways and provide scour protection at stormwater outfalls. Erosion protection is provided at all concentrated stormwater discharge points in the form of riprap pads.

Step 4 – Consider the need for source controls: This project has no need for specialized source controls.

e. Drainage and Bridge Fees

Solberg Ranch - 2024 Drainage Basin / Bridge Fees						
Drainage Fee/Impervious Acre	Bridge Fee/Impervious Acre	Site Acreage	Site Impervious	Impervious Acres	Drainage Fee	Bridge Fee
$24,832.00	$0	44.55	77%	34.30	$851,737.60	$0

Haegler Ranch - 2024 Drainage Basin / Bridge Fees						
Drainage Fee/Impervious Acre	Bridge Fee/Impervious Acre	Site Acreage	Site Impervious	Impervious Acres	Drainage Fee	Bridge Fee
$13,971.00	$2,062.00	6.75	77%	5.20	$72,649.20	$10,722.40

f. Opinion of Probable Cost

An engineer's opinion of probable cost is presented will be provided with the Final Drainage Report submittal.

g. Hydraulic Grade Line Analysis

A hydraulic grade line analysis of the proposed storm will be provided with the Final Drainage Report submittal.

V. Summary

Meadow Lake Industrial Phase 1 lies within the Solberg Ranch Drainage Basin and the Haegler Ranch Basin Drainage Basin. Water quality and detention for the site is provided in full spectrum water quality and detention ponds for all lots draining to the Solberg Ranch Drainage Basin in Ponds A and B. For Lots 1 and 15 draining to the Haegler Ranch Drainage Basin, they will provide their own detention and water quality treatment at time of Site Development Plan that will discharge to the Haegler Ranch Drainage Basin as it has gone historically. The water quality and detention ponds will be owned and maintained by a metropolitan district, to be established with the project. All drainage facilities were sized per the El Paso County Drainage Criteria Manuals. Offsite basins will not be affected by this project. The existing unnamed channel west of the proposed development will not be affected or its condition[illegible]site is less than existing rates to the ultimate outfall point into the channel[illegible]scribed herein.

Please provide a statement that the downstream and surrounding properties will not be adversely affected by this developments flows.

Added.

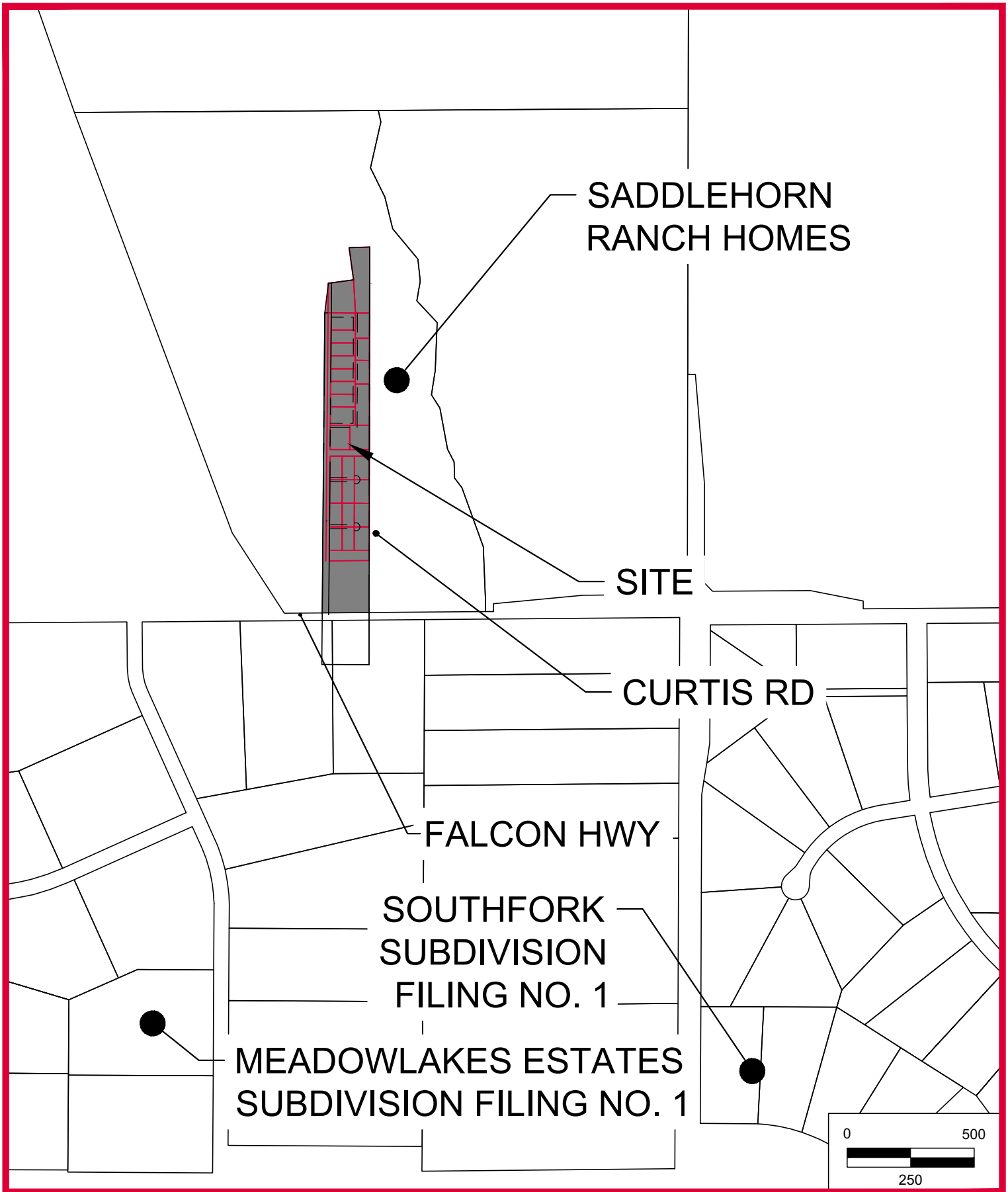
VI. Drawings

Please refer to the appendices for vicinity and drainage basin maps.

VII. References

1. Haegler Ranch Basin Drainage Basin Planning Study (DBPS), dated May 2009, by URS
2. City of Colorado Springs – Drainage Criteria Manual, May 2014, Revised January 2021.
3. Drainage Criteria Manual of El Paso, Colorado, October 2018.
4. Urban Storm Drainage Criteria Manual, Urban Drainage Flood Control District, January 2018.

APPENDIX A – VICINITY MAP, SOIL MAP, FEMA MAP



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NORTH

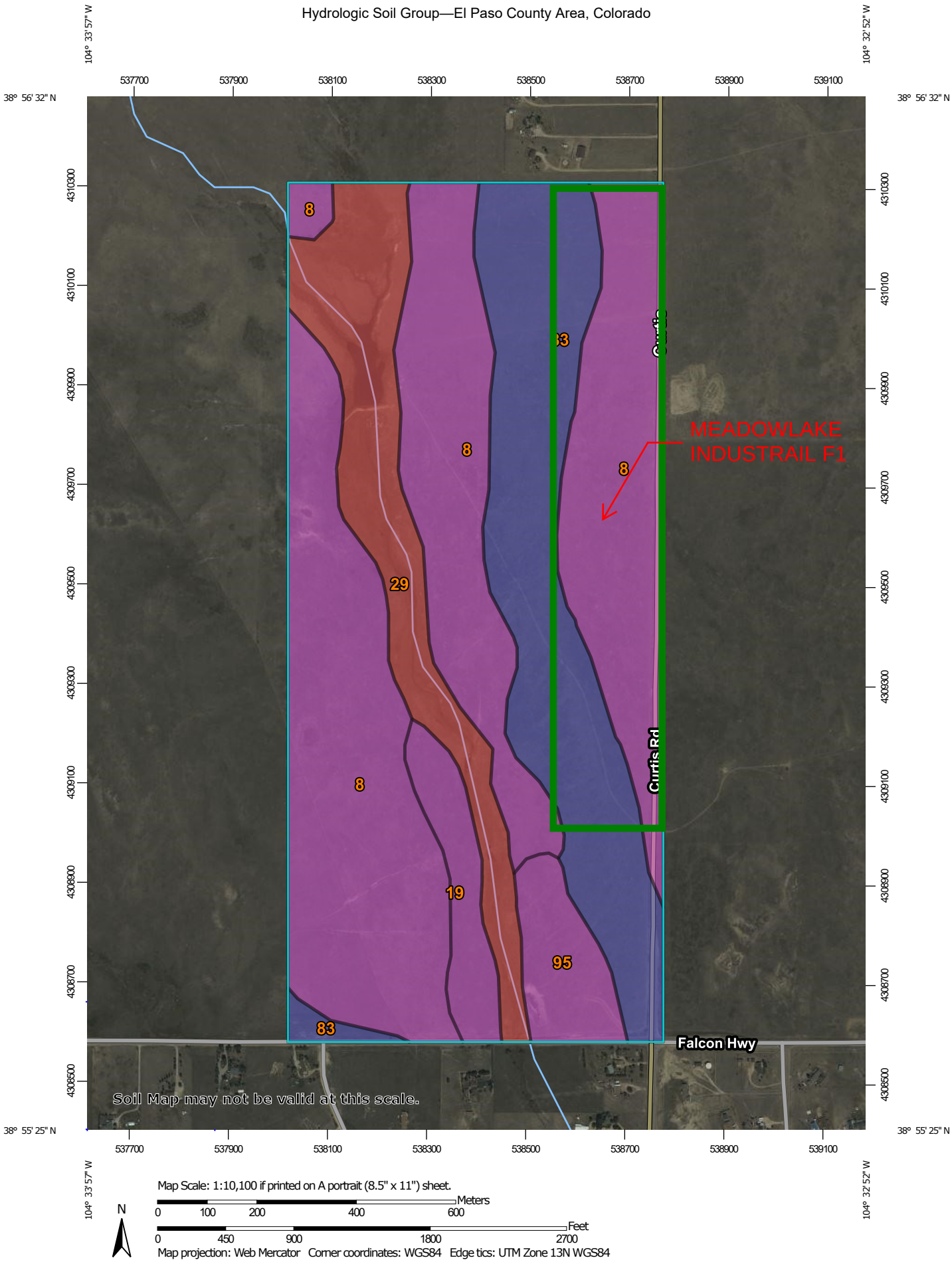
SHEET

VICINITY MAP

SCALE: 1"=500'

DATE: 06/08/2023

Xrefs: EPC_Parcels; 8.5x11_Titleblock


104° 33' 57" W
104° 32' 52" W
38° 56' 32" N
38° 55' 25" N
537700
537900
538100
538300
538500
538700
538900
539100
4310300
4310100
4309900
4309700
4309500
4309300
4309100
4308900
4308700
4308500
8
83
29
19
95
MEADOWLAKE INDUSTRAIL F1
Curtis Rd
Falcon Hwy
Soil Map may not be valid at this scale.
Map Scale: 1:10,100 if printed on A portrait (8.5" x 11") sheet.
N
Meters
0 100 200 400 600
Feet
0 450 900 1800 2700
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 20, Sep 2, 2022

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

Date(s) aerial images were photographed: Sep 11, 2018—Oct 20, 2018

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
8	Blakeland loamy sand, 1 to 9 percent slopes	A	174.3	53.7%
19	Columbine gravelly sandy loam, 0 to 3 percent slopes	A	13.3	4.1%
29	Fluvaquentic Haplaquolls, nearly level	D	47.2	14.5%
83	Stapleton sandy loam, 3 to 8 percent slopes	B	75.9	23.4%
95	Truckton loamy sand, 1 to 9 percent slopes	A	14.0	4.3%
Totals for Area of Interest			**324.7**	**100.0%**

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

NOTES TO USERS

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

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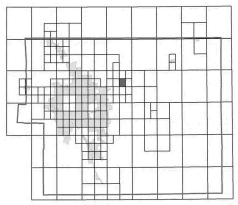
El Paso County Vertical Datum Offset Table

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



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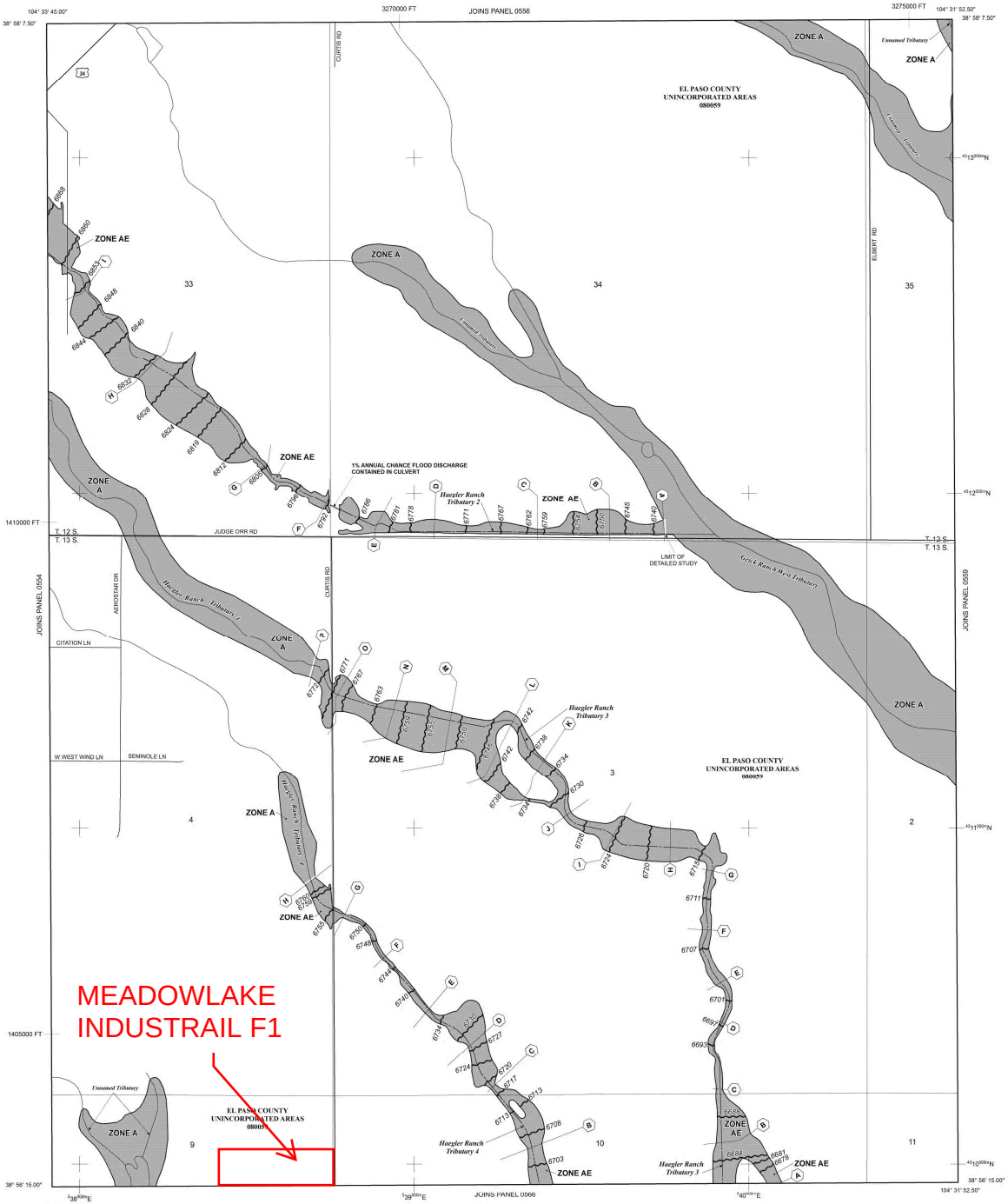
Additional Flood Hazard information and resources are available from local communities and the Colorado Water Conservation Board.



NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 12 SOUTH, RANGE 64 WEST, AND TOWNSHIP 13 SOUTH, RANGE 64 WEST.

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 encroachments 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
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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
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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.

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MAP SCALE 1" = 500'
250 0 500 1000 FEET
150 0 150 300 METERS

PANEL 0558G

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

EL PASO COUNTY, COLORADO AND INCORPORATED AREAS

PANEL 558 OF 1300

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
EL PASO COUNTY	080059	0558	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
08041C0558G

MAP REVISED
DECEMBER 7, 2018

Federal Emergency Management Agency

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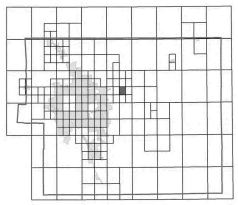

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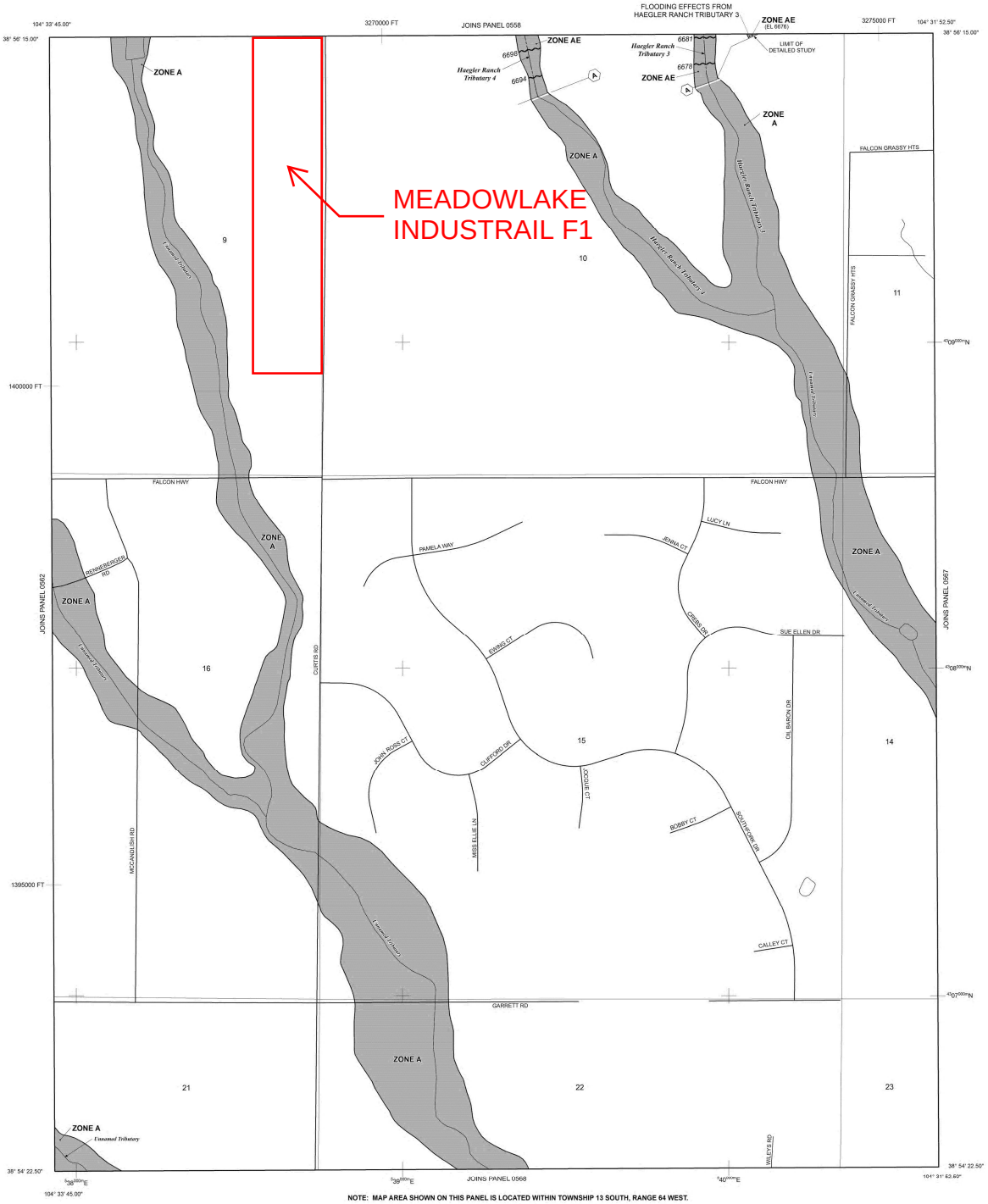

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* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

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MARCH 17, 1997

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
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250 0 500 1000 FEET
150 0 150 300 METERS

PANEL 0566G

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

EL PASO COUNTY, COLORADO AND INCORPORATED AREAS

PANEL 566 OF 1300

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
EL PASO COUNTY	080059	0566	G

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MAP NUMBER
08041C0566G

MAP REVISED
DECEMBER 7, 2018

Federal Emergency Management Agency

APPENDIX B – HYDROLOGIC CALCULATIONS

HRGreen	**MEADOWLAKE INDUSTRIAL**	**Calc'd by:**	**SPC**
	EXISTING CONDITIONS	**Checked by:**	**CM**
	EL PASO COUNTY, CO	**Date:**	**4/9/2024**

SUMMARY RUNOFF TABLE

BASIN	AREA (ac)	% IMPERVIOUS	Q_5 (cfs)	Q_{100} (cfs)
EX1	8.75	5	3.4	18.3
EX2	30.77	3	9.5	57.8
EX3	13.39	5	4.5	25.4
EX4	7.03	2	2.1	14.3
OS1	2.83	2	1.0	6.7
OS2.1	5.34	2	1.8	11.9
OS2.2	0.37	2	0.1	0.9
OS3	3.96	11	2.1	9.2
OS4	40.63	3	10.7	64.7

DESIGN POINT SUMMARY TABLE

DESIGN POINT	CONTRIBUTING BASINS	ΣQ_5 (cfs)	ΣQ_{100} (cfs)
1	OS1	1.0	6.7
2	EX1, DP1	4.2	23.9
3	OS2.1	1.8	11.9
4	EX2, DP3	10.9	67.6
5	OS2.2	0.1	0.9
6	EX3, DP5	13.2	79.9
7	OS3, DP6	13.2	77.4
8	EX4	2.1	14.3
9	OS4, DP7, DP8	22.6	135.2

MEADOWLAKE INDUSTRIAL
EXISTING CONDITIONS
EL PASO COUNTY, CO

Calc'd by: SPC

Checked by: CM

Date: 4/9/2024

SOIL TYPE: HSG A&B

COMPOSITE 'C' FACTORS

BASIN	LAND USE TYPE															TOTAL	COMPOSITE IMPERVIOUSNESS & C FACTOR			
	Historic Flow Analysis--Greenbelts, Agriculture			Paved			Land Use Undefined			Land Use Undefined			Land Use Undefined							
	%I	C_5	C_{100}	%I	C_5	C_{100}	%I	C_5	C_{100}	%I	C_5	C_{100}	%I	C_5	C_{100}					
	2	0.09	0.36	100	0.90	0.96	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00					
	ACRES			ACRES			ACRES			ACRES			ACRES			ACRES	%I	C_5	C_{100}
EX1	8.46			0.29												8.75	5	0.12	0.38
EX2	30.35			0.42												30.77	3	0.10	0.37
EX3	13.04			0.35												13.39	5	0.11	0.38
EX4	7.03															7.03	2	0.09	0.36
OS1	2.83															2.83	2	0.09	0.36
OS2.1	5.34															5.34	2	0.09	0.36
OS2.2	0.37															0.37	2	0.09	0.36
OS3	3.61			0.35												3.96	11	0.16	0.41
OS4	40.03			0.60												40.63	3	0.10	0.37

HRGreen	**MEADOWLAKE INDUSTRIAL**	**Calc'd by:**	**SPC**
	EXISTING CONDITIONS	**Checked by:**	**CM**
	EL PASO COUNTY, CO	**Date:**	**4/9/2024**

TIME OF CONCENTRATION

BASIN DATA			OVERLAND TIME (T_i)			TRAVEL TIME (T_t)					TOTAL	*tc=(L/180)+10*	**Design tc**
DESIGNATION	C_5	AREA (ac)	LENGTH (ft)	SLOPE %	t_i (min)	C_V	LENGTH (ft)	SLOPE %	V (ft/s)	t_t (min)	t_c (min)	*tc max*	*tc design (min)*
EX1	0.12	8.75	100	2.3	13.7	10	1270	3.0	1.7	12.2	25.9	17.6	17.6
EX2	0.10	30.77	100	2.2	14.1	10	1820	2.1	1.4	20.9	35.0	20.7	20.7
EX3	0.11	13.39	100	2.1	14.2	10	1889	1.9	1.4	22.8	37.0	21.1	21.1
EX4	0.09	7.03	100	2.4	13.8	10	1086	4.1	2.0	8.9	22.8	16.6	16.6
OS1	0.09	2.83	100	5.0	10.8	10	210	5.0	2.2	1.6	12.4	11.7	11.7
OS2.1	0.09	5.34	100	2.0	14.7	10	527	1.7	1.3	6.7	21.4	13.5	13.5
OS2.2	0.09	0.37	97	3.7	11.8	10	0	0.0	0.0	0.0	11.8	10.5	10.5
OS3	0.16	3.96	100	2.0	13.7	10	1160	2.0	1.4	13.7	27.3	17.0	17.0
OS4	0.10	40.63	100	5.5	10.4	10	3177	3.5	1.9	28.3	38.7	28.2	28.2

$$t_i = \frac{0.395(1.1 - C_5)\sqrt{L}}{S^{0.33}} \qquad V = C_v S_w^{0.5}$$

Table 6-7. Conveyance Coefficient, C_v

Type of Land Surface	C_v
Heavy meadow	2.5
Tillage/field	5
Riprap (not buried)*	6.5
Short pasture and lawns	7
Nearly bare ground	10
Grassed waterway	15
Paved areas and shallow paved swales	20

* For buried riprap, select C_v value based on type of vegetative cover.

HRGreen

MEADOWLAKE INDUSTRIAL
EXISTING CONDITIONS
DESIGN STORM: 5-YEAR

Calc'd by:	SPC
Checked by:	CM
Date:	4/9/2024

			DIRECT RUNOFF						TOTAL RUNOFF				STREET			PIPE				TRAVEL TIME			REMARKS
	DESIGN POINT	BASIN ID	AREA (ac)	C_5	t_c (min)	C_5*A (ac)	I (in./ hr.)	Q (cfs)	t_c (min)	C_5*A (ac)	I (in./ hr.)	Q (cfs)	Q_{street} (cfs)	C_5*A (ac)	SLOPE %	Q_{PIPE} (cfs)	C_5*A (ac)	SLOPE %	PIPE SIZE (ft)	LENGTH (FT)	VEL. (FPS)	TRAVEL TIME (min)	
	1	OS1	2.83	0.09	11.7	0.25	3.89	1.0	11.7	0.25	3.89	**1.0**	1.0	0.25	3.0					940	3.5	4.52	BASIN OS1 DRAINS INTO EX1 VIA SHEET FLOW AT DP1
	2	EX1	8.75	0.12	17.6	1.02	3.28	3.4	17.6	1.28	3.28	**4.2**											BASIN EX1 DRAINS NORTH OFFSITE VIA CHANNLEIZED FLOW AT DP2
	3	OS2.1	5.34	0.09	13.5	0.48	3.68	1.8	13.5	0.48	3.68	**1.8**	1.8	0.48	3.0					832	3.5	4.00	BASIN OS2.1 DRAINS INTO EX2 VIA SHEET FLOW AT DP3
	4	EX2	30.77	0.10	20.7	3.11	3.04	9.5	20.7	3.59	3.04	**10.9**	10.9	3.59	1.7					1150	2.6	7.35	BASIN EX2 DRAINS INTO EX3 VIA CHANNELIZED FLOW AT DP4
	5	OS2.2	0.37	0.09	10.5	0.03	4.05	0.1	10.5	0.03	4.05	**0.1**	0.1	0.03	1.9					1285	2.8	7.77	BASIN OS3 DRAINS INTO OS4 VIA CHANNELIZED FLOW AT DP5
	6	EX3	13.39	0.11	21.1	1.49	3.01	4.5	28.0	5.11	2.58	**13.2**	13.2	5.11	2.1					1015	2.9	5.84	BASIN EX3 DRAINS INTO OS3 VIA CHANNELIZED FLOW AT DP6
	7	OS3	3.96	0.16	17.0	0.64	3.33	2.1	33.9	5.75	2.30	**13.2**	13.2	5.75	3.7					853	3.8	3.70	BASIN OS3 DRAINS INTO OS4 VIA CHANNELIZED FLOW AT DP7
	8	EX4	7.03	0.09	16.6	0.63	3.37	2.1	16.6	0.63	3.37	**2.1**	2.1	0.63	1.4					1571	2.4	11.06	BASIN EX4 DRAINS INTO OS4 VIA SHEET FLOW AT DP8
	9	OS4	40.63	0.10	28.2	4.14	2.57	10.7	37.5	10.53	2.14	**22.6**											DP9 TOTAL FLOW OFFSITE AT EXISTING BOX CULVERTS

HRGreen

MEADOWLAKE INDUSTRIAL

EXISTING CONDITIONS

DESIGN STORM: 100-YEAR

Calc'd by:	SPC
Checked by:	CM
Date:	4/9/2024

			DIRECT RUNOFF						TOTAL RUNOFF				STREET			PIPE				TRAVEL TIME			REMARKS
	DESIGN POINT	BASIN ID	AREA (ac)	C_{100}	t_c (min)	C_{100}*A (ac)	I (in./ hr.)	Q (cfs)	t_c (min)	C_{100}*A (ac)	I (in./ hr.)	Q (cfs)	Q_{street} (cfs)	C_{100}*A (ac)	SLOPE %	Q_{PIPE} (cfs)	C_{100}*A (ac)	SLOPE %	PIPE SIZE (ft)	LENGTH (ft)	VEL. (ft/s)	TRAVEL TIME (min)	
	1	OS1	2.83	0.36	11.7	1.02	6.53	6.7	11.7	1.02	6.53	**6.7**	6.7	1.02	3.0					940	3.5	4.52	BASIN OS1 DRAINS INTO EX1 VIA SHEET FLOW AT DP1
	2	EX1	8.75	0.38	17.6	3.32	5.51	18.3	17.6	4.34	5.51	**23.9**											BASIN EX1 DRAINS NORTH OFFSITE VIA CHANNLEIZED FLOW AT DP2
	3	OS2.1	5.34	0.36	13.5	1.92	6.18	11.9	13.5	1.92	6.18	**11.9**	11.9	1.92	3.0					832	3.5	4.00	BASIN OS2.1 DRAINS INTO EX2 VIA SHEET FLOW AT DP3
	4	EX2	30.77	0.37	20.7	11.33	5.10	57.8	20.7	13.25	5.10	**67.6**	67.6	13.25	1.7					1150	2.6	7.35	BASIN EX2 DRAINS INTO EX3 VIA CHANNELIZED FLOW AT DP4
	5	OS2.2	0.37	0.36	10.5	0.13	6.80	0.9	10.5	0.13	6.80	**0.9**	0.9	0.13	1.9					1285	2.8	7.77	BASIN OS3 DRAINS INTO OS4 VIA CHANNELIZED FLOW AT DP5
	6	EX3	13.39	0.38	21.1	5.03	5.06	25.4	28.0	18.42	4.34	**79.9**	79.9	18.42	2.1					1015	2.9	5.84	BASIN EX3 DRAINS INTO OS3 VIA CHANNELIZED FLOW AT DP6
	7	OS3	3.96	0.41	17.0	1.64	5.60	9.2	33.9	20.05	3.86	**77.4**	77.4	20.05	3.7					853	3.8	3.70	BASIN OS3 DRAINS INTO OS4 VIA CHANNELIZED FLOW AT DP7
	8	EX4	7.03	0.36	16.6	2.53	5.66	14.3	16.6	2.53	5.66	**14.3**	14.3	2.53	1.4					1571	2.4	11.06	BASIN EX4 DRAINS INTO OS4 VIA SHEET FLOW AT DP8
	9	OS4	40.63	0.37	28.2	14.99	4.32	64.7	37.5	37.57	3.60	**135.2**											DP9 TOTAL FLOW OFFSITE AT EXISTING BOX CULVERTS

HRGreen	**MEADOWLAKE INDUSTRIAL**	**Calc'd by:**	**DH/AB**
	PROPOSED CONDITIONS	**Checked by:**	**NQJ**
	EL PASO COUNTY, CO	**Date:**	**4/9/2024**

SUMMARY RUNOFF TABLE

BASIN	AREA (ac)	% IMPERVIOUS	Q_5 (cfs)	Q_{100} (cfs)
A	5.78	45	8.4	19.9
B	1.10	96	3.6	6.6
C	3.01	80	7.0	13.9
D	3.05	80	7.3	14.6
E	3.68	80	8.8	17.5
F	1.10	90	2.8	5.2
G	6.75	2	2.0	13.5
H	3.71	74	7.7	15.8
I	1.12	67	2.1	4.6
J	3.14	25	3.0	9.6
K	0.24	90	1.0	1.9
L	0.24	90	1.0	1.9
N	6.07	80	14.5	28.9
O	3.04	80	7.2	14.2
P	3.20	80	7.8	15.5
Q	1.01	96	4.0	7.6
R	1.42	96	2.5	7.9
S	0.85	2	0.3	1.9
T	1.40	3	0.5	3.2
OS1	2.83	2	1.0	6.7
ROW1	1.95	17	1.4	5.0
ROW2	2.99	16	1.9	7.1
ROW3	6.44	7	2.4	11.8
OS4	40.11	3	10.5	63.9

DESIGN POINT SUMMARY TABLE

DESIGN POINT	CONTRIBUTING BASINS	ΣQ_5 (cfs)	ΣQ_{100} (cfs)
E1	OS1	1.0	6.7
7	G, DP E1	31.8	65.5
E2	ROW 1, DP 7	4.2	23.8
1	A	8.4	19.9
2	E	3.6	6.6
2.1	DP 1, DP 2	11.4	25.3
3	C	7.0	13.9
4	D	7.3	14.6
4.1	DP 3, DP 4	13.7	27.2
5	E	8.8	17.5
5.1	DP 2.1, DP5	18.0	38.3
5.2	DP 4.1, DP 5.1	29.3	60.8
6	F, DP 5.2	31.8	65.5
6.1	DP 6	31.8	65.5
8	H	7.7	15.8
9	I, DP 8	9.2	19.0
10	DP 6.1, DP 9	42.4	90.3
13	ROW2	1.9	7.1
E4	DP 13, POND A RELEASE	2.6	21.4
11	K	42.4	90.3
12	L, DP 11	42.4	90.3
12.1	DP 12	42.4	90.3
15	N	14.5	28.9
16	O	7.2	14.2
17	P	7.8	15.5
17.1	DP 16, DP 17	14.7	29.2
18	Q	4.0	7.6
19	R	2.5	7.9
19.1	DP 18, DP 19	17.5	37.7
20.1	DP 17.1, DP 19.1	23.8	50.2
21	S	1.7	4.4
22	T, DP 20.1, DP 21	13.7	55.7
E7	ROW 2, DP E4	8.1	32.4
E8	POND B RELEASE	0.5	14.3
E9	OS4, DP E7, DP E8	18.6	109.2

HRGreen	**MEADOWLAKE INDUSTRIAL**							**Calc'd by:**				**DH/AB**					
	PROPOSED CONDITIONS							**Checked by:**				**NQJ**					
	EL PASO COUNTY, CO							**Date:**				**4/9/2024**					

COMPOSITE 'C' FACTORS

BASIN	UNDEVELOPED	INDUSTRIAL	PAVED	TOTAL	SOIL TYPE	UNDEVELOPED			INDUSTRIAL			PAVED			COMPOSITE IMPERVIOUSNESS & C		
	ACRES					%I	C_5	C_{100}	%I	C_5	C_{100}	%I	C_5	C_{100}	%I	C_5	C_{100}
A	3.27	0.00	2.51	5.78	A/B	2	0.09	0.36	80	0.59	0.70	100	0.90	0.96	45	0.44	0.62
B	0.00	0.23	0.87	1.10	A/B	2	0.09	0.36	80	0.59	0.70	100	0.90	0.96	96	0.84	0.91
C	0.00	3.01	0.00	3.01	A/B	2	0.09	0.36	80	0.59	0.70	100	0.90	0.96	80	0.59	0.70
D	0.00	3.05	0.00	3.05	A/B	2	0.09	0.36	80	0.59	0.70	100	0.90	0.96	80	0.59	0.70
E	0.00	3.68	0.00	3.68	A/B	2	0.09	0.36	80	0.59	0.70	100	0.90	0.96	80	0.59	0.70
F	0.00	0.57	0.53	1.10	A/B	2	0.09	0.36	80	0.59	0.70	100	0.90	0.96	90	0.74	0.83
G	6.75	0.00	0.00	6.75	A/B	2	0.09	0.36	80	0.59	0.70	100	0.90	0.96	2	0.09	0.36
H	0.30	3.41	0.00	3.71	A/B	2	0.09	0.36	80	0.59	0.70	100	0.90	0.96	74	0.55	0.67
I	0.19	0.93	0.00	1.12	A/B	2	0.09	0.36	80	0.59	0.70	100	0.90	0.96	67	0.51	0.64
J	2.20	0.94	0.00	3.14	A/B	2	0.09	0.36	80	0.59	0.70	100	0.90	0.96	25	0.24	0.46
K	0.02	0.00	0.22	0.24	A/B	2	0.09	0.36	80	0.59	0.70	100	0.90	0.96	90	0.82	0.90
L	0.02	0.00	0.22	0.24	A/B	2	0.09	0.36	80	0.59	0.70	100	0.90	0.96	90	0.82	0.90
N	0.00	6.07	0.00	6.07	A/B	2	0.09	0.36	80	0.59	0.70	100	0.90	0.96	80	0.59	0.70
O	0.00	3.04	0.00	3.04	A/B	2	0.09	0.36	80	0.59	0.70	100	0.90	0.96	80	0.59	0.70
P	0.00	3.20	0.00	3.20	A/B	2	0.09	0.36	80	0.59	0.70	100	0.90	0.96	80	0.59	0.70
Q	0.20	0.20	0.81	1.01	A/B	2	0.09	0.36	80	0.59	0.70	100	0.90	0.96	96	0.86	0.98
R	0.28	0.28	1.14	1.42	A/B	2	0.09	0.36	80	0.59	0.70	100	0.90	0.96	96	0.86	0.98
S	0.85	0.00	0.00	0.85	A/B	2	0.09	0.36	80	0.59	0.70	100	0.90	0.96	2	0.09	0.36
T	1.38	0.00	0.02	1.40	A/B	2	0.09	0.36	80	0.59	0.70	100	0.90	0.96	3	0.10	0.37
OS1	2.83	0.00	0.00	2.83	A/B	2	0.09	0.36	80	0.59	0.70	100	0.90	0.96	2	0.09	0.36
ROW1	1.66	0.00	0.29	1.95	A/B	2	0.09	0.36	80	0.59	0.70	100	0.90	0.96	17	0.21	0.45
ROW2	2.57	0.00	0.42	2.99	A/B	2	0.09	0.36	80	0.59	0.70	100	0.90	0.96	16	0.20	0.44
ROW3	6.09	0.00	0.35	6.44	A/B	2	0.09	0.36	80	0.59	0.70	100	0.90	0.96	7	0.13	0.39
OS4	39.51	0.00	0.60	40.11	A/B	2	0.09	0.36	80	0.59	0.70	100	0.90	0.96	3	0.10	0.37
Pond A				25.69											65		
Pond B				17.47											73		

HRGreen	**MEADOWLAKE INDUSTRIAL**	**Calc'd by:**	**DH/AB**
	PROPOSED CONDITIONS	**Checked by:**	**NQJ**
	EL PASO COUNTY, CO	**Date:**	**4/9/2024**

TIME OF CONCENTRATION

BASIN DATA			OVERLAND TIME (T_i)			TRAVEL TIME (T_t)					TOTAL	*tc=(L/180)+10*	Design tc
DESIGNATION	C_5	AREA (ac)	LENGTH (ft)	SLOPE %	t_i (min)	C_V	LENGTH (ft)	SLOPE %	V (ft/s)	t_t (min)	t_c (min)	*tc max*	*tc design (min)*
A	0.44	5.78	100	1.9	9.7	20	1360	2.2	3.0	7.6	17.4	18.1	17.4
B	0.84	1.10	100	1.9	3.9	20	1330	2.2	3.0	7.5	11.4	17.9	11.4
C	0.59	3.01	100	2.0	7.4	20	665	1.9	2.8	4.0	11.4	14.3	11.4
D	0.59	3.05	100	2.0	7.4	20	425	1.5	2.4	2.9	10.3	12.9	10.3
E	0.59	3.68	100	2.0	7.4	20	470	1.6	2.5	3.1	10.5	13.2	10.5
F	0.74	1.10	100	1.9	5.3	20	1680	1.7	2.6	10.7	16.1	19.9	16.1
G	0.09	6.75	100	4.0	11.7	10	1200	0.4	0.7	30.2	41.8	17.2	17.2
H	0.55	3.71	100	2.0	8.0	15	665	2.4	2.3	4.7	12.7	14.3	12.7
I	0.51	1.12	100	2.0	8.7	15	360	1.1	1.6	3.8	12.5	12.6	12.5
J	0.24	3.14	100	2.0	12.5	20	140	0.9	1.9	1.2	13.7	11.3	11.3
K	0.82	0.24	15	2.0	1.6	20	390	1.5	2.4	2.7	5.0	12.3	5.0
L	0.82	0.24	15	2.0	1.6	20	390	1.5	2.4	2.7	5.0	12.3	5.0
N	0.59	6.07	100	2.0	7.4	20	460	1.5	2.4	3.1	10.6	13.1	10.6
O	0.59	3.04	100	2.0	7.4	20	525	1.5	2.4	3.6	11.0	13.5	11.0
P	0.59	3.20	40	2.0	4.7	20	1100	3.0	3.5	5.3	10.0	16.3	10.0
Q	0.86	1.01	100	2.0	3.6	20	550	1.5	2.4	3.7	7.3	13.6	7.3
R	0.86	1.42	17	25.0	0.6	10	1160	1.5	1.2	15.8	16.4	16.5	16.4
S	0.09	0.85	100	2.0	14.7	20	505	2.5	3.2	2.7	17.4	13.4	13.4
T	0.10	1.40	100	2.0	14.5	20	540	2.5	3.2	2.8	17.4	13.6	13.6
OS1	0.09	2.83	100	5.0	10.8	10	210	5.0	2.2	1.6	12.4	11.7	11.7
ROW1	0.21	1.95	81	6.4	7.9	15	1012	0.5	1.1	15.9	23.8	16.1	16.1
ROW2	0.20	2.99	81	6.4	8.0	15	1494	1.9	2.1	12.0	20.0	18.8	18.8
ROW3	0.13	6.44	81	3.4	10.6	15	2515	1.2	1.6	25.5	36.1	24.4	24.4
OS4	0.10	40.11	300	5.5	18.0	15	2977	3.5	2.8	17.7	35.6	28.2	28.2

FORMULAS:

$$t_i = \frac{0.395(1.1 - C_5)\sqrt{L}}{S^{0.33}} \qquad V = C_v S_w^{0.5}$$

Table 6-7. Conveyance Coefficient, C_v

Type of Land Surface	C_v
Heavy meadow	2.5
Tillage/field	5
Riprap (not buried)*	6.5
Short pasture and lawns	7
Nearly bare ground	10
Grassed waterway	15
Paved areas and shallow paved swales	20

*For buried riprap, select C_v value based on type of vegetative cover.

HRGreen

MEADOWLAKE INDUSTRIAL
PROPOSED CONDITIONS
DESIGN STORM: 5-YEAR

Calc'd by:	DH/AB
Checked by:	NQJ
Date:	4/9/2024

			DIRECT RUNOFF						TOTAL RUNOFF				STREET			PIPE				TRAVEL TIME			REMARKS
STREET	DESIGN POINT	BASIN ID	AREA (ac)	C_5	t_c (min)	C_5*A (ac)	I (in./ hr.)	Q (cfs)	t_c (min)	C_5*A (ac)	I (in./ hr.)	Q (cfs)	Q_{street} (cfs)	C_5*A (ac)	SLOPE %	Q_{PIPE} (cfs)	C_5*A (ac)	SLOPE %	PIPE SIZE (FT)	LENGTH (FT)	VEL. (FPS)	TRAVEL TIME (min)	
	E1	OS1	2.83	0.09	11.7	0.25	3.89	1.0	11.7	0.25	3.89	**0.99**	1.0	0.25	4.8					228	4.4	0.87	DP E1 DRAINS VIA SHEETFLOW INTO BASIN G TO DP 7
	7	G	6.75	0.09	17.2	0.61	3.31	2.0	17.2	0.86	3.31	**2.86**	2.9	0.86	4.0					81	4.0	0.34	DP7 DRAINS VIA SHEETFLOW INTO BASIN ROW1 TO DP E2
	E2	ROW1	1.95	0.21	16.1	0.41	3.42	1.4	17.6	1.27	3.28	**4.18**	4.2	1.27	4.0					81	4.0	0.34	**DP E2 DRAINS NORTH OFFSITE**
	1	A	5.78	0.44	17.4	2.55	3.30	8.4	17.4	2.55	3.30	**8.42**				8.4	2.55	1.2	1.5	40	6.5	0.10	DP1 CAPTURED W/ 10' TYPE R SUMP INELT, PIPE TO DP2.1
	2	B	1.1	0.84	11.4	0.92	3.93	3.6	11.4	0.92	3.93	**3.61**				3.6	0.92	0.5	1.5	89	4.2	0.35	
	2.1								17.5	3.47	3.29	**11.43**				11.4	3.47	0.5	1.5	305	4.2	1.21	DP2 CAPTURED W/ 5' TYPE R SUMP INLET, PIPE TO DP2.1 DP2.1 FLOW, PIPE TO DP5.1
	3	C	3.01	0.59	11.4	1.78	3.93	7.0	11.4	1.78	3.93	**6.97**				7.0	1.78	2.0	1.5	427	8.4	0.85	DP3 CPATURED W/ 20' TYPE R INLET, PIPE TO DP4.1
	4	D	3.05	0.59	10.3	1.80	4.08	7.3	10.3	1.80	4.08	**7.35**				7.3	1.80	1.0	1.5	6	5.9	0.02	DP4 CAPTURED W/ 20' TYPE R INLET, PIPE TO DP4.1
	4.1								12.3	3.58	3.82	**13.66**				13.7	3.58	2.0	1.5	500	8.4	0.99	DP4.1 FLOW, PIPE TO DP5.1
	5	E	3.68	0.59	10.5	2.17	4.05	8.8	10.5	2.17	4.05	**8.80**				8.8	2.17	3.0	1.5	6	10.3	0.01	DP5 CAPTURED W/ 15' TYPE R SUMP INLET, PIPE TO DP5.1
	5.1								18.7	5.64	3.19	**18.00**				18.0	5.64	0.4	2.0	50	4.6	0.18	DP5.1 FLOW, PIPE TO DP5.2
	5.2								18.9	9.22	3.18	**29.28**				29.3	9.22	0.8	2.0	36	6.2	0.10	DP5.2 FLOW, PIPE TO DP6.1
	6	F	1.1	0.74	16.1	0.81	3.42	2.8	19.0	10.03	3.17	**31.78**				2.8	0.81	1.0	2.0	12	7.2	0.03	DP6 CAPTURED IN 15' TYPE R SUMP INLET , PIPE TO DP6.1
	6.1								19.0	10.03	3.17	**31.78**											DP6.1, PIPE TO POND A
	8	H	3.71	0.55	12.7	2.04	3.76	7.7	12.7	2.04	3.76	**7.68**	7.7	2.04	1.7					360	2.6	2.30	SWALE TO BASIN I
	9	I	1.12	0.51	12.5	0.57	3.80	2.1	15.1	2.60	3.52	**9.16**											SWALE TO DET POND A
	10	J	3.14	0.24	11.3	0.75	3.94	3.0	19.0	13.39	3.17	**42.42**											**DP10 FLOW, TOTAL FLOW ENTERING POND A**
	13	ROW2	2.99	0.20	18.8	0.61	3.19	1.9	18.8	0.61	3.19	**1.94**				1.9	0.61	0.5	1.5	75	4.2	0.30	DP13 FLOW, TOTAL FLOWTO CULVERT AT DP 13
	E4								19.0	0.61	3.16	**2.63**											**DP E4 FLOW, TOTAL FLOW TO ROADSIDE SWALE INCLUDING POND A RELEASE**

HRGreen

MEADOWLAKE INDUSTRIAL
PROPOSED CONDITIONS
DESIGN STORM: 5-YEAR

Calc'd by:	DH/AB
Checked by:	NQJ
Date:	4/9/2024

			DIRECT RUNOFF						TOTAL RUNOFF				STREET			PIPE				TRAVEL TIME			REMARKS
STREET	DESIGN POINT	BASIN ID	AREA (ac)	C_5	t_c (min)	C_5*A (ac)	I (in./ hr.)	Q (cfs)	t_c (min)	C_5*A (ac)	I (in./ hr.)	Q (cfs)	Q_{street} (cfs)	C_5*A (ac)	SLOPE %	Q_{PIPE} (cfs)	C_5*A (ac)	SLOPE %	PIPE SIZE (FT)	LENGTH (FT)	VEL. (FPS)	TRAVEL TIME (min)	
	11	K	0.24	0.82	5.0	0.20	5.17	1.0	5.0	0.20	5.17	**1.02**				1.0	0.20	2.0	1.5	25	8.4	0.05	DP11 CAPTURED W/ 5' TYPE R SUMP INLET, PIPE TO DP12.1
	12	L	0.24	0.82	5.0	0.20	5.17	1.0	5.0	0.39	5.15	**2.03**				1.0	0.20	2.0	1.5	25	8.4	0.05	DP12 CAPTURED W/ 5' TYPE R SUMP INELT, PIPE TO DP12.1
	12.1								5.0	0.39	5.15	**2.03**	2.0	0.39	1.0					1150	2.0	9.58	DP12.1 SWALE FLOW TO DP21
	15	N	6.07	0.59	10.6	3.58	4.05	14.5	10.6	3.58	4.05	**14.50**				16.9	4.17	3.6	1.5	32	11.3	0.05	DP15 CAPTURED IN 15' TYPE R INLET, PIPE TO DP19.1
	16	O	3.04	0.59	11.0	1.79	3.99	7.2	11.0	1.79	3.99	**7.15**				8.6	2.16	1.0	1.5	10	5.9	0.03	DP16 CAPTURED IN 10' TYPE R INLET, PIPE TO DP17.1
	17	P	3.2	0.59	10.0	1.89	4.13	7.8	10.0	1.89	4.13	**7.80**				14.6	3.53	2.0	1.5	27	8.4	0.05	DP17 CAPTURED IN 10' TYPE R INLET, PIPE TO DP17.1
	17.1								11.0	3.68	3.98	**14.67**				14.7	3.68	3.6	2.0	42	13.7	0.05	DP17.1 FLOW, PIPE TO DP21
	18	Q	1.01	0.86	7.3	0.86	4.60	4.0	7.3	0.86	4.60	**3.98**				7.5	1.63	0.5	1.5	50	4.2	0.20	DP18 CAPTURED IN 5' TYPE R INLET, PIPE TO DP19.1
	19	R	0.85	0.86	16.4	0.73	3.39	2.5	16.4	0.73	3.39	**2.46**				2.5	0.73	1.0	1.5	6	5.9	0.02	DP19 CAPTURED IN 10' TYPE R SUMP INLET, PIPE TO DP19.1
	19.1								16.4	5.17	3.38	**17.51**				17.5	5.17	0.5	2.0	42	5.1	0.14	DP19.1 FLOW, PIPE TO DP20.1
	20.1								16.6	7.06	3.37	**23.81**				23.8	7.06	0.5	2.5	370	5.9	1.04	DP20.1 PIPE FLOW TO POND B
	21	S	0.85	0.09	13.4	0.08	3.69	0.3	14.6	0.47	3.56	**1.67**				1.7	0.47	0.5	2.5	370	5.9	1.04	DP21 SWALE FLOW TO POND B
	22	T	1.4	0.10	13.6	0.14	3.67	0.5	13.6	3.72	3.67	**13.68**	13.7	3.72	3.7					60	3.8	0.26	**TOTAL FLOW ENTERING POND B**
	E7	ROW3	6.44	0.13	24.4	0.86	2.79	2.4	24.4	2.66	2.79	**8.11**	8.1	2.66	4.2					865	4.1	3.52	DP E7 SWALE FLOW TO DP E9
	E8											**0.50**											DP E8 SWALE FLOW TO DP E9 (POND B RELEASE)
	E9	OS4	40.11	0.10	28.2	4.10	2.57	10.5	28.2	6.75	2.57	**18.58**											**DP E9 TOTAL FLOW OFFSITE**

HRGreen

MEADOWLAKE INDUSTRIAL

PROPOSED CONDITIONS

DESIGN STORM: 100-YEAR

Calc'd by:	**DH/AB**
Checked by:	**NQJ**
Date:	**4/9/2024**

			DIRECT RUNOFF						TOTAL RUNOFF				STREET			PIPE				TRAVEL TIME			REMARKS
STREET	DESIGN POINT	BASIN ID	AREA (ac)	C_{100}	t_c (min)	C_{100}*A (ac)	I (in./ hr.)	Q (cfs)	t_c (min)	C_{100}*A (ac)	I (in./ hr.)	Q (cfs)	Q_{street} (cfs)	C_{100}*A (ac)	SLOPE %	Q_{PIPE} (cfs)	C_{100}*A (ac)	SLOPE %	PIPE SIZE (ft)	LENGTH (ft)	VEL. (ft/s)	TRAVEL TIME (min)	
	E1	OS1	2.83	0.36	11.7	1.02	6.53	6.7	11.7	1.02	6.53	**6.7**	6.7	1.02	4.8					228	4.4	0.87	DP E1 DRAINS VIA SHEETFLOW INTO BASIN G TO DP 7
	7	G	6.75	0.36	17.2	2.43	5.56	13.5	17.2	3.45	5.56	**19.2**	19.2	3.45	4.0					81	4.0	0.34	DP7 DRAINS VIA SHEETFLOW INTO BASIN ROW1 TO DP E2
	E2	ROW1	1.95	0.45	16.1	0.88	5.74	5.0	17.6	4.32	5.51	**23.8**	23.8	4.32	4.0					81	4.0	0.34	**DP E2 DRAINS NORTH OFFSITE**
	1	A	5.78	0.62	17.4	3.59	5.54	19.9	17.4	3.59	5.54	**19.9**				19.9	3.59	1.2	1.5	40	6.5	0.10	DP1 CAPTURED W/ 10' TYPE R SUMP INELT, PIPE TO DP2.1
	2	B	1.1	0.91	11.4	1.00	6.60	6.6	11.4	1.00	6.60	**6.6**				6.6	1.00	0.5	1.5	89	4.2	0.35	
	2.1								17.5	4.58	5.52	**25.3**				25.3	4.58	0.5	1.5	305	4.2	1.21	DP2 CAPTURED W/ 5' TYPE R SUMP INLET, PIPE TO DP2.1 DP2.1 FLOW, PIPE TO DP5.1
	3	C	3.01	0.70	11.4	2.11	6.59	13.9	11.4	2.11	6.59	**13.9**				13.9	2.11	2.0	1.5	427	8.4	0.85	DP3 CPATURED W/ 20' TYPE R INLET, PIPE TO DP4.1
	4	D	3.05	0.70	10.3	2.14	6.85	14.6	10.3	2.14	6.85	**14.6**				14.6	2.14	1.0	1.5	6	5.9	0.02	DP4 CAPTURED W/ 20' TYPE R INLET, PIPE TO DP4.1
	4.1								12.3	4.24	6.41	**27.2**				27.2	4.24	2.0	1.5	500	8.4	0.99	DP4.1 FLOW, PIPE TO DP5.1
	5	E	3.68	0.70	10.5	2.58	6.81	17.5	10.5	2.58	6.81	**17.5**				17.5	2.58	3.0	1.5	6	10.3	0.01	DP5 CAPTURED W/ 15' TYPE R SUMP INLET, PIPE TO DP5.1
	5.1								18.7	7.16	5.36	**38.3**				38.3	7.16	0.4	2.0	50	4.6	0.18	DP5.1 FLOW, PIPE TO DP5.2
	5.2								18.9	11.40	5.33	**60.8**				60.8	11.40	0.8	2.0	36	6.2	0.10	DP5.2 FLOW, PIPE TO DP6.1
	6	F	1.1	0.83	16.1	0.91	5.74	5.2	19.0	12.31	5.32	**65.5**				5.2	0.91	1.0	2.0	12	7.2	0.03	DP6 CAPTURED IN 15' TYPE R SUMP INLET , PIPE TO DP6.1
	6.1								19.0	12.31	5.32	**65.5**											DP6.1, PIPE TO POND A
	8	H	3.71	0.67	12.7	2.50	6.32	15.8	12.7	2.50	6.32	**15.8**	15.8	2.50	1.7					360	2.6	2.30	SWALE TO BASIN I
	9	I	1.12	0.64	12.5	0.72	6.38	4.6	15.1	3.21	5.90	**19.0**											SWALE TO DET POND A
	10	J	3.14	0.46	11.3	1.45	6.62	9.6	19.0	16.97	5.32	**90.3**											**DP10 FLOW, TOTAL FLOW ENTERING POND A**
	13	ROW2	2.99	0.44	18.8	1.33	5.35	7.1	18.8	1.33	5.35	**7.1**				7.1	1.33	0.5	1.5	75	4.2	0.30	DP13 FLOW, TOTAL FLOWTO CULVERT AT DP 13
	E4								19.0	1.33	5.31	**21.4**											**DP E4 FLOW, TOTAL FLOW TO ROADSIDE SWALE INCLUDING POND A RELEASE**

HRGreen

MEADOWLAKE INDUSTRIAL

PROPOSED CONDITIONS

DESIGN STORM: 100-YEAR

Calc'd by:	**DH/AB**
Checked by:	**NQJ**
Date:	**4/9/2024**

			DIRECT RUNOFF						TOTAL RUNOFF				STREET			PIPE				TRAVEL TIME			REMARKS
STREET	DESIGN POINT	BASIN ID	AREA (ac)	C_{100}	t_c (min)	C_{100}*A (ac)	I (in./ hr.)	Q (cfs)	t_c (min)	C_{100}*A (ac)	I (in./ hr.)	Q (cfs)	Q_{street} (cfs)	C_{100}*A (ac)	SLOPE %	Q_{PIPE} (cfs)	C_{100}*A (ac)	SLOPE %	PIPE SIZE (ft)	LENGTH (ft)	VEL. (ft/s)	TRAVEL TIME (min)	
	11	K	0.24	0.90	5.0	0.22	8.68	1.9	5.0	0.22	8.68	**1.9**				1.9	0.22	2.0	1.5	25	8.4	0.05	DP11 CAPTURED W/ 5' TYPE R SUMP INLET, PIPE TO DP12.1
	12	L	0.24	0.90	5.0	0.22	8.68	1.9	5.0	0.43	8.65	**3.7**				1.9	0.22	2.0	1.5	25	8.4	0.05	DP12 CAPTURED W/ 5' TYPE R SUMP INELT, PIPE TO DP12.1
	12.1								5.0	0.43	8.65	**3.7**	3.7	0.43	1.0					1150	2.0	9.58	DP12.1 SWALE FLOW TO DP21
	15	N	6.07	0.70	10.6	4.25	6.80	28.9	10.6	4.25	6.80	**28.9**				16.9	2.49	3.6	1.5	32	11.3	0.05	DP15 CAPTURED IN 15' TYPE R INLET, PIPE TO DP19.1
	16	O	3.04	0.70	11.0	2.13	6.69	14.2	11.0	2.13	6.69	**14.2**				8.6	1.28	1.0	1.5	10	5.9	0.03	DP16 CAPTURED IN 10' TYPE R INLET, PIPE TO DP17.1
	17	P	3.2	0.70	10.0	2.24	6.94	15.5	10.0	2.24	6.94	**15.5**				14.6	2.10	2.0	1.5	27	8.4	0.05	DP17 CAPTURED IN 10' TYPE R INLET, PIPE TO DP17.1
	17.1								11.0	4.37	6.69	29.2				29.2	4.37	3.6	2.0	42	13.7	0.05	DP17.1 FLOW, PIPE TO DP21
	18	Q	1.01	0.98	7.3	0.99	7.73	7.6	7.3	0.99	7.73	**7.6**				7.5	0.97	0.5	1.5	50	4.2	0.20	DP18 CAPTURED IN 5' TYPE R INLET, PIPE TO DP19.1
	19	R	1.42	0.98	16.4	1.39	5.68	7.9	16.4	1.39	5.68	**7.9**				7.9	1.39	1.0	1.5	6	5.9	0.02	DP19 CAPTURED IN 10' TYPE R SUMP INLET, PIPE TO DP19.1
	19.1								16.4	6.63	5.68	**37.7**				37.7	6.63	0.5	2.0	42	5.1	0.14	DP19.1 FLOW, PIPE TO DP20.1
	20.1								16.6	8.87	5.66	**50.2**				50.2	8.87	0.5	2.5	370	5.9	1.04	DP20.1 PIPE FLOW TO POND B
	21	S	0.85	0.36	13.4	0.31	6.20	1.9	14.6	0.74	5.97	**4.4**				4.4	0.74	0.5	2.5	370	5.9	1.04	DP21 SWALE FLOW TO POND B
	22	T	1.4	0.37	13.6	0.52	6.17	3.2	17.6	10.12	5.51	**55.7**	55.7	10.12	3.7					60	3.8	0.26	**TOTAL FLOW ENTERING POND B**
	E7	ROW3	6.44	0.39	24.4	2.53	4.68	11.8	24.4	3.86	4.68	**32.4**	32.4	3.86	4.2					865	4.1	3.52	DP E7 SWALE FLOW TO DP E9
	E8											**14.3**											DP E8 SWALE FLOW TO DP E9 (POND B RELEASE)
	E9	OS4	40.11	0.37	28.2	14.80	4.32	63.9	28.2	18.66	4.32	**109.2**											**DP E9 TOTAL FLOW OFFSITE**

APPENDIX C – HYDRAULIC CALCULATIONS

Hydraulic calculations will be provided with the Final Drainage Report.

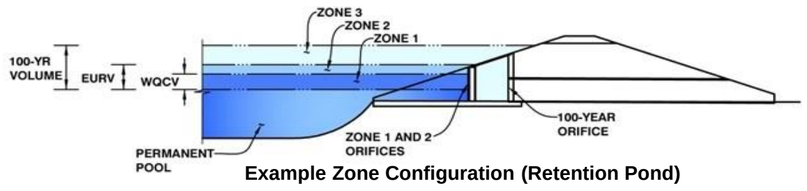
APPENDIX D – WATER QUALITY & DETENTION

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)

Project: **Meadowlake Industrial F1**

Basin ID: **Pond A**



Example Zone Configuration (Retention Pond)

Depth Increment = ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
6761.5 **Top of Micropool**	--	0.00	--	--	--	10	0.000		
6762	--	0.50	--	--	--	400	0.009	102	0.002
	--	1.50	--	--	--	9,930	0.228	5,267	0.121
	--	2.50	--	--	--	22,794	0.523	21,629	0.497
6,765.00	--	3.50	--	--	--	30,703	0.705	48,378	1.111
	--	4.50	--	--	--	37,312	0.857	82,385	1.891
	--	5.50	--	--	--	41,510	0.953	121,796	2.796
	--	6.50	--	--	--	45,283	1.040	165,193	3.792
6,769.00	--	7.50	--	--	--	49,171	1.129	212,420	4.876

Watershed Information

Selected BMP Type =	**EDB**	
Watershed Area =	24.94	acres
Watershed Length =	2,185	ft
Watershed Length to Centroid =	1,100	ft
Watershed Slope =	0.015	ft/ft
Watershed Imperviousness =	65.00%	percent
Percentage Hydrologic Soil Group A =	76.0%	percent
Percentage Hydrologic Soil Group B =	24.0%	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.

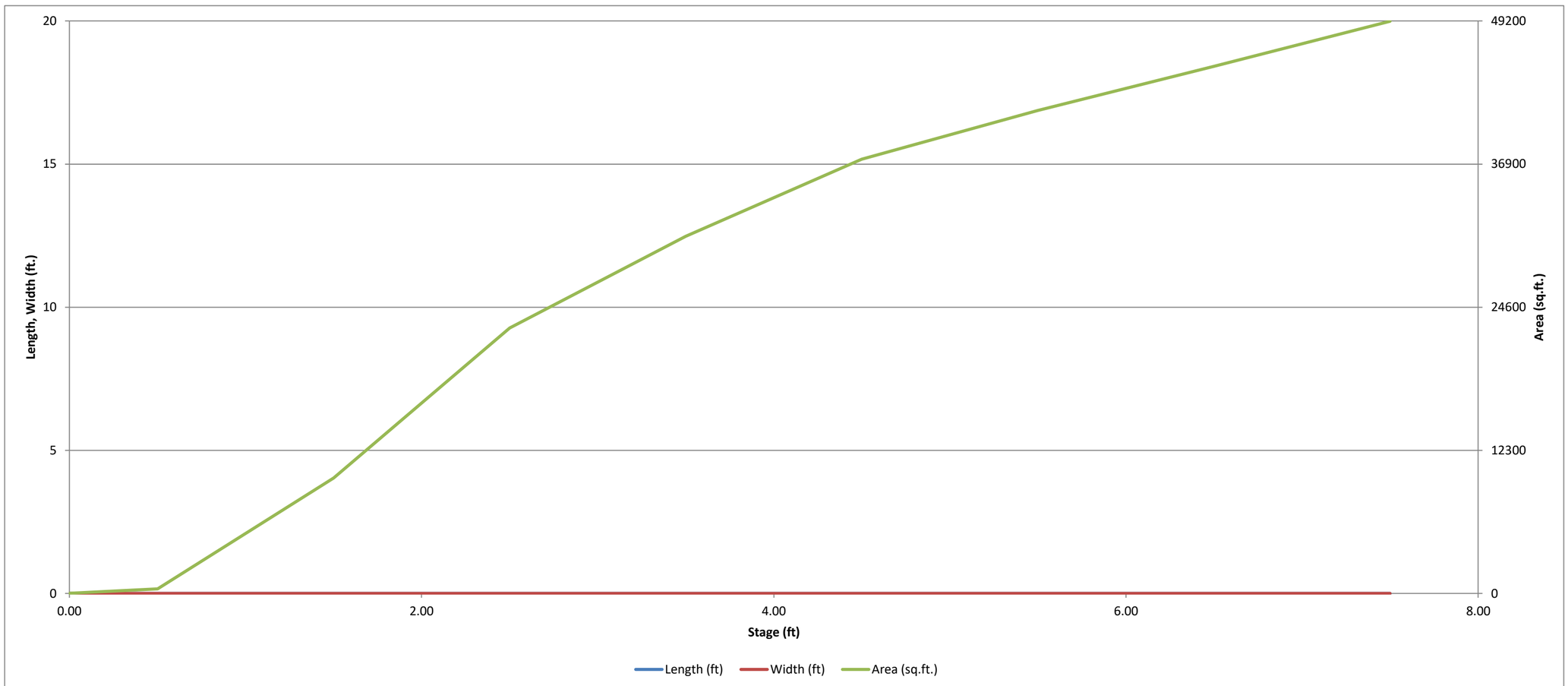
			Optional User Overrides	
Water Quality Capture Volume (WQCV) =	0.528	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	1.954	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	1.519	acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	1.984	acre-feet	1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	2.391	acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	2.971	acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	3.467	acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	4.091	acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 3.14 in.) =	5.411	acre-feet		inches
Approximate 2-yr Detention Volume =	1.324	acre-feet		
Approximate 5-yr Detention Volume =	1.742	acre-feet		
Approximate 10-yr Detention Volume =	2.130	acre-feet		
Approximate 25-yr Detention Volume =	2.493	acre-feet		
Approximate 50-yr Detention Volume =	2.709	acre-feet		
Approximate 100-yr Detention Volume =	2.961	acre-feet		

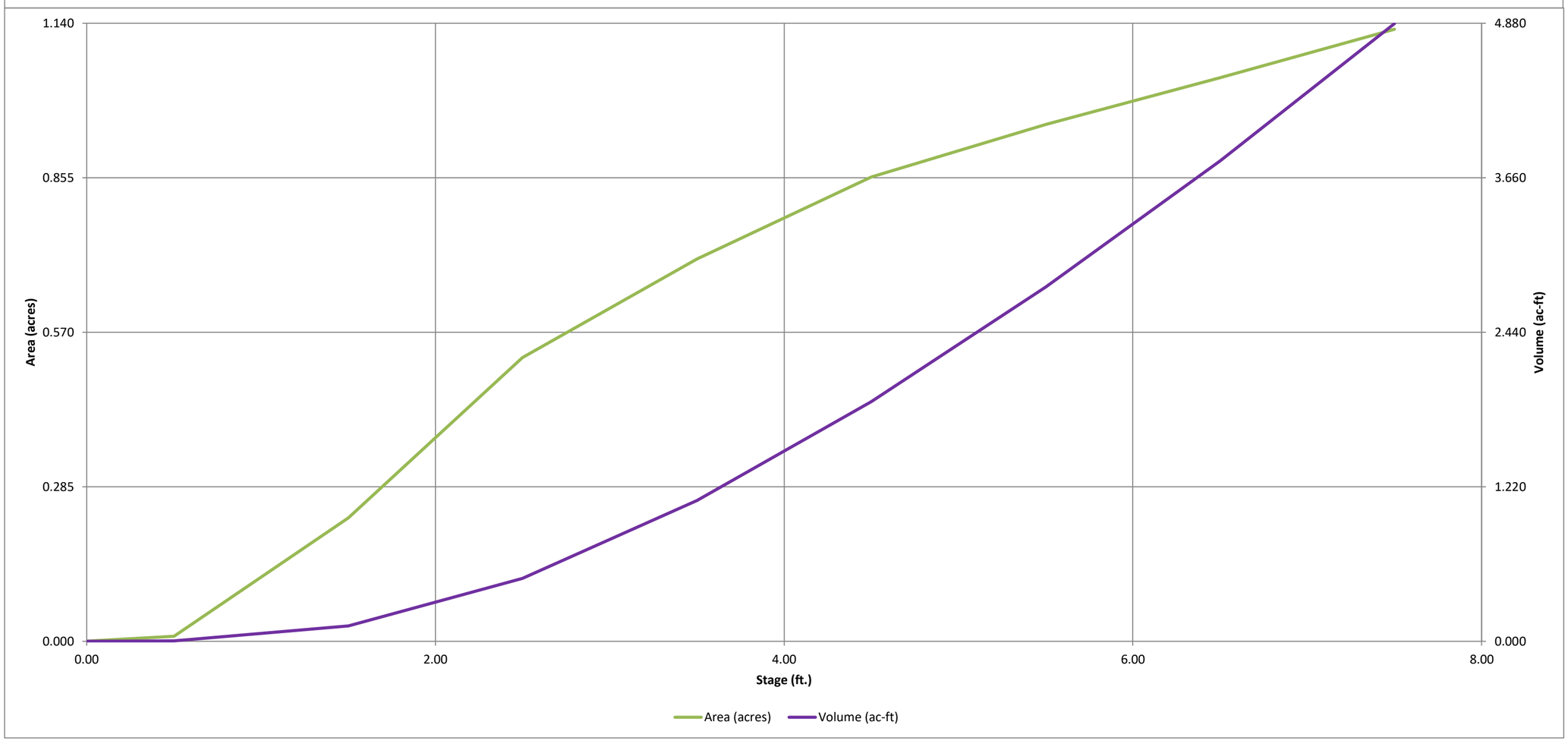
Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	0.528	acre-feet
Zone 2 Volume (EURV - Zone 1) =	1.425	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	1.007	acre-feet
Total Detention Basin Volume =	2.961	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

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)



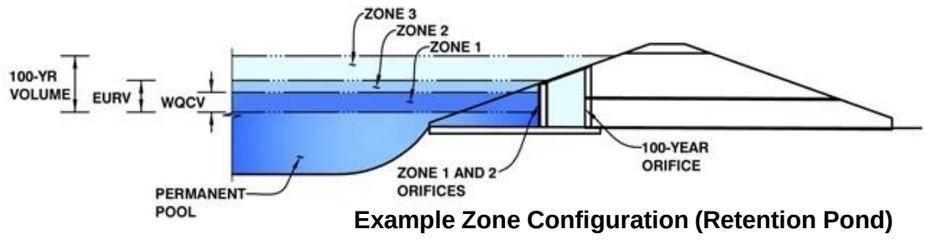


DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)

Project: **Meadowlake Industrial F1**

Basin ID: **Pond A**



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	2.56	0.528	Orifice Plate
Zone 2 (EURV)	4.58	1.425	Circular Orifice
Zone 3 (100-year)	5.68	1.007	Weir&Pipe (Restrict)
Total (all zones)		2.961	

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 =	2.56	ft (relative to basin bottom at Stage = 0 ft)
Orifice Plate: Orifice Vertical Spacing =	N/A	inches
Orifice Plate: Orifice Area per Row =	1.90	sq. inches (diameter = 1-9/16 inches)

Calculated Parameters for Plate

WQ Orifice Area per Row =	1.319E-02	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	0.83	1.66					
Orifice Area (sq. inches)	1.90	1.90	1.90					

	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)

	Zone 2 Circular	Not Selected	
Invert of Vertical Orifice =	2.57	N/A	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Vertical Orifice =	4.64	N/A	ft (relative to basin bottom at Stage = 0 ft)
Vertical Orifice Diameter =	3.33	N/A	inches

Calculated Parameters for Vertical Orifice

	Zone 2 Circular	Not Selected	
Vertical Orifice Area =	0.06	N/A	ft^2
Vertical Orifice Centroid =	0.14	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 =	4.67	N/A	ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length =	5.67	N/A	feet
Overflow Weir Grate Slope =	0.00	N/A	H:V
Horiz. Length of Weir Sides =	2.92	N/A	feet
Overflow Grate Type =	Type C Grate	N/A	
Debris Clogging % =	50%	N/A	%

Calculated Parameters for Overflow Weir

	Zone 3 Weir	Not Selected	
Height of Grate Upper Edge, H_t =	4.67	N/A	feet
Overflow Weir Slope Length =	2.92	N/A	feet
Grate Open Area / 100-yr Orifice Area =	8.80	N/A	
Overflow Grate Open Area w/o Debris =	11.52	N/A	ft^2
Overflow Grate Open Area w/ Debris =	5.76	N/A	ft^2

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 =	0.10	N/A	ft (distance below basin bottom at Stage = 0 ft)
Outlet Pipe Diameter =	18.00	N/A	inches
Restrictor Plate Height Above Pipe Invert =	12.50		inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

	Zone 3 Restrictor	Not Selected	
Outlet Orifice Area =	1.31	N/A	ft^2
Outlet Orifice Centroid =	0.58	N/A	feet
Half-Central Angle of Restrictor Plate on Pipe =	1.97	N/A	radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	6.00	ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length =	45.00	feet
Spillway End Slopes =	4.00	H:V
Freeboard above Max Water Surface =	1.00	feet

Calculated Parameters for Spillway

Spillway Design Flow Depth=	0.50	feet
Stage at Top of Freeboard =	7.50	feet
Basin Area at Top of Freeboard =	1.13	acres
Basin Volume at Top of Freeboard =	4.88	acre-ft

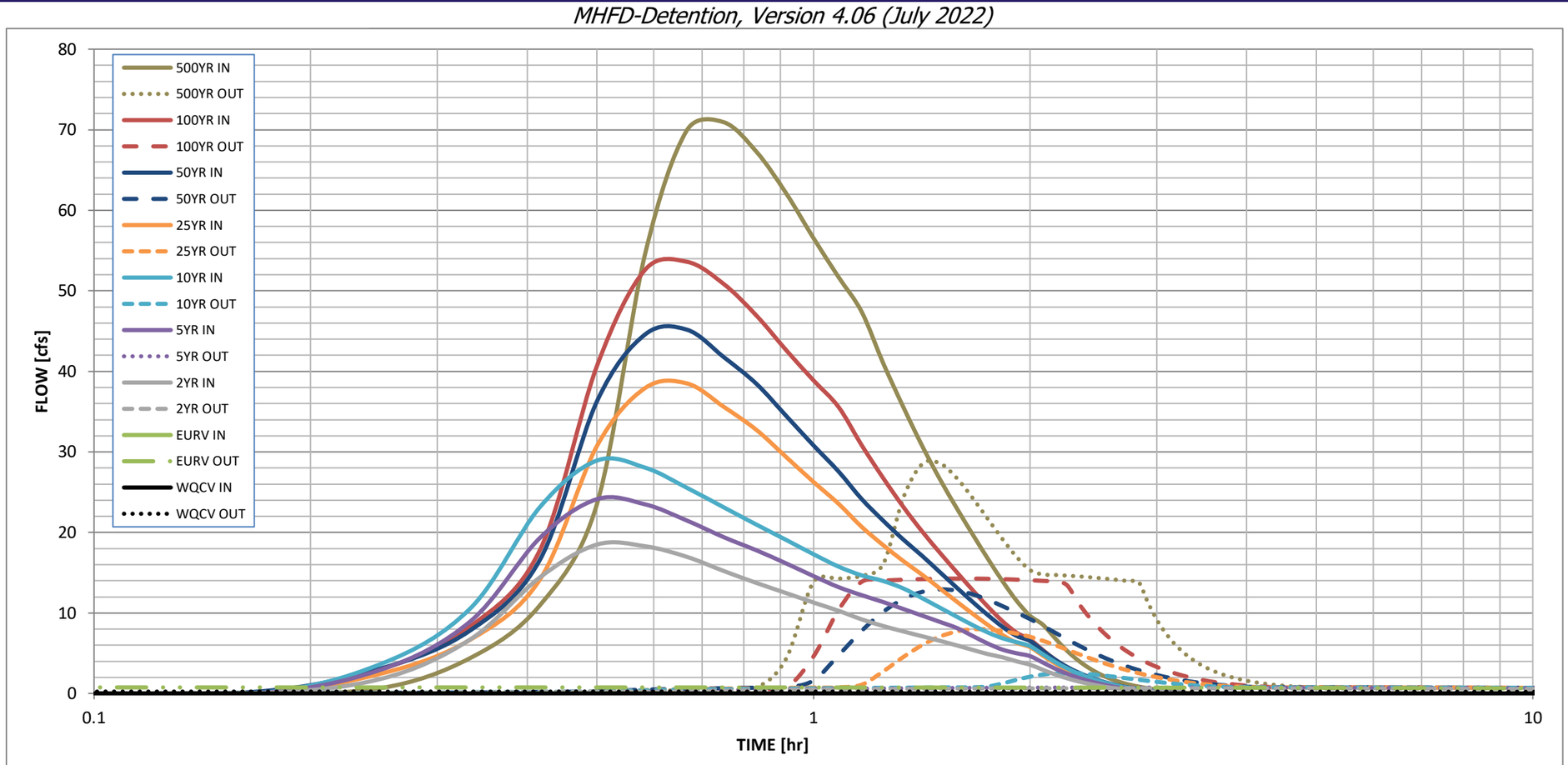
Routed Hydrograph Results

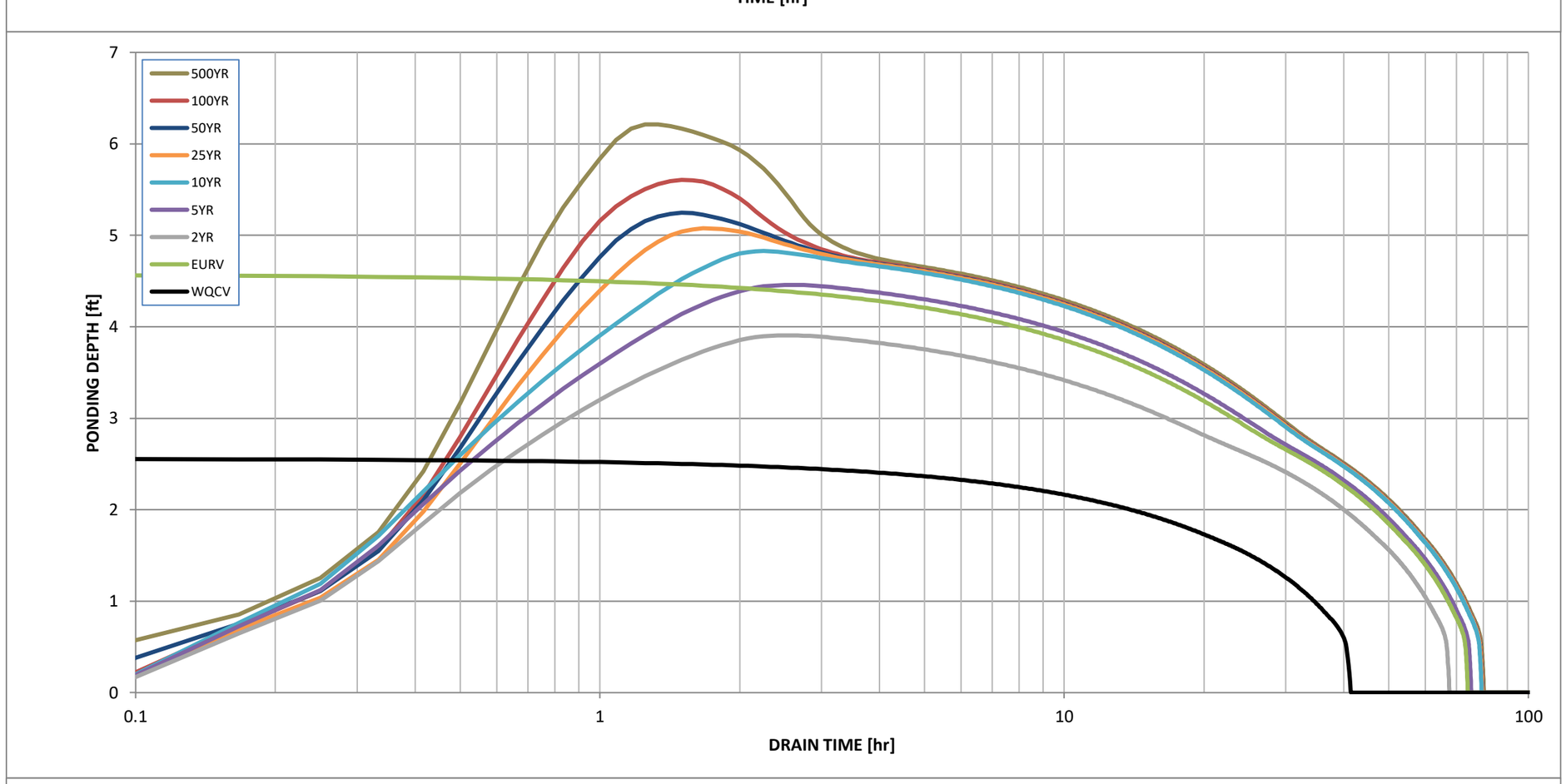
The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

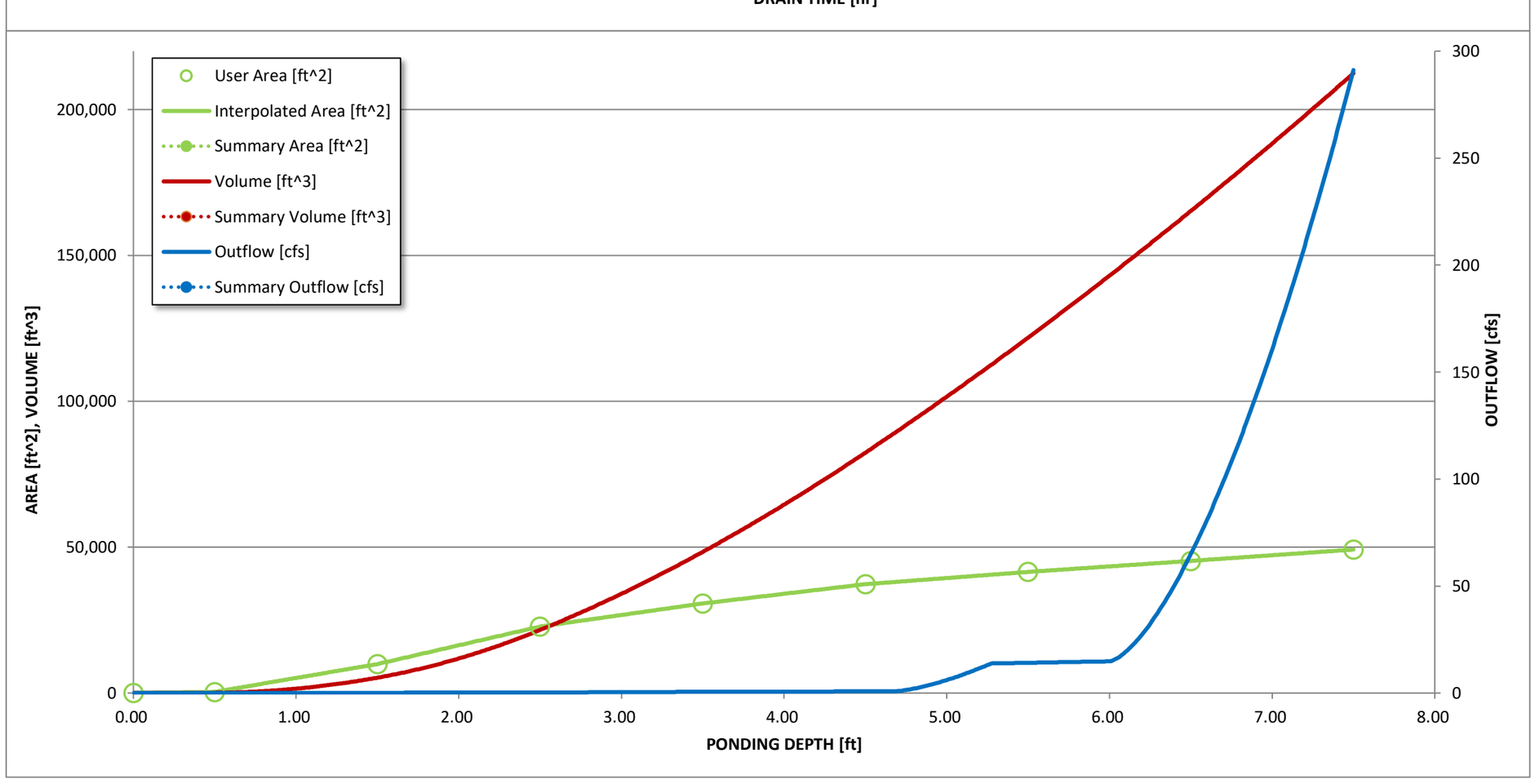
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	N/A	N/A	1.19	1.50	1.75	2.00	2.25	2.52	3.14
CUHP Runoff Volume (acre-ft) =	0.528	1.954	1.519	1.984	2.391	2.971	3.467	4.091	5.411
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	1.519	1.984	2.391	2.971	3.467	4.091	5.411
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	0.2	0.3	1.5	6.4	9.5	14.3	23.7
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.01	0.01	0.06	0.26	0.38	0.57	0.95
Peak Inflow Q (cfs) =	N/A	N/A	18.5	24.1	28.9	38.5	45.2	53.6	70.9
Peak Outflow Q (cfs) =	0.2	0.8	0.7	0.7	2.5	8.0	12.9	14.3	28.6
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	2.5	1.7	1.2	1.4	1.0	1.2
Structure Controlling Flow =	Plate	Vertical Orifice 1	Vertical Orifice 1	Vertical Orifice 1	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Outlet Plate 1	Spillway
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	N/A	0.2	0.6	1.0	1.2	1.2
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	59	65	68	66	65	63	60
Time to Drain 99% of Inflow Volume (hours) =	**40**	69	64	71	74	73	73	72	71
Maximum Ponding Depth (ft) =	2.56	4.58	3.91	4.46	4.83	5.08	5.24	5.61	6.21
Area at Maximum Ponding Depth (acres) =	0.53	0.86	0.77	0.85	0.89	0.91	0.93	0.96	1.01
Maximum Volume Stored (acre-ft) =	0.528	1.960	1.405	1.849	2.170	2.395	2.552	2.892	3.494

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 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.

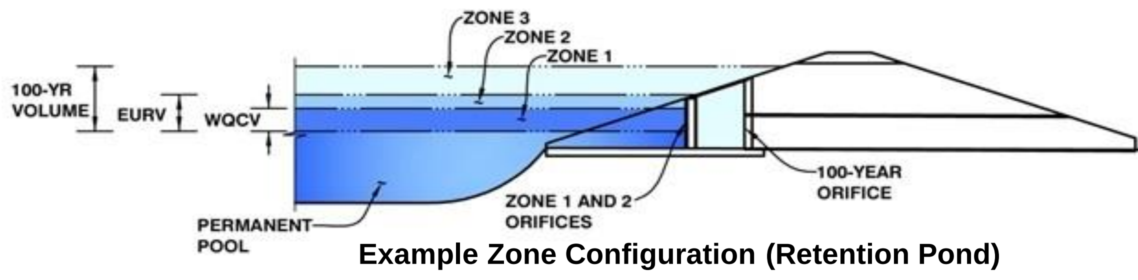
	SOURCE	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP
Time Interval	TIME	WQCV [cfs]	EURV [cfs]	2 Year [cfs]	5 Year [cfs]	10 Year [cfs]	25 Year [cfs]	50 Year [cfs]	100 Year [cfs]	500 Year [cfs]
5.00 min	0:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.02	0.66
	0:15:00	0.00	0.00	1.80	2.94	3.64	2.45	3.09	2.99	4.41
	0:20:00	0.00	0.00	6.72	8.95	10.55	6.68	7.83	8.33	10.96
	0:25:00	0.00	0.00	14.42	19.32	23.15	14.16	16.61	17.82	23.50
	0:30:00	0.00	0.00	18.50	24.13	28.92	30.71	36.26	40.65	54.55
	0:35:00	0.00	0.00	18.29	23.49	28.05	37.92	44.58	52.61	69.91
	0:40:00	0.00	0.00	16.97	21.48	25.55	38.51	45.18	53.61	70.94
	0:45:00	0.00	0.00	15.22	19.42	23.13	35.61	41.79	50.86	67.26
	0:50:00	0.00	0.00	13.73	17.78	20.97	32.73	38.45	46.92	62.08
	0:55:00	0.00	0.00	12.47	16.15	19.07	29.35	34.46	42.62	56.55
	1:00:00	0.00	0.00	11.30	14.59	17.30	26.28	30.81	38.89	51.72
	1:05:00	0.00	0.00	10.28	13.22	15.76	23.57	27.58	35.59	47.41
	1:10:00	0.00	0.00	9.21	12.21	14.67	20.70	24.16	30.84	41.02
	1:15:00	0.00	0.00	8.38	11.36	13.97	18.43	21.46	26.76	35.56
	1:20:00	0.00	0.00	7.71	10.50	13.05	16.45	19.11	23.17	30.72
	1:25:00	0.00	0.00	7.11	9.67	11.83	14.74	17.08	20.10	26.56
	1:30:00	0.00	0.00	6.54	8.88	10.64	13.02	15.04	17.45	22.95
	1:35:00	0.00	0.00	5.97	8.13	9.52	11.39	13.12	15.03	19.68
	1:40:00	0.00	0.00	5.40	7.12	8.47	9.87	11.33	12.78	16.65
	1:45:00	0.00	0.00	4.89	6.18	7.55	8.47	9.69	10.73	13.89
	1:50:00	0.00	0.00	4.49	5.44	6.85	7.25	8.25	8.94	11.50
	1:55:00	0.00	0.00	3.99	5.00	6.37	6.30	7.15	7.55	9.65
	2:00:00	0.00	0.00	3.58	4.65	5.88	5.76	6.52	6.72	8.56
	2:05:00	0.00	0.00	2.95	3.86	4.89	4.71	5.32	5.41	6.87
	2:10:00	0.00	0.00	2.37	3.09	3.93	3.74	4.21	4.21	5.33
	2:15:00	0.00	0.00	1.90	2.47	3.14	2.95	3.32	3.26	4.11
	2:20:00	0.00	0.00	1.51	1.96	2.50	2.33	2.62	2.52	3.16
	2:25:00	0.00	0.00	1.20	1.56	1.97	1.83	2.06	1.94	2.42
	2:30:00	0.00	0.00	0.94	1.22	1.53	1.42	1.60	1.49	1.85
	2:35:00	0.00	0.00	0.74	0.94	1.18	1.10	1.23	1.15	1.43
	2:40:00	0.00	0.00	0.57	0.72	0.90	0.84	0.94	0.88	1.10
	2:45:00	0.00	0.00	0.44	0.55	0.70	0.65	0.73	0.69	0.86
	2:50:00	0.00	0.00	0.33	0.41	0.53	0.50	0.56	0.53	0.66
	2:55:00	0.00	0.00	0.24	0.30	0.39	0.37	0.41	0.40	0.49
	3:00:00	0.00	0.00	0.16	0.21	0.27	0.26	0.29	0.28	0.34
	3:05:00	0.00	0.00	0.10	0.13	0.17	0.17	0.19	0.18	0.22
	3:10:00	0.00	0.00	0.05	0.08	0.10	0.10	0.11	0.11	0.13
	3:15:00	0.00	0.00	0.02	0.04	0.04	0.05	0.05	0.05	0.06
	3:20:00	0.00	0.00	0.01	0.01	0.01	0.01	0.02	0.02	0.02
	3:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	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

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)

Project: **Meadowlake Industrial F1**

Basin ID: **Pond B**



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	**EDB**	
Watershed Area =	17.47	acres
Watershed Length =	1,280	ft
Watershed Length to Centroid =	640	ft
Watershed Slope =	0.020	ft/ft
Watershed Imperviousness =	73.00%	percent
Percentage Hydrologic Soil Group A =	23.0%	percent
Percentage Hydrologic Soil Group B =	77.0%	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) =	0.421	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	1.458	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	1.212	acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	1.626	acre-feet	1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	1.966	acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	2.381	acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	2.748	acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	3.187	acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 3.14 in.) =	4.110	acre-feet		inches
Approximate 2-yr Detention Volume =	1.095	acre-feet		
Approximate 5-yr Detention Volume =	1.448	acre-feet		
Approximate 10-yr Detention Volume =	1.800	acre-feet		
Approximate 25-yr Detention Volume =	1.979	acre-feet		
Approximate 50-yr Detention Volume =	2.083	acre-feet		
Approximate 100-yr Detention Volume =	2.230	acre-feet		

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	0.421	acre-feet
Zone 2 Volume (EURV - Zone 1) =	1.037	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	0.772	acre-feet
Total Detention Basin Volume =	2.230	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 = 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)
6732.5	**Top of Micropool**	--	0.00	--	--	--	10	0.000		
	6733	--	0.50	--	--	--	2,433	0.056	611	0.014
		--	1.50	--	--	--	11,642	0.267	7,648	0.176
	6735	--	2.50	--	--	--	18,245	0.419	22,592	0.519
		--	3.50	--	--	--	21,975	0.504	42,702	0.980
		--	4.50	--	--	--	25,977	0.596	66,678	1.531
		--	5.50	--	--	--	30,252	0.694	94,792	2.176
		--	6.50	--	--	--	34,801	0.799	127,319	2.923
	6740	--	7.50	--	--	--	39,622	0.910	164,530	3.777
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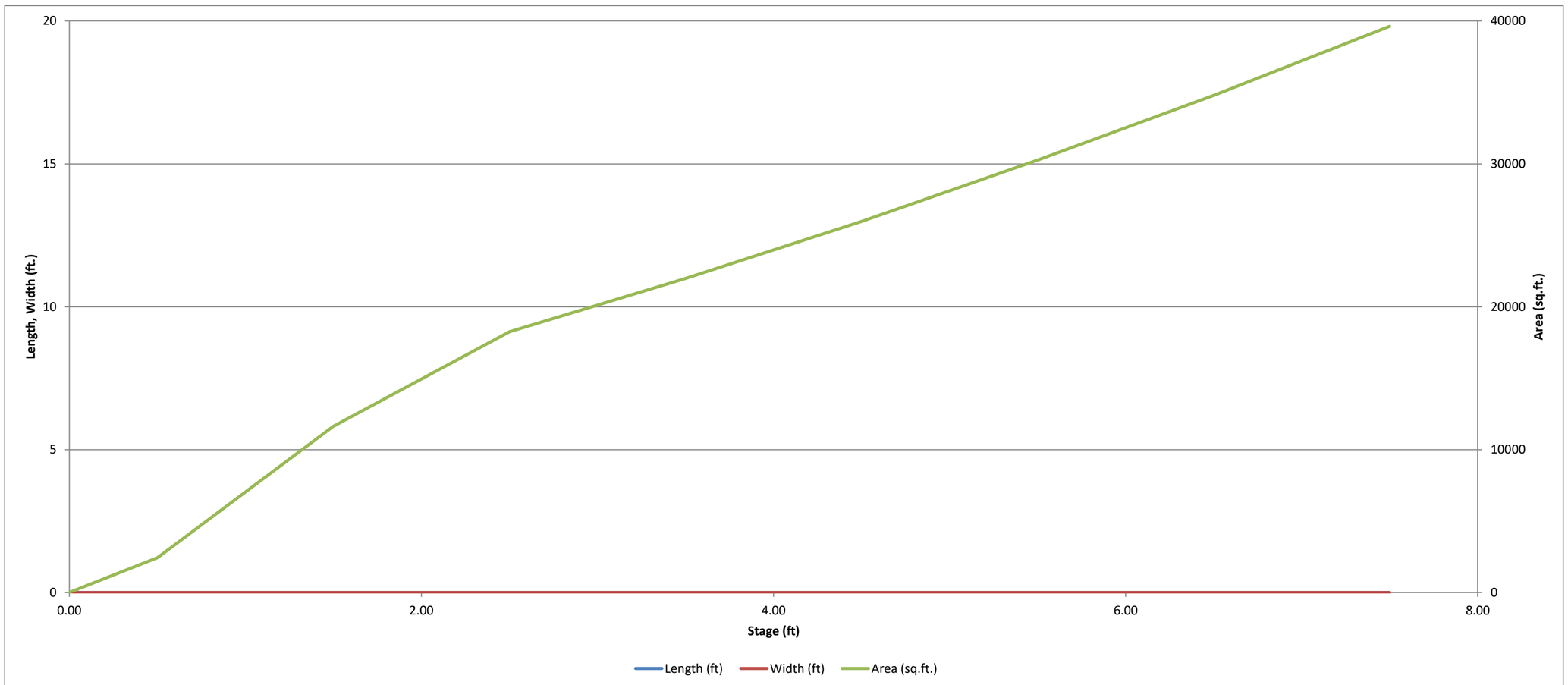
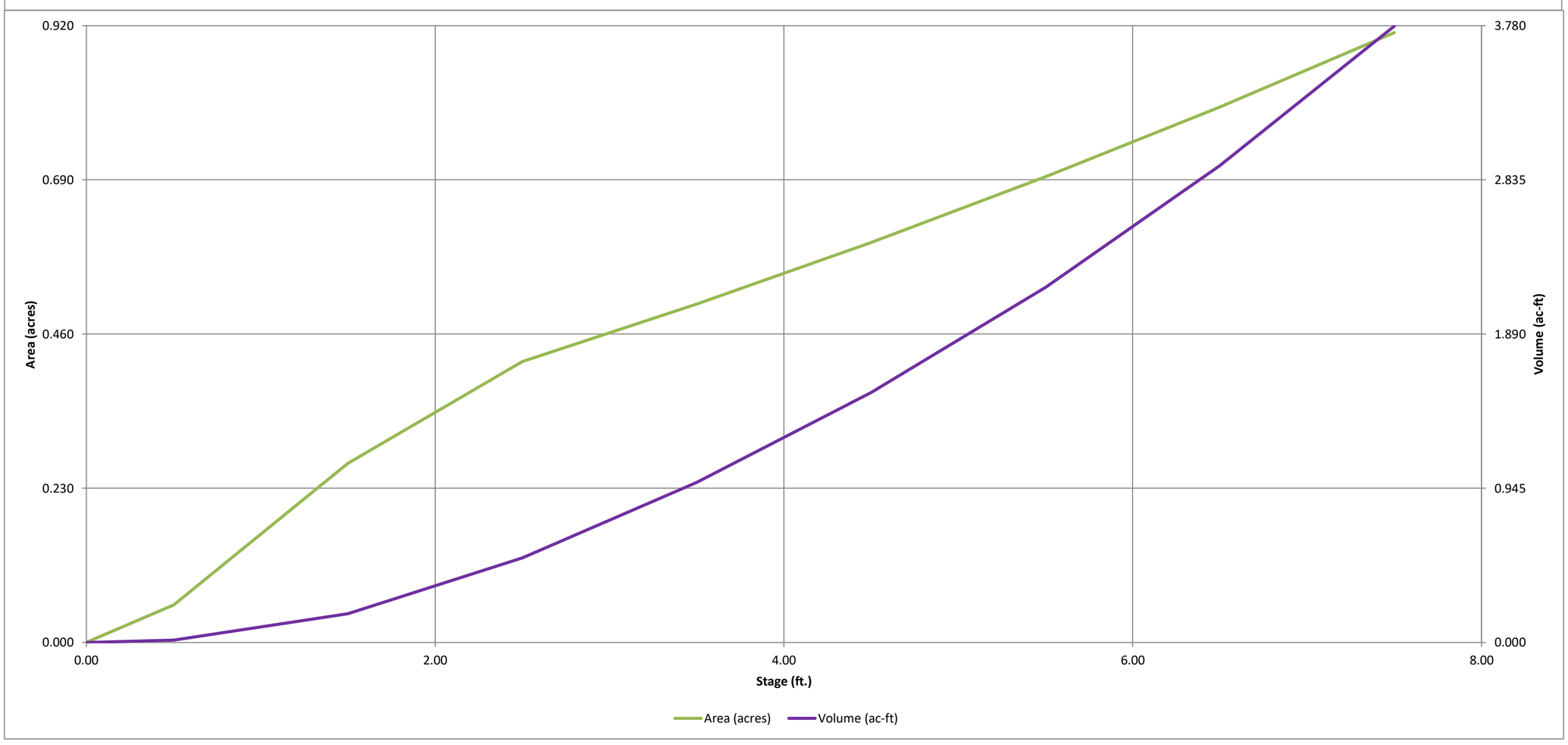
DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)



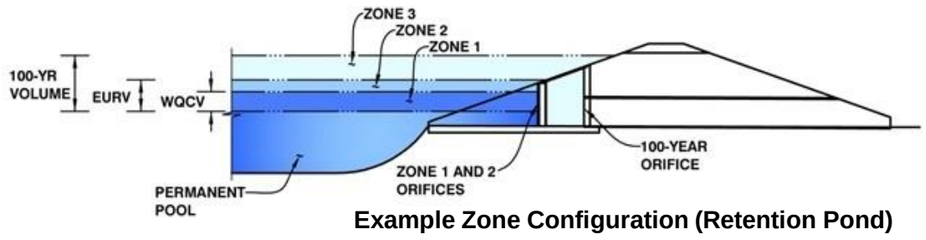


DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)

Project: **Meadowlake Industrial F1**

Basin ID: **Pond B**



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	2.26	0.421	Orifice Plate
Zone 2 (EURV)	4.38	1.037	Circular Orifice
Zone 3 (100-year)	5.58	0.772	Weir&Pipe (Restrict)
Total (all zones)		2.230	

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 =	2.26	ft (relative to basin bottom at Stage = 0 ft)
Orifice Plate: Orifice Vertical Spacing =	N/A	inches
Orifice Plate: Orifice Area per Row =	1.89	sq. inches (diameter = 1-9/16 inches)

Calculated Parameters for Plate

WQ Orifice Area per Row =	1.313E-02	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	0.75	1.50					
Orifice Area (sq. inches)	1.89	1.89	1.89					

	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)

	Zone 2 Circular	Not Selected	
Invert of Vertical Orifice =	2.27	N/A	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Vertical Orifice =	4.44	N/A	ft (relative to basin bottom at Stage = 0 ft)
Vertical Orifice Diameter =	2.00	N/A	inches

Calculated Parameters for Vertical Orifice

	Zone 2 Circular	Not Selected	
Vertical Orifice Area =	0.02	N/A	ft^2
Vertical Orifice Centroid =	0.08	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 =	4.50	N/A	ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length =	5.67	N/A	feet
Overflow Weir Grate Slope =	0.00	N/A	H:V
Horiz. Length of Weir Sides =	2.92	N/A	feet
Overflow Grate Type =	Type C Grate	N/A	
Debris Clogging % =	50%	N/A	%

Calculated Parameters for Overflow Weir

	Zone 3 Weir	Not Selected	
Height of Grate Upper Edge, H_t =	4.50	N/A	feet
Overflow Weir Slope Length =	2.92	N/A	feet
Grate Open Area / 100-yr Orifice Area =	8.80	N/A	
Overflow Grate Open Area w/o Debris =	11.52	N/A	ft^2
Overflow Grate Open Area w/ Debris =	5.76	N/A	ft^2

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 =	0.20	N/A	ft (distance below basin bottom at Stage = 0 ft)
Outlet Pipe Diameter =	18.00	N/A	inches
Restrictor Plate Height Above Pipe Invert =	12.50		inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

	Zone 3 Restrictor	Not Selected	
Outlet Orifice Area =	1.31	N/A	ft^2
Outlet Orifice Centroid =	0.58	N/A	feet
Half-Central Angle of Restrictor Plate on Pipe =	1.97	N/A	radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	6.00	ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length =	50.00	feet
Spillway End Slopes =	4.00	H:V
Freeboard above Max Water Surface =	1.00	feet

Calculated Parameters for Spillway

Spillway Design Flow Depth=	0.50	feet
Stage at Top of Freeboard =	7.50	feet
Basin Area at Top of Freeboard =	0.91	acres
Basin Volume at Top of Freeboard =	3.78	acre-ft

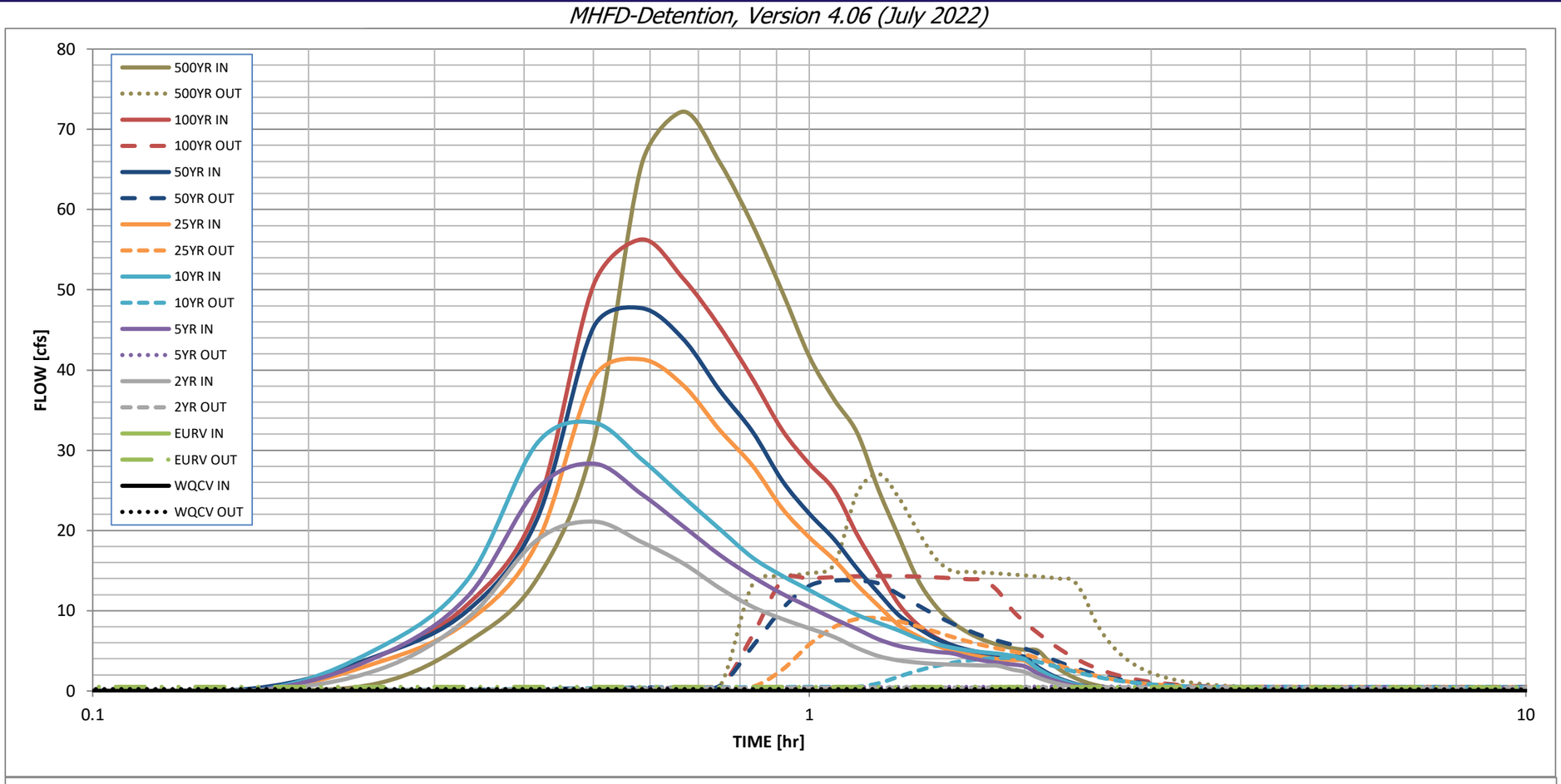
Routed Hydrograph Results

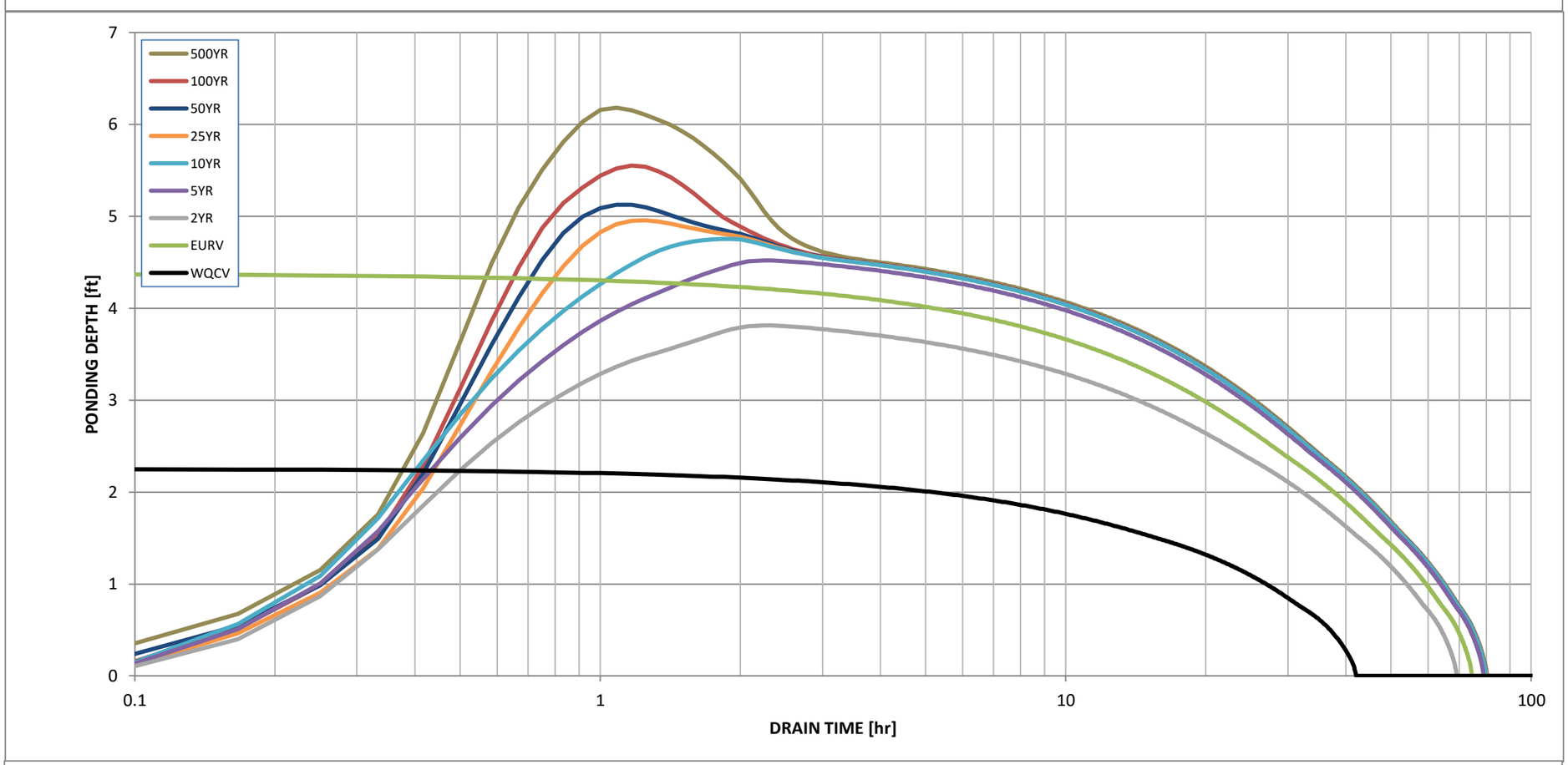
The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

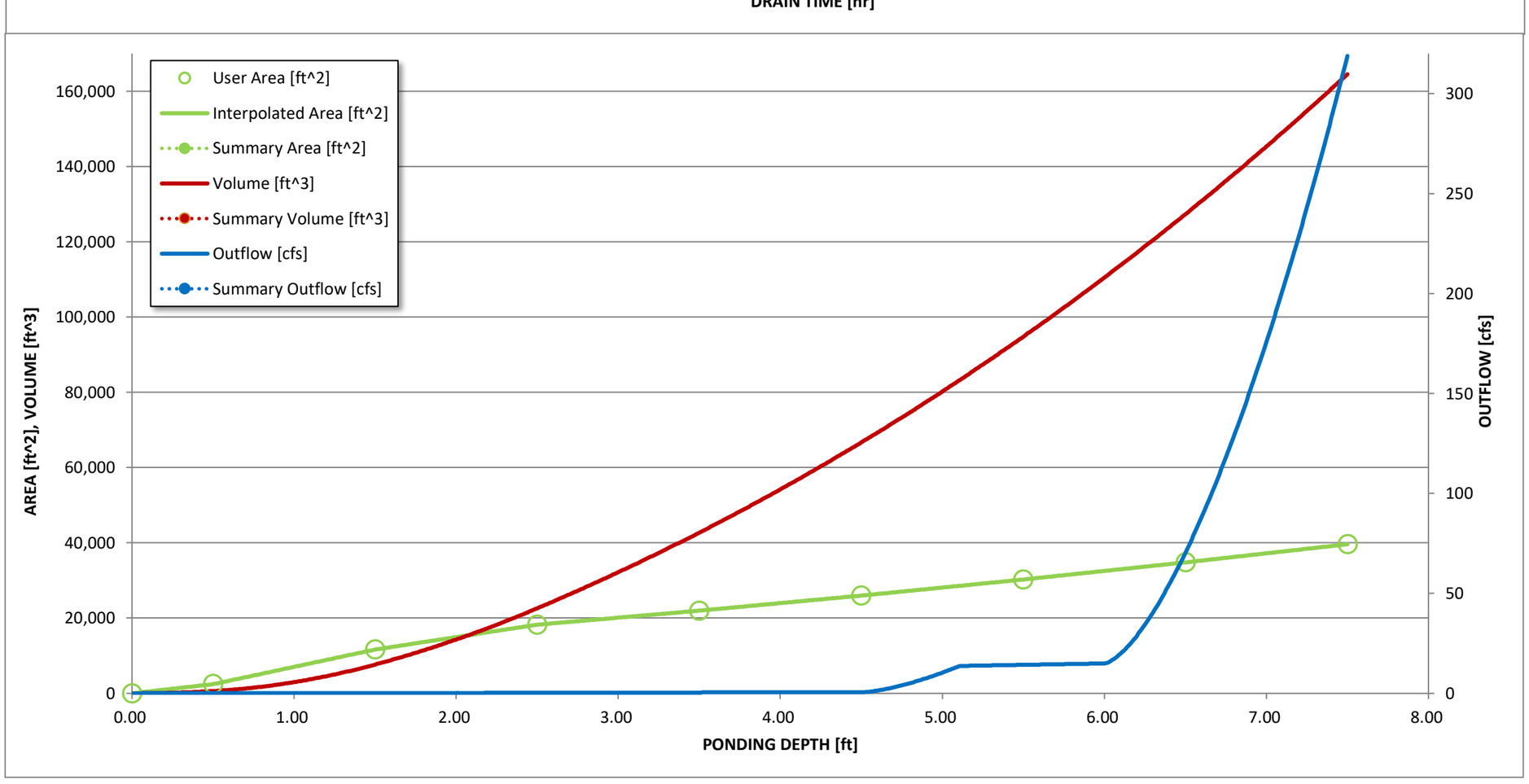
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	N/A	N/A	1.19	1.50	1.75	2.00	2.25	2.52	3.14
CUHP Runoff Volume (acre-ft) =	0.421	1.458	1.212	1.626	1.966	2.381	2.748	3.187	4.110
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	1.212	1.626	1.966	2.381	2.748	3.187	4.110
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	0.3	3.6	6.2	12.0	15.6	20.5	29.2
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.02	0.21	0.35	0.69	0.89	1.17	1.67
Peak Inflow Q (cfs) =	N/A	N/A	21.1	28.3	33.4	41.3	47.7	56.3	72.2
Peak Outflow Q (cfs) =	0.2	0.5	0.5	0.6	4.1	9.1	13.7	14.3	27.0
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.2	0.7	0.8	0.9	0.7	0.9
Structure Controlling Flow =	Plate	Vertical Orifice 1	Vertical Orifice 1	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	0.0	0.3	0.7	1.1	1.2	1.3
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) =	37	63	59	67	66	64	63	62	59
Time to Drain 99% of Inflow Volume (hours) =	**40**	69	65	73	73	72	72	71	69
Maximum Ponding Depth (ft) =	2.26	4.38	3.81	4.52	4.76	4.96	5.13	5.55	6.18
Area at Maximum Ponding Depth (acres) =	0.38	0.59	0.53	0.60	0.62	0.64	0.66	0.70	0.77
Maximum Volume Stored (acre-ft) =	0.422	1.460	1.141	1.537	1.683	1.809	1.919	2.211	2.673

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 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

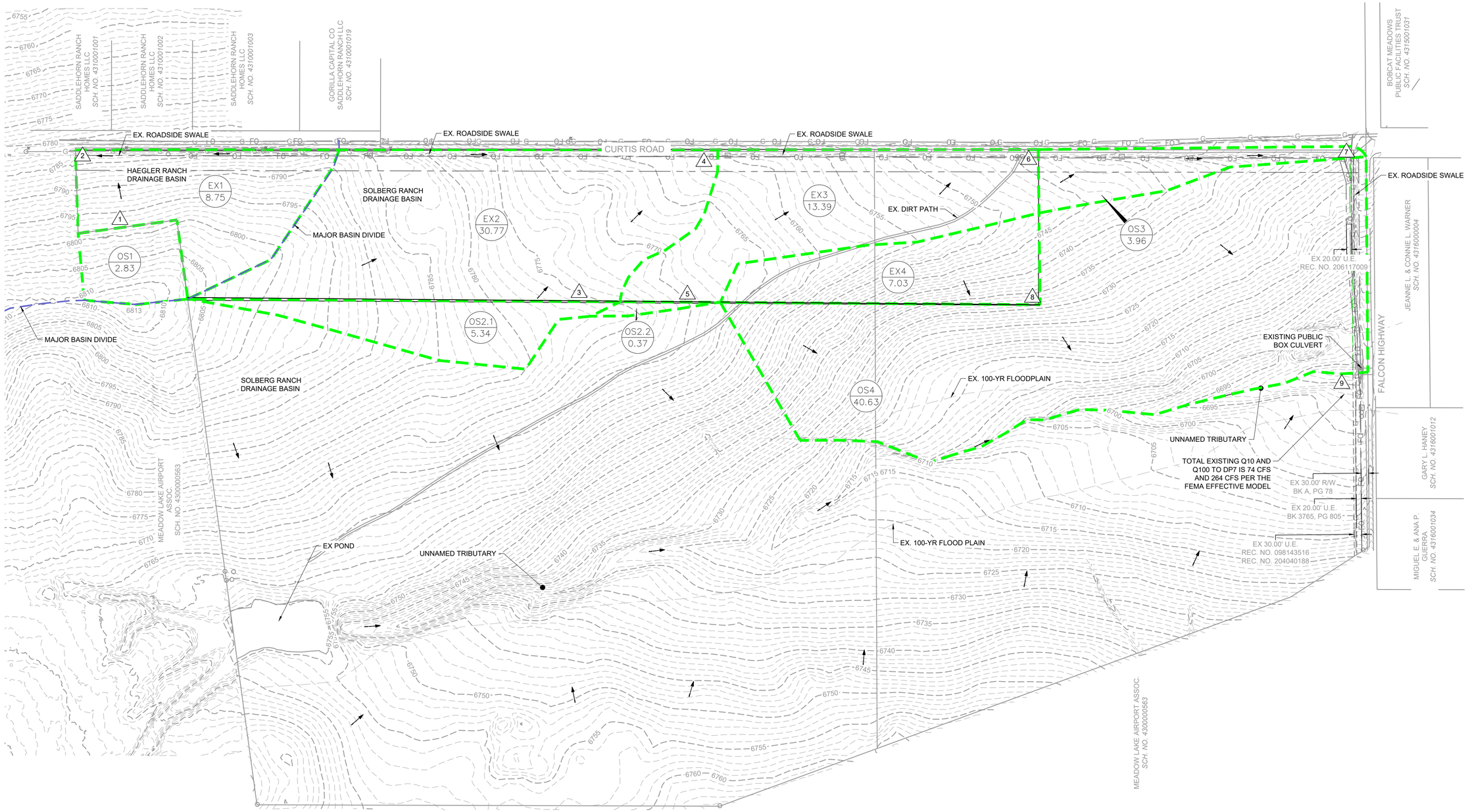
Outflow Hydrograph Workbook Filename:

Inflow Hydrographs

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

	SOURCE	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP
Time Interval	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	0.30	0.03	0.95
	0:15:00	0.00	0.00	2.63	4.28	5.30	3.55	4.39	4.32	6.08
	0:20:00	0.00	0.00	9.02	11.74	13.83	8.63	10.00	10.76	13.93
	0:25:00	0.00	0.00	18.79	25.11	30.82	18.37	21.33	22.79	30.93
	0:30:00	0.00	0.00	21.11	28.33	33.45	39.00	45.32	50.58	65.54
	0:35:00	0.00	0.00	18.57	24.54	28.87	41.34	47.71	56.28	72.21
	0:40:00	0.00	0.00	15.91	20.54	24.20	38.11	43.89	51.43	65.89
	0:45:00	0.00	0.00	12.82	16.96	20.17	32.52	37.45	45.39	58.10
	0:50:00	0.00	0.00	10.50	14.25	16.63	28.09	32.33	38.92	49.80
	0:55:00	0.00	0.00	8.98	12.12	14.36	22.75	26.23	32.53	41.71
	1:00:00	0.00	0.00	7.81	10.48	12.58	19.15	22.12	28.32	36.34
	1:05:00	0.00	0.00	6.73	8.98	10.92	16.34	18.90	25.04	32.17
	1:10:00	0.00	0.00	5.35	7.69	9.48	13.20	15.24	19.48	25.03
	1:15:00	0.00	0.00	4.34	6.43	8.46	10.58	12.19	14.96	19.24
	1:20:00	0.00	0.00	3.81	5.61	7.54	8.21	9.45	10.83	13.93
	1:25:00	0.00	0.00	3.53	5.17	6.55	6.84	7.88	8.28	10.63
	1:30:00	0.00	0.00	3.37	4.88	5.87	5.72	6.56	6.70	8.58
	1:35:00	0.00	0.00	3.29	4.68	5.39	4.99	5.71	5.70	7.27
	1:40:00	0.00	0.00	3.22	4.17	5.05	4.51	5.13	5.01	6.36
	1:45:00	0.00	0.00	3.18	3.79	4.82	4.20	4.76	4.55	5.76
	1:50:00	0.00	0.00	3.14	3.51	4.65	3.98	4.50	4.23	5.35
	1:55:00	0.00	0.00	2.69	3.31	4.39	3.84	4.33	4.06	5.12
	2:00:00	0.00	0.00	2.36	3.07	3.95	3.76	4.24	4.00	5.04
	2:05:00	0.00	0.00	1.68	2.18	2.79	2.67	3.01	2.85	3.59
	2:10:00	0.00	0.00	1.16	1.52	1.94	1.86	2.10	2.00	2.52
	2:15:00	0.00	0.00	0.80	1.03	1.34	1.29	1.45	1.39	1.75
	2:20:00	0.00	0.00	0.53	0.68	0.90	0.87	0.97	0.93	1.17
	2:25:00	0.00	0.00	0.34	0.44	0.58	0.57	0.64	0.61	0.77
	2:30:00	0.00	0.00	0.21	0.28	0.37	0.37	0.42	0.40	0.50
	2:35:00	0.00	0.00	0.11	0.16	0.21	0.22	0.24	0.23	0.29
	2:40:00	0.00	0.00	0.05	0.08	0.09	0.10	0.12	0.11	0.14
	2:45:00	0.00	0.00	0.01	0.02	0.03	0.03	0.03	0.03	0.04
	2:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	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

APPENDIX E – DRAINAGE MAPS



LEGEND:

EXISTING MAJOR CONTOUR	5250
EXISTING MINOR CONTOUR	
FLOW DIRECTION	←
DRAINAGE BASIN	
DESIGN POINT	X
EXISTING BASIN LABEL	11 / 1.25 — BASIN DESIGNATION / AREA (AC.)

SUMMARY RUNOFF TABLE

BASIN	AREA (ac)	% IMPERVIOUS	Q5 (cfs)	Q100 (cfs)
EX1	8.75	5	3.4	18.3
EX2	30.77	3	9.5	57.8
EX3	13.39	5	4.5	25.4
EX4	7.03	2	2.1	14.3
OS1	2.83	2	1.0	6.7
OS2.1	5.34	2	1.8	11.9
OS2.2	0.37	2	0.1	0.9
OS3	3.96	11	2.1	9.2
OS4	40.63	3	10.7	64.7

DESIGN POINT SUMMARY TABLE

DESIGN POINT	CONTRIBUTING BASINS	SQ5 (cfs)	SQ100 (cfs)
1	OS1	1.0	6.7
2	EX1, DP1	4.2	23.9
3	OS2.1	1.8	11.9
4	EX2, DP3	10.9	67.6
5	OS2.2	0.1	0.9
6	EX3, DP5	13.2	79.9
7	OS3, DP6	13.2	77.4
8	EX4	2.1	14.3
9	OS4, DP7, DP8	22.6	135.2

NORTH

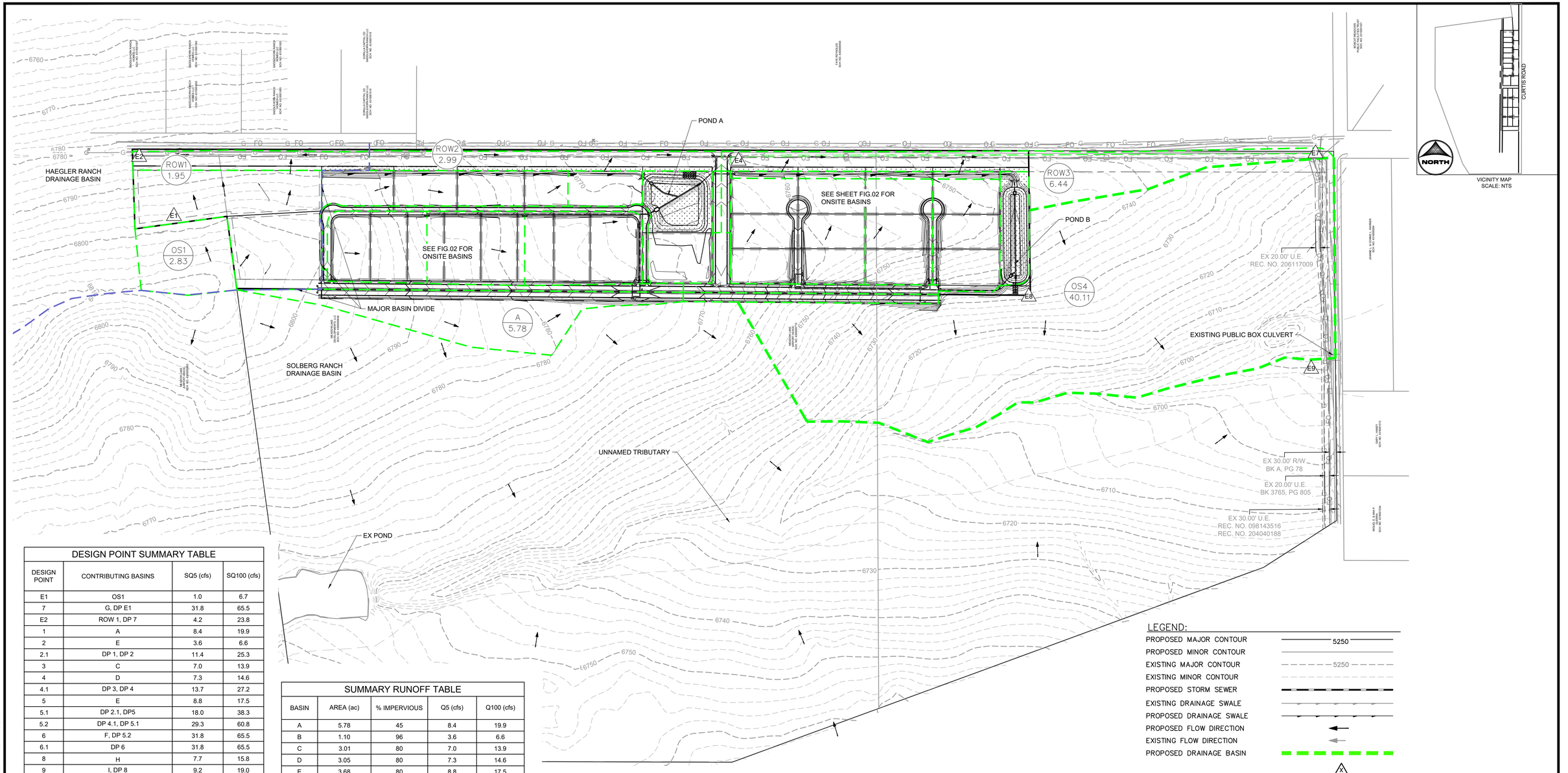
0 100 200

HRGreen

Job No.:	2202774
Prepared By:	AB
Date:	4/9/2024

MEADOWLAKE INDUSTRIAL
EXISTING DRAINAGE MAP

FIG.01



DESIGN POINT SUMMARY TABLE

DESIGN POINT	CONTRIBUTING BASINS	SQ5 (cfs)	SQ100 (cfs)
E1	OS1	1.0	6.7
7	G, DP E1	31.8	65.5
E2	ROW 1, DP 7	4.2	23.8
1	A	8.4	19.9
2	E	3.6	6.6
2.1	DP 1, DP 2	11.4	25.3
3	C	7.0	13.9
4	D	7.3	14.6
4.1	DP 3, DP 4	13.7	27.2
5	E	8.8	17.5
5.1	DP 2.1, DP5	18.0	38.3
5.2	DP 4.1, DP 5.1	29.3	60.8
6	F, DP 5.2	31.8	65.5
6.1	DP 6	31.8	65.5
8	H	7.7	15.8
9	I, DP 8	9.2	19.0
10	DP 6.1, DP 9	42.4	90.3
13	ROW2	1.9	7.1
E4	DP 13, POND A RELEASE	2.6	21.4
11	K	42.4	90.3
12	L, DP 11	42.4	90.3
12.1	DP 12	42.4	90.3
15	N	14.5	28.9
16	O	7.2	14.2
17	P	7.8	15.5
17.1	DP 16, DP 17	14.7	29.2
18	Q	4.0	7.6
19	R	2.5	7.9
19.1	DP 18, DP 19	17.5	37.7
20.1	DP 17.1, DP 19.1	23.8	50.2
21	S	1.7	4.4
22	T, DP 20.1, DP 21	13.7	55.7
E7	ROW 2, DP E4	8.1	32.4
E8	POND B RELEASE	0.5	14.3
E9	OS4, DP E7, DP E8	18.6	109.2

SUMMARY RUNOFF TABLE

BASIN	AREA (ac)	% IMPERVIOUS	Q5 (cfs)	Q100 (cfs)
A	5.78	45	8.4	19.9
B	1.10	96	3.6	6.6
C	3.01	80	7.0	13.9
D	3.05	80	7.3	14.6
E	3.68	80	8.8	17.5
F	1.10	90	2.8	5.2
G	6.75	2	2.0	13.5
H	3.71	74	7.7	15.8
I	1.12	67	2.1	4.6
J	3.14	25	3.0	9.6
K	0.24	90	1.0	1.9
L	0.24	90	1.0	1.9
N	6.07	80	14.5	28.9
O	3.04	80	7.2	14.2
P	3.20	80	7.8	15.5
Q	1.01	96	4.0	7.6
R	1.42	96	2.5	7.9
S	0.85	2	0.3	1.9
T	1.40	3	0.5	3.2
OS1	2.83	2	1.0	6.7
ROW1	1.95	17	1.4	5.0
ROW2	2.99	16	1.9	7.1
ROW3	6.44	7	2.4	11.8
OS4	40.11	3	10.5	63.9

LEGEND:

- PROPOSED MAJOR CONTOUR — 5250
- PROPOSED MINOR CONTOUR
- EXISTING MAJOR CONTOUR — 5250
- EXISTING MINOR CONTOUR
- PROPOSED STORM SEWER
- EXISTING DRAINAGE SWALE
- PROPOSED DRAINAGE SWALE
- PROPOSED FLOW DIRECTION
- EXISTING FLOW DIRECTION
- PROPOSED DRAINAGE BASIN
- PROPOSED BASIN LABEL / DESIGN POINT — BASIN DESIGNATION; AREA (AC.)

NORTH
0 200
100

EPC EDARP FILE NO. SP236

DRAWN BY: AB/DH JOB DATE: 4/16/2024
APPROVED: CM JOB NUMBER: 2202774
CAD DATE: 4/19/2024
CAD FILE: J:\2022\2202774\CAD\Dwgs\C\Drainage\Pr_Drainage_Map

BAR IS ONE INCH ON OFFICIAL DRAWINGS. 0 1" IF NOT ONE INCH ADJUST SCALE ACCORDINGLY.

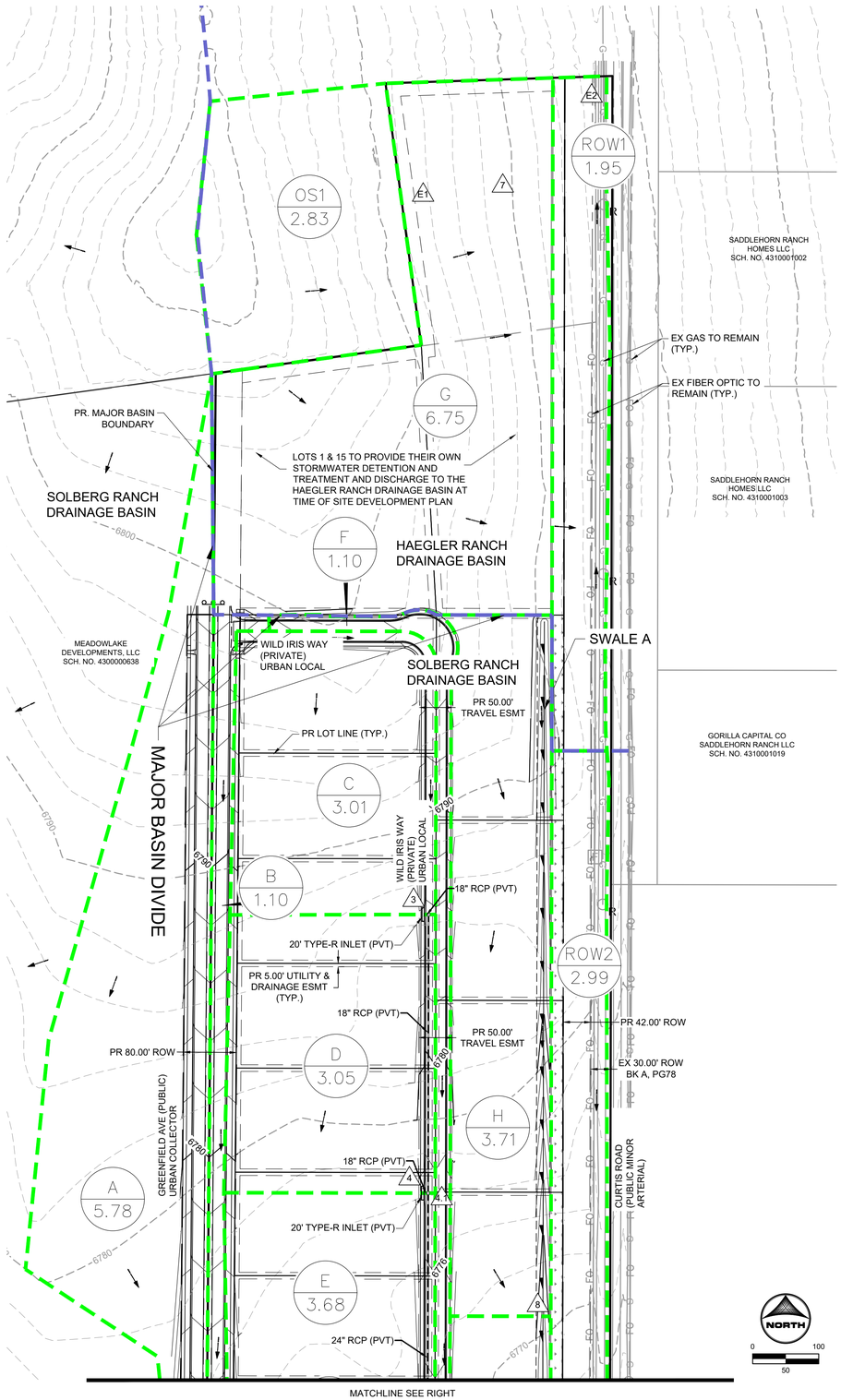
NO.	DATE	BY	REVISION DESCRIPTION

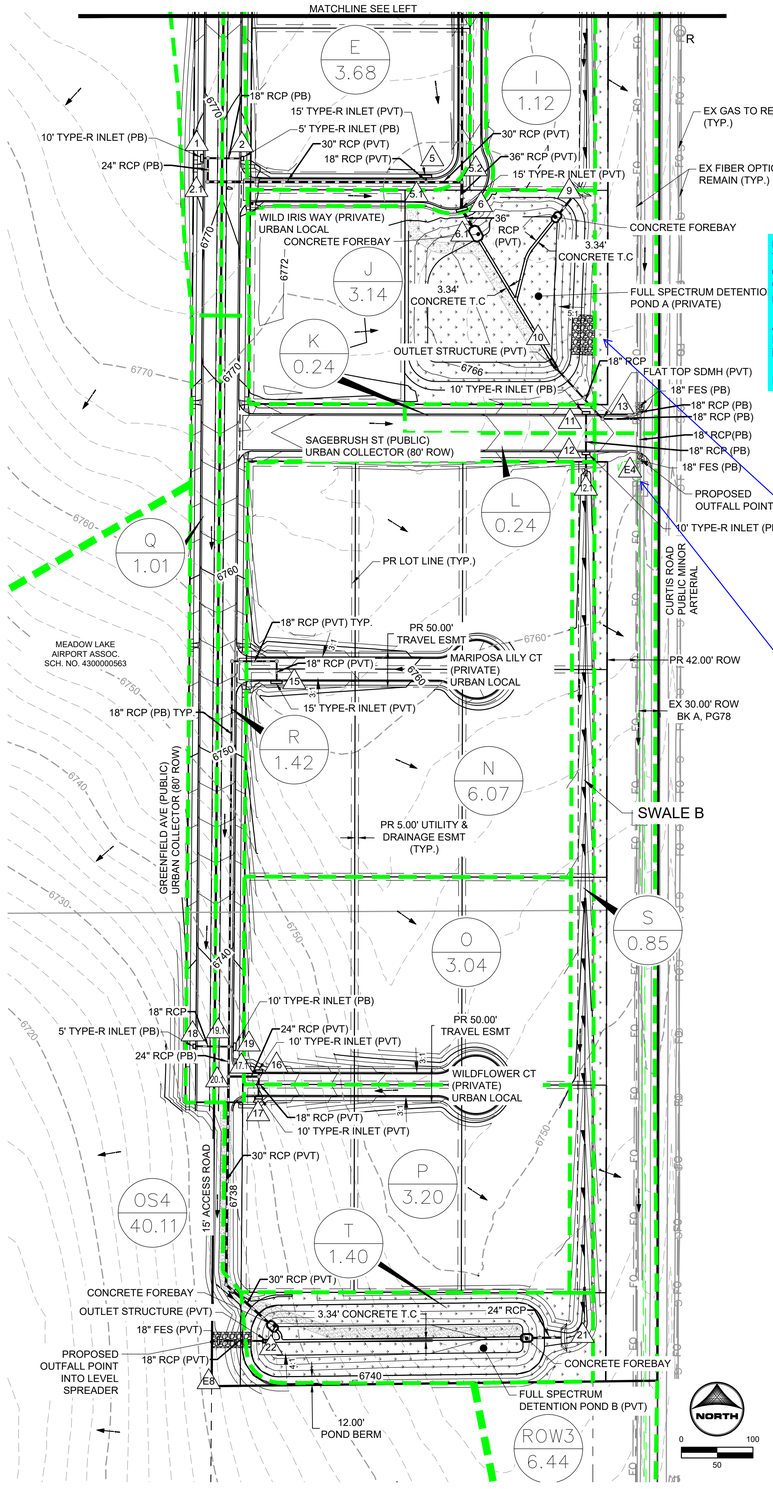
HRGreen
HR GREEN - COLORADO SPRINGS
1975 RESEARCH PARKWAY SUITE 230
COLORADO SPRINGS, CO 80920
PHONE: 719.394.2440
FAX: 713.965.0044

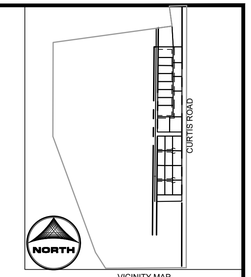
MEADOW LAKE INDUSTRIAL PHASE 1
MEADOWLAKE DEVELOPMENTS, LLC
EL PASO COUNTY, CO

DRAINAGE MAPS
PROPOSED DRAINAGE MAP

SHEET DR 2







review 1 comment: comments have been provided on the TIS to identify improvements that may be needed with this development to Curtis Rd roadway cross section. Coordinate with the traffic engineer and account for any necessary improvements in your design.

A northbound left turn is indicated as required at Sagebrush. Please account for this in your analysis/design as it may impact the existing roadside ditch and the proposed outfall.

Review 2: unresolved. Please address the above comment.

Added required improvements and included in drainage analysis.

see comment in the narrative regarding the pond outfall to the ditch. Identify that roadside ditch will be analyzed/designed with the final drainage report to ensure a suitable outfall

Identified in the report text (added statement in this edb's section.)

DESIGN POINT SUMMARY TABLE

DESIGN POINT	CONTRIBUTING BASINS	SQ5 (cfs)	SQ100 (cfs)
E1	OS1	1.0	6.7
7	G, DP E1	31.8	65.5
E2	ROW 1, DP 7	4.2	23.8
1	A	8.4	19.9
2	E	3.6	6.6
2.1	DP 1, DP 2	11.4	25.3
3	C	7.0	13.9
4	D	7.3	14.6
4.1	DP 3, DP 4	13.7	27.2
5	E	8.8	17.5
		.0	38.3
		.3	60.8
		.8	65.5
		.8	65.5
		.7	15.8
		.2	19.0
		.4	90.3
		.9	7.1
		.6	21.4
11	K	42.4	90.3
12	L, DP 11	42.4	90.3
12.1	DP 12	42.4	90.3
15	N	14.5	28.9
16	O	7.2	14.2
17	P	7.8	15.5
17.1	DP 16, DP 17	14.7	29.2
18	Q	4.0	7.6
19	R	2.5	7.9
19.1	DP 18, DP 19	17.5	37.7
20.1	DP 17.1, DP 19.1	23.8	50.2
21	S	1.7	4.4
	T, DP 20.1, DP 21	13.7	55.7
	ROW 2, DP E4	8.1	32.4
	POND B RELEASE	0.5	14.3
	OS4, DP E7, DP E8	18.6	109.2

SUMMARY RUNOFF TABLE

BASIN	AREA (ac)	% IMPERVIOUS	Q5 (cfs)	Q100 (cfs)
A	5.78	45	8.4	19.9
B	1.10	96	3.6	6.6
C	3.01	80	7.0	13.9
D	3.05	80	7.3	14.6
E	3.68	80	8.8	17.5
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- PROPOSED FLOW DIRECTION
- EXISTING FLOW DIRECTION
- PROPOSED DRAINAGE BASIN — A
- PROPOSED BASIN LABEL — BASIN DESIGNATION
- DESIGN POINT — X / 1.25 — AREA (AC.)

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DRAINAGE MAPS
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SHEET DR 3