EPC STORMWATER REVIEW COMMENTS
IN ORANGE BOXES WITH BLACK TEXT

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Preliminary Drainage Report
Meadow Lake Industrial Filing No. 1
El Paso County, Colorado

August, 2023

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, PE

cmonahan@hrgreen.com

(719) 394-2433

PCD File No. TBD 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, PE Date

State of Colorado No.

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 Filing No. 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. Location

Meadow Lake Industrial Filing No. 1, referred to as 'the site' herein, is 254 acres of undeveloped land. A 51.3 acre portion of the site will be developed as an industrial subdivision, Filing No. 1, and 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 land, to the east by Curtis Road, and to the south by Falcon Highway. A vicinity map is presented in Appendix A.

c. Description of Property

The property is currently undeveloped and unplatted. The developed site 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. There are no existing utilities on the site. Onsite vegetation consists primarily of native grasses and weeds. 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 Filing No. 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

Revise drainage report to include all of the offsite basins that drain to this site. Per the streamstats application there is a large area upstream of this site.

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

These existing drainage basins are much larger than the proposed. The existing and proposed basins should be looking at approximately the same areas for comparison between the existing and developed conditions.

a. Previous Drainage Studies

The site is primarily located within the Solberg Ranch Drainage Basin. Solberg Ranch does not have a Drainage Basin Planning Study (DBPS) on file with El Paso County.

b. Existing Subbasin Description

Basin EX1 is 200.66 acres of undeveloped area. Stormwater (Q_5 = 18.9 cfs Q_{100} = 126.8 cfs) flows south in the unnamed tributary to DP1.

Basin EX2 is 45.17 acres of undeveloped area. Stormwater (Q_5 = 5.1 cfs Q_{100} = 26.7 cfs) flows south in a roadside ditch adjacent to Curtis Road to DP2.

Basin EX3 is 8.49 acres of undeveloped area. Stormwater (Q_5 = 1.5 cfs Q_{100} = 9.8 cfs) flows north in a roadside ditch adjacent to Curtis Road to DP3.

c. Proposed Subbasin Description

it does not appear that there is undeveloped area in basin B as it is all lots and roadway. revise

Basin A is 4.79 acres of roadway and undeveloped area. Stormwater (Q_5 = 5.3 cfs Q_{100} = 14.1 cfs) is captured at DP1 in a public 10' Type R sump inlet. In the event of inlet failure at DP1, an overflow path is provided in Greenfield Avenue to Pond A. Basin A will be detained in Pond A.

Basin B is 1.68 acres of roadway and undeveloped area. Stormwater (Q_5 = 5.7 cfs Q_{100} = 10.4 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.

Basin C is 2.93 acres of industrial lots and roadway. Stormwater (Q_5 = 6.8 cfs Q_{100} = 13.5 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 2.92 acres of industrial lots and roadway. Stormwater (Q_5 = 7.0 cfs Q_{100} = 14.0 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 3.54 acres of industrial lots and roadway. Stormwater (Q_5 = 8.5 cfs Q_{100} = 16.9 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 1.70 acres of industrial lots and roadway. Stormwater (Q_5 = 4.7 cfs Q_{100} = 8.7 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.

Basin G is 9.87 acres of industrial lots and undeveloped area. Stormwater (Q_5 = 14.9 cfs Q_{100} = 30.3 cfs) is captured at DP7 and conveyed in a swale to Pond A. Basin G will be detained in Pond A.

Revise to include offsite runoff that drains to this basin.

Basin H is 2.33 acres of industrial lots and undeveloped area. Stormwater (Q_5 = 4.6 cfs Q_{100} = 9.6 cfs) is captured at DP8 and conveyed in a swale to Pond A. Basin H will be detained in Pond A.

Basin I is 1.25 acres of industrial lots and undeveloped area. Stormwater (Q_5 = 2.5 cfs Q_{100} = 5.2 cfs) is captured at DP9 and conveyed in a swale to Pond A. Basin G will be detained in Pond A.

Basin J is 3.00 acres and contains Pond A. Stormwater (Q_5 = 2.7 cfs Q_{100} = 8.6 cfs) sheet flows directly to Pond A. Basin J will be detained in Pond A.

Basin K is 0.42 acres of roadway. Stormwater (Q_5 = 1.8 cfs Q_{100} = 3.3 cfs) is captured at DP11 in a public 5' Type R sump inlet in Sagebrush Street. In the event of inlet failure at DP11, an overflow path is provided in Swale B to Pond B. Basin K will be detained in Pond B.

Basin L is 0.42 acres of roadway. Stormwater (Q_5 = 1.8 cfs Q_{100} = 3.3 cfs) is captured at DP12 in a public 5' Type R sump inlet in Sagebrush Street. In the event of inlet failure at DP12, an overflow path is provided in Swale B to Pond B. Basin L will be detained in Pond B.

Basin M and DP14 have been omitted as they are an old basin and design point that have been removed. In order to keep all calculations consistent within this report, the proceeding basin designations and design points have not changed and remain sequential.

Basin N is 6.01 acres of industrial lots and roadway. Stormwater (Q_5 = 14.4 cfs Q_{100} = 28.6 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 in 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 in within the public roadway and access road that drain due south directly to Pond B.

Basin R is 1.11 acres of roadway. Stormwater (Q_5 = 3.2 cfs Q_{100} = 6.2 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 in 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} = 1.7 cfs) is captured at DP21 and conveyed in a swale to Pond B. Basin S will be detained in Pond B.

Basin T is 1.19 acres and contains Pond B. Stormwater (Q_5 = 0.4 cfs Q_{100} = 2.4 cfs) sheet flows directly to Pond B. Basin T will be detained in Pond B.

IV. Drainage Facility Design

a. General Concept

Meadow Lake Industrial 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.

b. Water Quality & Detention

Stabilized access ramp shall be a minimum of 15ft wide and no greater than 12% slope, in accordance with DCMv1, Chap 11.2.2.

Pond A

Water quality and detention for Basins A - J is provided in a full spectrum water quality and detention pond: Pond A. Pond A is located in Tract A. A total of 34.01 acres at 68% imperviousness will be detained in the pond. The WQCV is 0.755 ac-ft, the EURV is 2.133 ac-ft, and the 100-year volume is 4.274 ac-ft. The WQCV, EURV and 100-year storms are released in 40, 72 and 74 hours, respectively. A forebay is located at the outfall into the pond and a 2.0' trickle channel conveys flow towards the outlet structure. A 10' access and maintenance road 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. Pond design calculations are presented in Appendix D.

Pond B

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 17.81 acres at 74% imperviousness will be detained in the pond. The WQCV is 0.437 ac-ft, the EURV is 1.247 ac-ft, and the 100-year volume is 2.447 ac-ft. The WQCV, EURV and 100-year storms are released in 40, 72 and 73 hours, respectively. A forebay is located at the outfall into the pond and a 2.0' trickle channel conveys flow towards the outlet structure. A 10' access and maintenance road is provided to the bottom of the pond to facilitate future maintenance. An 18' 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. Pond design calculations are presented in Appendix D.

c. Inspection and Maintenance

A maintenance agreement with the County is required.

The private detention ponds are to be owned and maintained by a metropolitan district, to be established with the project. Maintenance access for the full spectrum detention facilities will be provided through private drainage easements and tracts.

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.

For both narratives expand more on the ultimate outfall each pond will drain to. Per ECM 3.2.4 developed flows need to drain to a system that is hydraulically adequate. Analyze outfalls for each pond.

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. Onsite full spectrum detention pond provides water quality treatment for the site. The WQCV is released over a period of 40 hours.

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: Source controls will be required at the time of development for the industrial lots. Source control descriptions are discussed in the Stormwater Management Report for this project.

This step is focused on permanent specialized source control, not the temp BMPs proposed. This project has no need of specialized source controls an d that can be stated.

e. Drainage and Bridge Fees

d bridge fees for Meadow Lake Industrial are presented below. Drainage fees will be paid platting.

Solberg Ranch - 2023 Drainage Basin Fees

e/Impervious Acre	Site Acreage	Site Impervious	Impervious Acres	Drainage Fee
$23,078.00	51.3	77%	39.50	$911,581.00

Probable Cost

ion of probable cost is presented will be provided with a subsequent Final Drainage Report

Grade Line Analysis

ine analysis of the proposed storm will be provided with a subsequent Final Drainage

previously in the narrative it was stated that the site is primarily in the solberg ranch drainage basin. Per County GIS it appears that the northeast portion may be within the Haegler Ranch drainage basin. Please indicate whether this development lies solely in the Solberg basin otherwise also include anticipated fees due for Haegler Ranch.

V. Summary

Meadow Lake Industrial lies within the Solberg Ranch Drainage Basin. Water quality and detention for the site is provided in full spectrum water quality and detention ponds. 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.

VI. Drawings

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

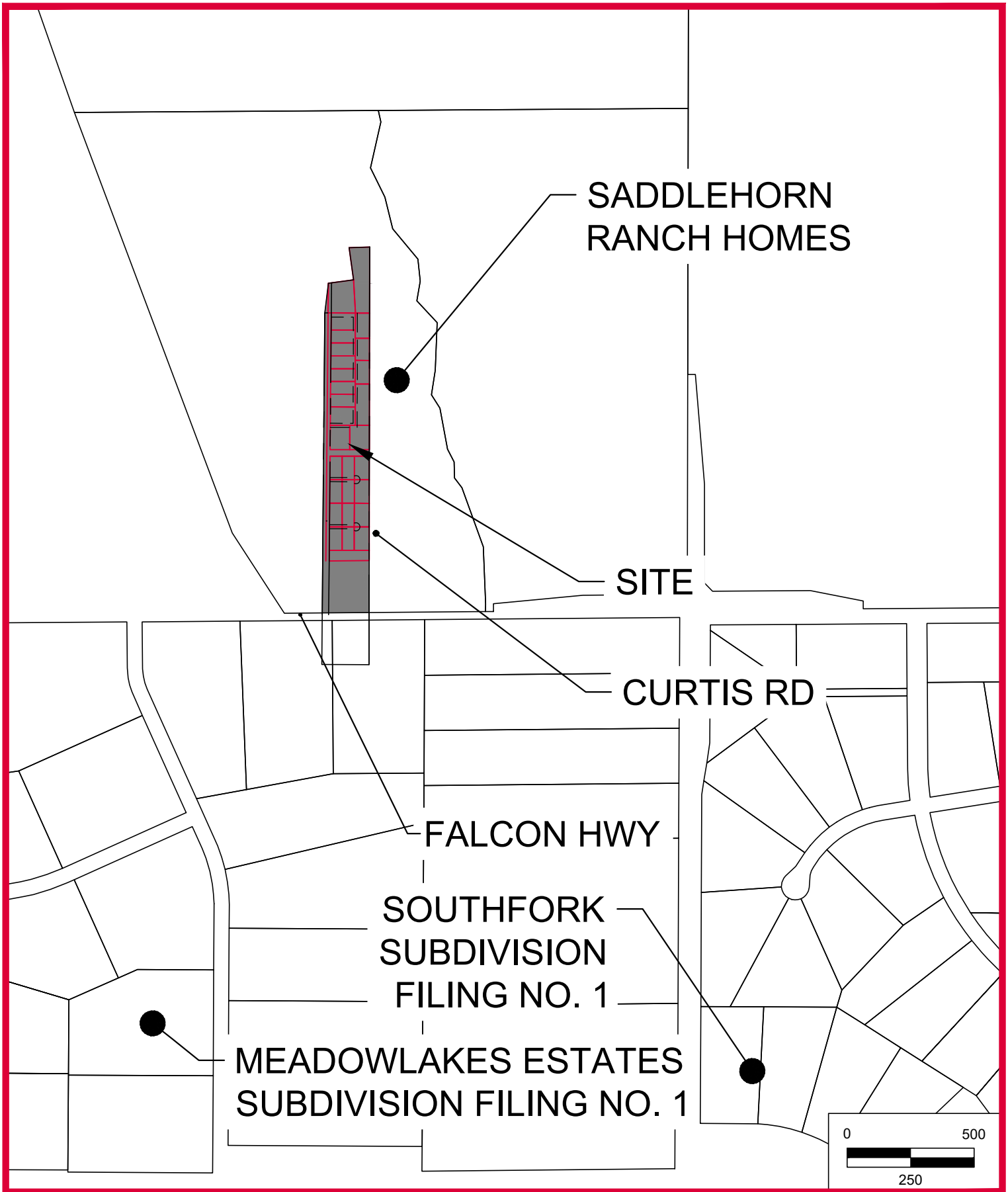
Discuss offsite flows that flow through the site. What is the condition of the natural channel labeled as the unnamed tributary where pond B outfalls. Determine if mitigation will be required because of the pond b outfall.

Revise to explain whether downstream facilities/ natural swales are hydraulically adequate to handle developed flows. What are the ultimate destinations for each outfall? Are developed flows a major increase compared to historic flows? Explain.

VII. References

1. City of Colorado Springs – Drainage Criteria Manual, May 2014, Revised January 2021.
2. Drainage Criteria Manual of El Paso, Colorado, October 2018.
3. 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

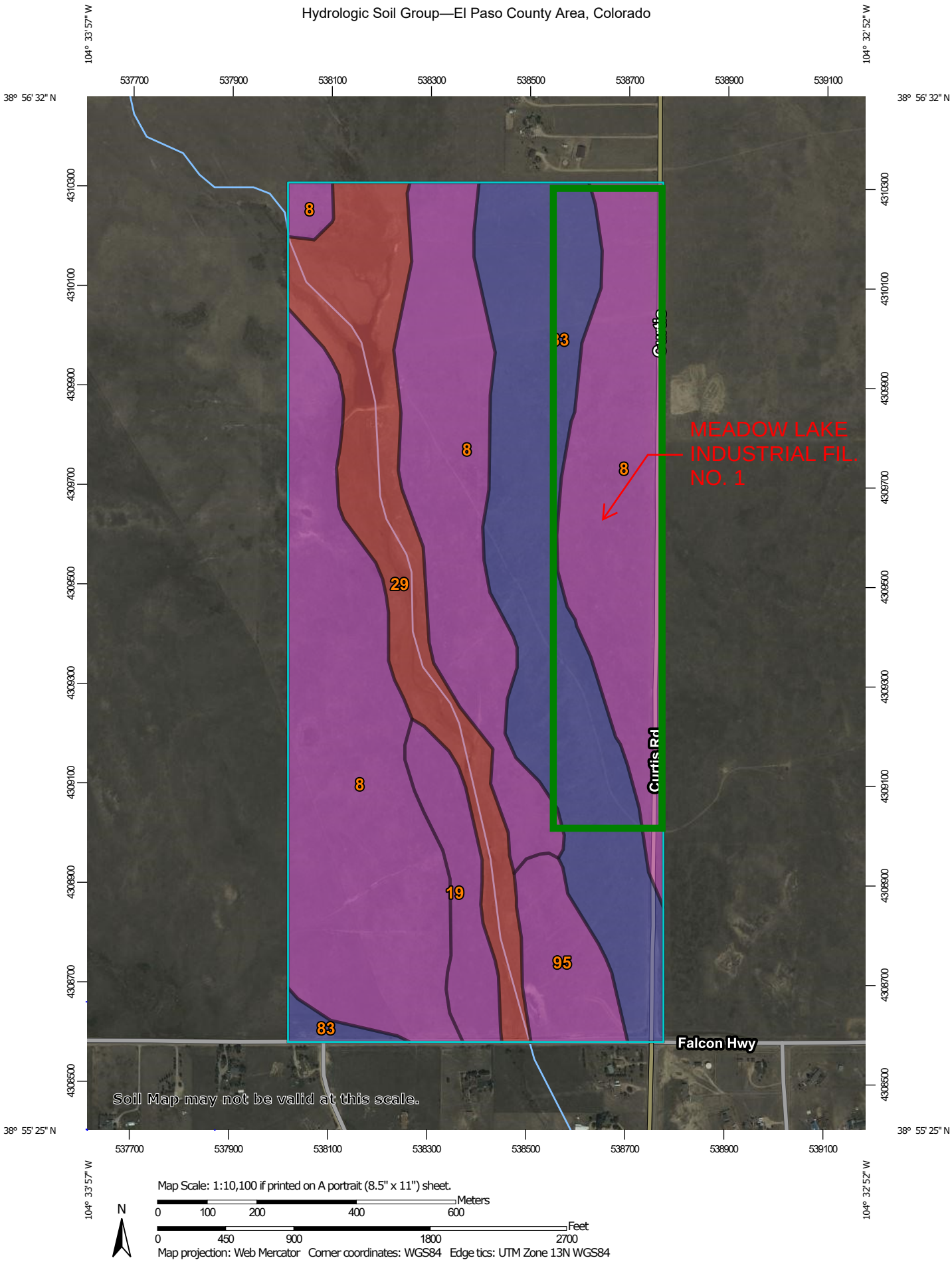
SHEET

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
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538700
538900
539100
4310300
4310100
4309900
4309700
4309500
4309300
4309100
4308900
4308700
4308500
8
83
29
19
95
MEADOW LAKE INDUSTRIAL FIL. NO. 1
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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

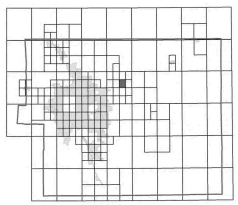
If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip.

El Paso County Vertical Datum Offset Table

Flooding Source	Vertical Datum Offset (ft)

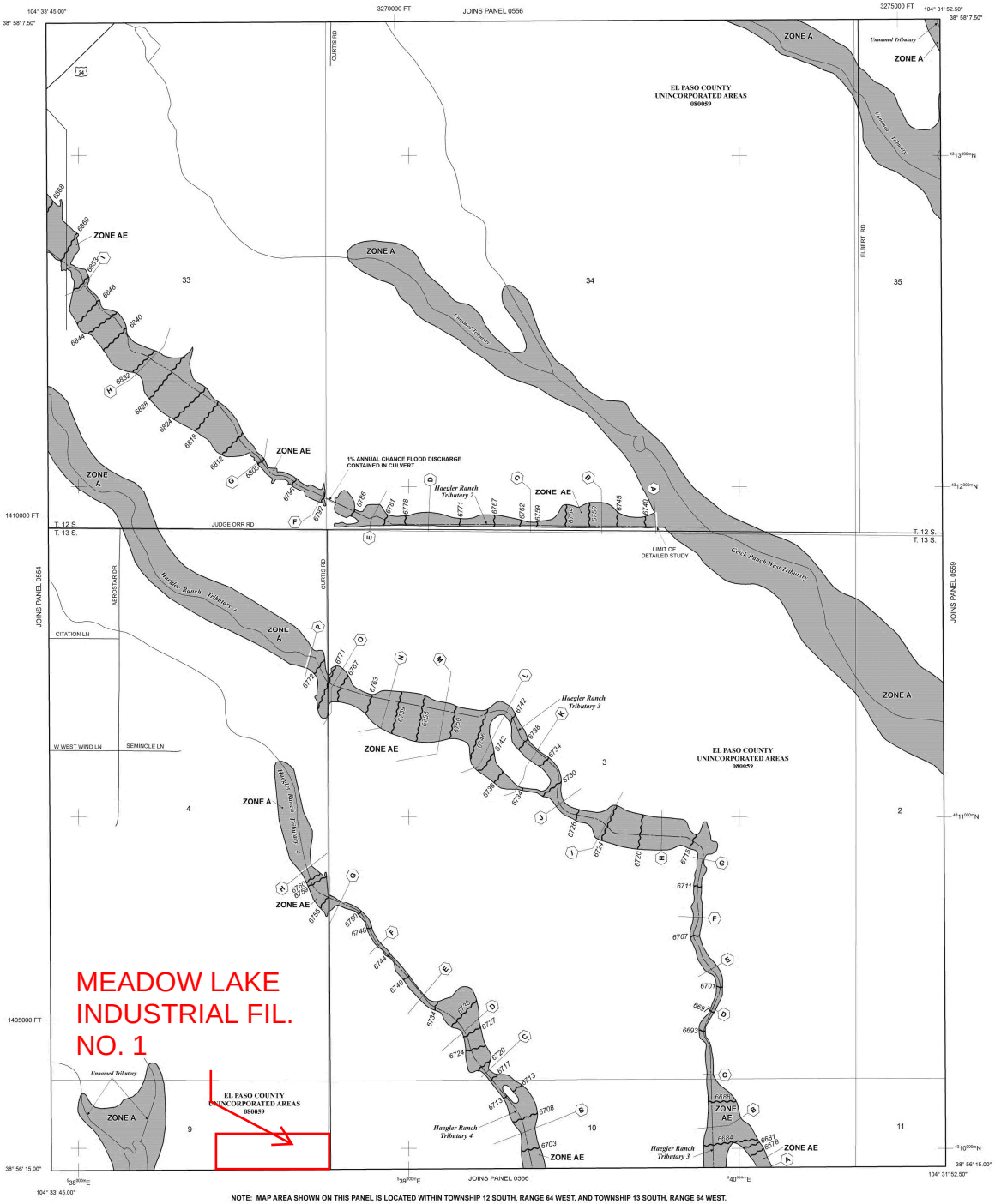
REFER TO SECTION 3.3 OF THE EL PASO COUNTY FLOOD INSURANCE STUDY FOR STREAM BY STREAM VERTICAL DATUM CONVERSION INFORMATION

Panel Location Map



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

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



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

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

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

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

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

MAP SCALE 1" = 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

NOTES TO USERS

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

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

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

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

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

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

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

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

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

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

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

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

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

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

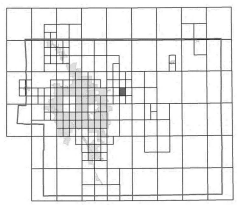
If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip.

El Paso County Vertical Datum Offset Table

Flooding Source	Vertical Datum Offset (ft)

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

Panel Location Map



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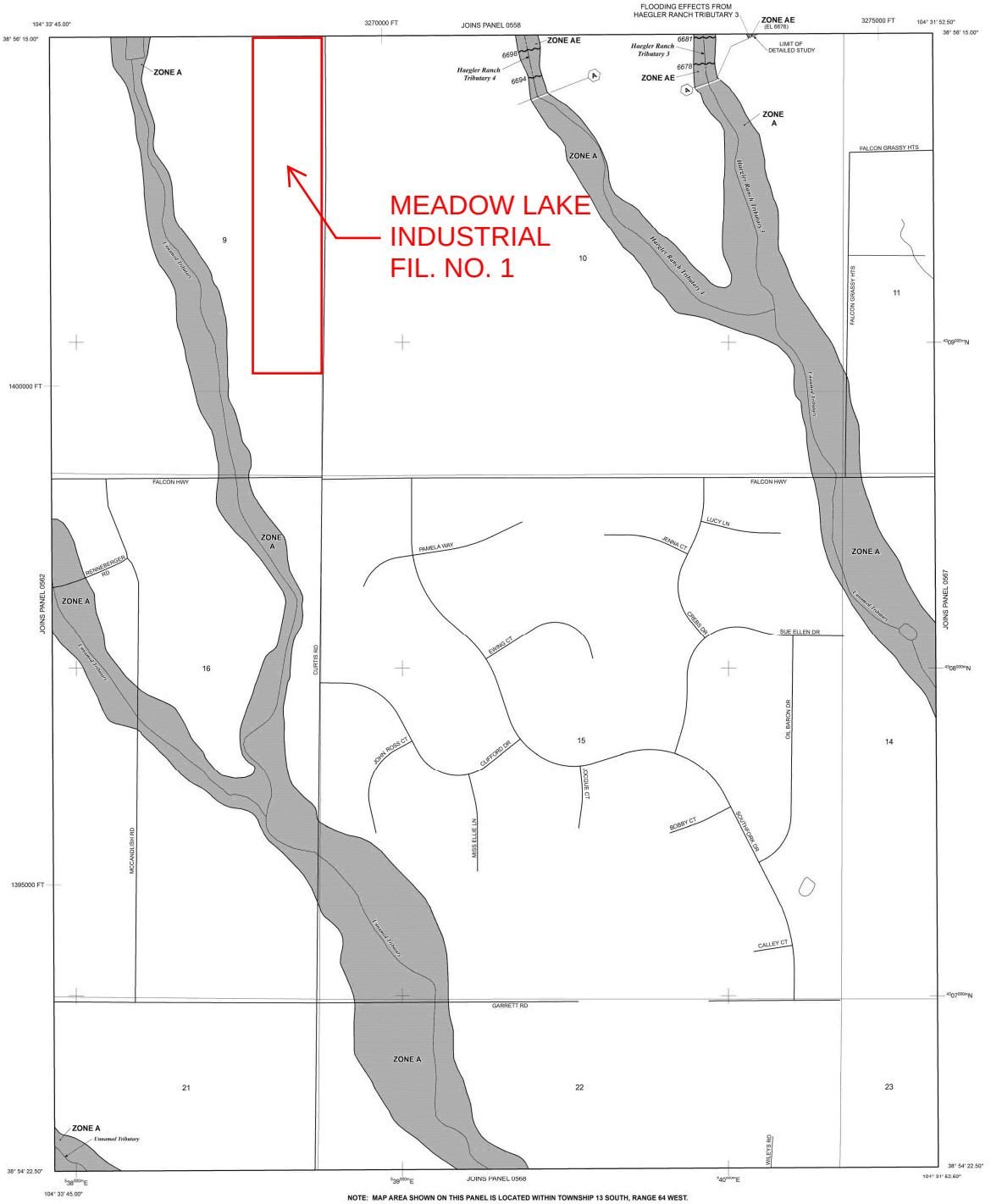

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* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

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M1.5 River Mile

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

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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:**	**NQJ**
	EXISTING CONDITIONS	**Checked by:**	**CM**
	EL PASO COUNTY, CO	**Date:**	**6/6/2023**

SUMMARY RUNOFF TABLE

BASIN	AREA (ac)	% IMPERVIOUS	Q_5 (cfs)	Q_{100} (cfs)
EX1	200.66	2	18.9	126.8
EX2	45.17	6	5.1	26.7
EX3	8.49	2	1.5	9.8

DESIGN POINT SUMMARY TABLE

DESIGN POINT	CONTRIBUTING BASINS	ΣQ_5 (cfs)	ΣQ_{100} (cfs)
1	EX1	18.9	126.8
2	EX2	5.1	26.7
3	EX3	1.5	9.8

HRGreen	**MEADOWLAKE INDUSTRIAL**					**Calc'd by:**	**NQJ**	
	EXISTING CONDITIONS					**Checked by:**	**CM**	
	EL PASO COUNTY, CO					**Date:**	**6/6/2023**	

COMPOSITE 'C' FACTORS

BASIN	UNDEVELOPED	PAVED	TOTAL	SOIL TYPE	UNDEVELOPED			PAVED			COMPOSITE IMPERVIOUSNESS & C		
	ACRES				%I	C_5	C_{100}	%I	C_5	C_{100}	%I	C_5	C_{100}
EX1	200.66	0.00	200.66	A/B	2	0.09	0.36	100	0.90	0.96	2	0.09	0.36
EX2	43.31	1.86	45.17	A/B	2	0.09	0.36	100	0.90	0.96	6	0.12	0.38
EX3	8.49	0.00	8.49	A/B	2	0.09	0.36	100	0.90	0.96	2	0.09	0.36
Total			254.32										

This area is significantly more than the proposed condition and as such the calculated flows are not comparable.

HRGreen	**MEADOWLAKE INDUSTRIAL**	**Calc'd by:**	**NQJ**
	EXISTING CONDITIONS	**Checked by:**	**CM**
	EL PASO COUNTY, CO	**Date:**	**6/6/2023**

TIME OF CONCENTRATION

BASIN DATA			OVERLAND TIME (T_i)			TRAVEL TIME (T_t)					TOTAL
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)
EX1	0.09	200.66	300	3.1	22.0	10	4252	1.6	1.3	56.0	78.0
EX2	0.12	45.17	300	2.1	24.2	10	4000	1.2	1.1	60.9	85.1
EX3	0.09	8.49	300	2.6	23.3	10	960	0.6	0.8	20.7	44.0

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

EXISTING CONDITIONS

DESIGN STORM: 5-YEAR

Calc'd by:	NQJ
Checked by:	CM
Date:	6/6/2023

			DIRECT RUNOFF						TOTAL RUNOFF				SURFACE			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 (in)	LENGTH (FT)	VEL. (FPS)	TRAVEL TIME (min	
	1	EX1	200.7	0.09	78.0	18.06	1.05	18.9															BASIN EX1 FLOW @ DP1
	2	EX2	45.17	0.12	85.1	5.57	0.92	5.1															BASIN EX2 FLOW @ DP2
	3	EX3	8.49	0.09	44.0	0.76	1.91	1.5															BASIN EX3 FLOW @ DP3

HRGreen	**MEADOWLAKE INDUSTRIAL**	**Calc'd by:**	**DH/AB**
	PROPOSED CONDITIONS	**Checked by:**	**NQJ**
	EL PASO COUNTY, CO	**Date:**	**8/15/2023**

SUMMARY RUNOFF TABLE

BASIN	AREA (ac)	% IMPERVIOUS	Q_5 (cfs)	Q_{100} (cfs)
A	4.79	33	5.3	14.1
B	1.68	97	5.7	10.4
C	2.93	80	6.8	13.5
D	2.92	80	7.0	14.0
E	3.54	80	8.5	16.9
F	1.70	93	4.7	8.7
G	9.87	76	14.9	30.3
H	2.33	70	4.6	9.6
I	1.25	68	2.5	5.2
J	3.00	26	2.7	8.6
K	0.42	90	1.8	3.3
L	0.42	90	1.8	3.3
N	6.01	80	14.4	28.6
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	1.11	96	3.2	6.2
S	0.85	2	0.3	1.7
T	1.19	4	0.4	2.4

Impervious value for basin appears to be low. It includes lot 6, which will have an industrial use. Revise.

DESIGN POINT SUMMARY TABLE

DESIGN POINT	CONTRIBUTING BASINS	ΣQ_5 (cfs)	ΣQ_{100} (cfs)
1	A	5.3	14.1
2	B	5.7	10.4
2.1	DP1,DP2	9.9	22.2
3	C	6.8	13.5
4	D	7.0	14.0
4.1	DP3,DP4	13.2	24.8
5	E	8.5	16.9
5.1	DP2.1,DP5	16.0	32.6
5.2	DP4.1,5.1	26.5	51.6
6	F	4.7	8.7
6.1	DP5.2,DP6	30.6	58.3
7	G	14.9	30.3
8	DP7,H	15.9	32.5
9	I,DP8	16.7	34.1
10	DP6.1,J	32.9	64.9
11	K	1.8	3.3
12	L	1.8	3.3
13	OS1	1.6	6.1
15	N	14.4	28.6
16	O	7.2	14.2
17	P	7.8	15.5
17.1	DP16,DP17	13.5	22.7
18	Q	4.0	7.6
19	DP15,DP16,R	6.3	17.1
21	DP12.1,S	2.5	59.6
22	DP20.1,DP21,T	30.3	68.9

HRGreen	**MEADOWLAKE INDUSTRIAL**							**Calc'd by:**				**DH/AB**					
	PROPOSED CONDITIONS							**Checked by:**				**NQJ**					
	EL PASO COUNTY, CO							**Date:**				**8/15/2023**					

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	1.52	4.79	A/B	2	0.09	0.36	80	0.59	0.70	100	0.90	0.96	33	0.35	0.55
B	0.00	0.23	1.45	1.68	A/B	2	0.09	0.36	80	0.59	0.70	100	0.90	0.96	97	0.86	0.92
C	0.00	2.93	0.00	2.93	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	2.92	0.00	2.92	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	3.54	0.00	3.54	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	1.13	1.70	A/B	2	0.09	0.36	80	0.59	0.70	100	0.90	0.96	93	0.80	0.87
G	0.50	9.37	0.00	9.87	A/B	2	0.09	0.36	80	0.59	0.70	100	0.90	0.96	76	0.56	0.68
H	0.30	2.03	0.00	2.33	A/B	2	0.09	0.36	80	0.59	0.70	100	0.90	0.96	70	0.53	0.66
I	0.19	1.06	0.00	1.25	A/B	2	0.09	0.36	80	0.59	0.70	100	0.90	0.96	68	0.51	0.65
J	2.06	0.94	0.00	3.00	A/B	2	0.09	0.36	80	0.59	0.70	100	0.90	0.96	26	0.25	0.47
K	0.04	0.00	0.38	0.42	A/B	2	0.09	0.36	80	0.59	0.70	100	0.90	0.96	90	0.82	0.90
L	0.04	0.00	0.38	0.42	A/B	2	0.09	0.36	80	0.59	0.70	100	0.90	0.96	90	0.82	0.90
OS1	2.81	0.00	0.40	3.21	A/B	2	0.09	0.36	80	0.59	0.70	100	0.90	0.96	14	0.19	0.43
N	0.00	6.01	0.00	6.01	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	0.22	0.22	0.89	1.11	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	1.17	0.00	0.02	1.19	A/B	2	0.09	0.36	80	0.59	0.70	100	0.90	0.96	4	0.10	0.37
Total				54.47											39		
North Pond				31.01											72		
South Pond				21.85											62		

total draining to ponds = 52.86 ac, what basin is not draining to the pond? OS1? Adding that OS1 basin area to the combined pond areas you get 56.07 ac.

HRGreen	**MEADOWLAKE INDUSTRIAL**	**Calc'd by:**	**DH/AB**
	PROPOSED CONDITIONS	**Checked by:**	**NQJ**
	EL PASO COUNTY, CO	**Date:**	**8/15/2023**

TIME OF CONCENTRATION

BASIN DATA			OVERLAND TIME (T_i)			TRAVEL TIME (T_t)					TOTAL
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)
A	0.35	4.79	100	1.9	11.1	20	1360	2.2	3.0	7.6	18.8
B	0.86	1.68	100	1.9	3.6	20	1330	2.2	3.0	7.5	11.1
C	0.59	2.93	100	2.0	7.4	20	665	1.9	2.8	4.0	11.4
D	0.59	2.92	100	2.0	7.4	20	425	1.5	2.4	2.9	10.3
E	0.59	3.54	100	2.0	7.4	20	470	1.6	2.5	3.1	10.5
F	0.80	1.70	100	1.9	4.5	20	1680	1.7	2.6	10.7	15.2
G	0.56	9.87	100	4.0	6.2	15	1200	0.4	1.0	20.1	26.3
H	0.53	2.33	100	2.0	8.4	15	665	2.4	2.3	4.7	13.1
I	0.51	1.25	100	2.0	8.5	15	360	1.1	1.6	3.8	12.3
J	0.25	3.00	100	2.0	12.4	20	140	0.9	1.9	1.2	13.6
K	0.82	0.42	15	2.0	1.6	20	390	1.5	2.4	2.7	5.0
L	0.82	0.42	15	2.0	1.6	20	390	1.5	2.4	2.7	5.0
OS1	0.19	3.21	70	5.0	8.2	10	1490	1.6	1.3	19.6	27.8
N	0.59	6.01	100	2.0	7.4	20	460	1.5	2.4	3.1	10.6
O	0.59	3.04	100	2.0	7.4	20	525	1.5	2.4	3.6	11.0
P	0.59	3.20	40	2.0	4.7	20	1100	3.0	3.5	5.3	10.0
Q	0.86	1.01	100	2.0	3.6	20	550	1.5	2.4	3.7	7.3
R	0.86	1.11	17	25.0	0.6	10	1160	1.5	1.2	15.8	16.4
S	0.09	0.85	100	2.0	14.7	20	505	2.5	3.2	2.7	17.4
T	0.10	1.19	100	2.0	14.5	20	540	2.5	3.2	2.8	17.3

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:	8/15/2023

			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)	
	1	A	4.79	0.35	18.8	1.66	3.18	5.3								5.3	1.66	1.2	1.5	40	6.5	0.10	DP1 CAPTURED W/ 10' TYPE R SUMP INELT, PIPE TO DP2.1
	2	B	1.68	0.86	11.1	1.44	3.98	5.7								5.7	1.44	0.5	1.5	89	4.2	0.35	DP2 CAPTURED W/ 5' TYPE R SUMP INLET, PIPE TO DP2.1
	2.1								18.9	3.10	3.18	9.9				9.9	3.10	0.5	1.5	305	4.2	1.21	DP2.1 FLOW, PIPE TO DP5.1
	3	C	2.93	0.59	11.4	1.73	3.93	6.8								6.8	1.73	2.0	1.5	427	8.4	0.85	DP3 CPATURED W/ 20' TYPE R INLET, PIPE TO DP4.1
	4	D	2.92	0.59	10.3	1.72	4.08	7.0								7.0	1.72	1.0	1.5	6	5.9	0.02	DP4 CAPTURED W/ 20' TYPE R INLET, PIPE TO DP4.1
	4.1								12.3	3.45	3.82	13.2				13.2	3.45	2.0	1.5	500	8.4	0.99	DP4.1 FLOW, PIPE TO DP5.1
	5	E	3.54	0.59	10.5	2.09	4.05	8.5								8.5	2.09	3.0	1.5	6	10.3	0.01	DP5 CAPTURED W/ 15' TYPE R SUMP INLET, PIPE TO DP5.1
	5.1								20.1	5.19	3.08	16.0				16.0	5.19	0.4	2.0	50	4.6	0.18	DP5.1 FLOW, PIPE TO DP5.2
	5.2								20.3	8.64	3.07	26.5				26.5	8.64	0.8	2.0	36	6.2	0.10	DP5.2 FLOW, PIPE TO DP6.1
	6	F	1.7	0.80	15.2	1.35	3.50	4.7								4.7	1.35	1.0	2.0	12	7.2	0.03	DP6 CAPTURED IN 15' TYPE R SUMP INLET , PIPE TO DP6.1
	6.1								20.4	10.00	3.06	30.6											DP6.1, PIPE TO POND A
	7	G	9.87	0.56	26.3	5.57	2.68	14.9					14.9	5.57	0.7					665	1.7	6.62	SWALE TO BASIN H
	8	H	2.33	0.53	13.1	1.22	3.72	4.6	32.9	6.80	2.34	15.9	32.9	6.80	1.7					360	2.6	2.30	SWALE TO BASIN I
	9	I	1.25	0.51	12.3	0.64	3.81	2.5	35.2	7.44	2.24	16.7											SWALE TO DET POND A
	10	J	3	0.25	13.6	0.74	3.66	2.7	20.4	10.74	3.06	32.9											**DP10 FLOW, TOTAL FLOW ENTERING POND A**

HRGreen

MEADOWLAKE INDUSTRIAL
PROPOSED CONDITIONS
DESIGN STORM: 5-YEAR

Calc'd by:	DH/AB
Checked by:	NQJ
Date:	8/15/2023

			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	0.42	0.82	5.0	0.34	5.17	1.8								1.8	0.34	2.0	1.5	25	2.8	0.15	DP11 CAPTURED W/ 5' TYPE R SUMP INLET, PIPE TO DP12.1
	12	L	0.42	0.82	5.0	0.34	5.17	1.8								1.8	0.34	2.0	1.5	25	2.8	0.15	DP12 CAPTURED W/ 5' TYPE R SUMP INELT, PIPE TO DP12.1
	12.1								5.1	0.69	5.13	3.5	3.5	0.69	1.0					1150	2.0	9.58	DP12.1 SWALE FLOW TO DP21
	13	OS1	3.21	0.19	27.8	0.61	2.60	1.6															DP13 FLOWS TO PR CULVERT, FOLLOW HISTORIC DRAINAGE PATTERNS SOUTH ALONG CURTIS ROAD UNDER ACCESS ROAD NORTH
	15	N	6.01	0.59	10.6	3.55	4.05	14.4					2.6	0.63	3.0	11.8	2.91	3.6	1.5	550 32	3.5 11.3	2.65 0.05	DP15 BYPASS TO DP19 DP15 CAPTURED IN 15' TYPE R INLET, PIPE TO DP15.1
	16	O	3.04	0.59	11.0	1.79	3.99	7.2					1.2	0.29	3.0	6.0	1.50	1.0	1.5	60 10	3.5 5.9	0.29 0.03	DP16 BYPASS TO DP19 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								7.8	1.89	2.0	1.5	27	8.4	0.05	DP17 BYPASS OFFSITE DP17 CAPTURED IN 20' TYPE R INLET, PIPE TO DP17.1
	17.1								11.0	3.39	3.98	13.5				13.5	3.39	3.6	2.0	42	13.7	0.05	DP17.1 FLOW, PIPE TO DP20.1
	18	Q	1.01	0.86	7.3	0.86	4.60	4.0								4.0	0.86	0.5	1.5	50	4.2	0.20	DP18 BYPASS OFFSITE DP18 CAPTURED IN 5' TYPE R SUMP INLET, PIPE TO DP19.1
	19	R	1.11	0.86	16.4	0.95	3.39	3.2	16.4	1.87	3.39	6.3				3.2	0.95	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	5.65	3.38	19.1				19.1	5.65	0.5	2.0	42	5.1	0.14	DP19.1 FLOW, PIPE TO DP20.1
	20.1								16.4	9.04	3.38	30.6				30.6	9.04	0.5	2.5	370	5.9	1.04	DP20.1 PIPE FLOW TO POND B
	21	S	0.85	0.09	17.4	0.08	3.30	0.3	17.4	0.76	3.30	2.5				17.4	0.76	4.0	2.0	151	14.4	0.17	DP21 SWALE FLOW TO POND B
	22	T	1.19	0.10	17.3	0.12	3.30	0.4	17.4	9.17	3.30	30.3											**TOTAL FLOW ENTERING POND B**

HRGreen

MEADOWLAKE INDUSTRIAL

PROPOSED CONDITIONS

DESIGN STORM: 100-YEAR

Calc'd by:	**DH/AB**
Checked by:	**NQJ**
Date:	**8/15/2023**

			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)	
	1	A	4.79	0.55	18.8	2.64	5.34	14.1								14.1	2.64	1.2	1.5	40	2.2	0.30	DP1 CAPTURED W/ 10' TYPE R SUMP INELT, PIPE TO DP2.1
	2	B	1.68	0.92	11.1	1.55	6.68	10.4								10.4	1.55	0.5	1.5	89	1.4	1.05	DP2 CAPTURED W/ 5' TYPE R SUMP INLET, PIPE TO DP2.1
	2.1								19.1	4.19	5.30	22.2				22.2	4.19	0.5	1.5	305	1.4	3.59	DP2.1 FLOW, PIPE TO DP5.1
	3	C	2.93	0.70	11.4	2.05	6.59	13.5					0.4	0.06	2.0	13.1	1.99	2.0	1.5	427	2.8 2.8	0.00 2.52	DP3 CPATURED W/ 20' TYPE R INLET, PIPE TO DP4.1
	4	D	2.92	0.70	10.3	2.04	6.85	14.0	11.4	2.10	6.59	13.9	0.2	0.03	1.6	13.7	2.07	1.0	1.5	6	2.5 2.0	0.00 0.05	DP4 CAPTURED W/ 20' TYPE R INLET, PIPE TO DP4.1
	4.1								14.0	4.06	6.09	24.8				24.8	4.06	2.0	1.5	500	2.8	2.95	DP4.1 FLOW, PIPE TO DP5.1
	5	E	3.54	0.70	10.5	2.48	6.81	16.9	10.5	2.51	6.81	17.1				17.1	2.51	3.0	1.5	6	3.5	0.03	DP5 CAPTURED W/ 15' TYPE R SUMP INLET, PIPE TO DP5.1
	5.1								22.7	6.70	4.87	32.6				32.6	6.70	0.4	2.0	50	1.3	0.66	DP5.1 FLOW, PIPE TO DP5.2
	5.2								23.3	10.76	4.80	51.6				51.6	10.76	0.8	2.0	36	1.7	0.35	DP5.2 FLOW, PIPE TO DP6.1
	6	F	1.7	0.87	15.2	1.48	5.87	8.7								8.7	1.48	1.0	2.0	12	2.0	0.10	DP6 CAPTURED IN 15' TYPE R SUMP INLET , PIPE TO DP6.1
	6.1								23.7	12.25	4.76	58.3											DP6.1, PIPE TO POND A
	7	G	9.87	0.68	26.3	6.74	4.50	30.3					30.3	6.74	0.7					665	1.7	6.62	SWALE TO BASIN H
	8	H	2.33	0.66	13.1	1.53	6.25	9.6	32.9	8.27	3.93	32.5	32.5	8.27	1.7					360	2.6	2.30	SWALE TO BASIN I
	9	I	1.25	0.65	12.3	0.81	6.40	5.2	35.2	9.08	3.76	34.1											SWALE TO DET POND A
	10	J	3	0.47	13.6	1.40	6.15	8.6	23.7	13.65	4.76	64.9											**DP10 FLOW, TOTAL FLOW ENTERING POND A**

HRGreen

MEADOWLAKE INDUSTRIAL

PROPOSED CONDITIONS

DESIGN STORM: 100-YEAR

Calc'd by:	**DH/AB**
Checked by:	**NQJ**
Date:	**8/15/2023**

			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	0.42	0.90	5.0	0.38	8.68	3.3								3.3	0.38	2.0	1.5	25	8.4	0.05	DP11 CAPTURED W/ 5' TYPE R SUMP INLET, PIPE TO DP12.1
	12	L	0.42	0.90	5.0	0.38	8.68	3.3								3.3	0.38	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	0.76	8.65	6.5	6.5	0.76	1.0					1150	2.0	9.58	DP12.1 SWALE FLOW TO DP21
	13	OS1	3.21	0.43	27.8	1.40	4.36	6.1															DP13 FLOWS TO PR CULVERT, FOLLOW HISTORIC DRAINAGE PATTERNS SOUTH ALONG CURTIS ROAD UNDER ACCESS ROAD NORTH
	15	N	6.01	0.70	10.6	4.21	6.80	28.6					11.7	1.72	3.0	16.9	2.49	3.6	1.5	550 32	3.5 11.3	2.65 0.05	DP15 BYPASS TO DP19 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					5.6	0.84	3.0	8.6	1.28	1.0	1.5	60 10	3.5 5.9	0.29 0.03	DP16 BYPASS TO DP19 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					0.9	0.14	3.0	14.6	2.10	2.0	1.5	27	8.4	0.05	DP17 BYPASS, FLOW TO POND B DP17 CAPTURED IN 10' TYPE R INLET, PIPE TO DP17.1
	17.1								11.0	3.39	6.69	22.7				22.7	3.39	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					0.1	0.02	3.0	7.5	0.97	0.5	1.5	50	4.2	0.20	DP18 BYPASS OFFSITE DP18 CAPTURED IN 5' TYPE R INLET, PIPE TO DP19.1
	19	R	1.11	0.98	16.4	1.09	5.68	6.2	24.5	3.65	4.68	17.1				6.2	1.09	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	7.11	5.68	40.4				40.4	7.11	0.5	2.0	42	5.1	0.14	DP19.1 FLOW, PIPE TO DP20.1
	20.1								24.5	3.65	4.68	17.1				17.1	3.65	0.5	2.5	370	5.9	1.04	DP20.1 PIPE FLOW TO POND B
	21	S	0.85	0.36	17.4	0.31	5.54	1.7	16.4	10.50	5.68	59.6				59.6	10.50	0.5	2.5	370	5.9	1.04	DP21 SWALE FLOW TO POND B
	22	T	1.19	0.37	17.3	0.44	5.54	2.4	24.5	14.73	4.68	68.9											**TOTAL FLOW ENTERING POND B**

APPENDIX C – HYDRAULIC CALCULATIONS

Provide riprap calculations for the culverts, pond outfall pipes, pond spillways, and any other riprap utilized onsite

MHFD-Inlet, Version 5.02 (August 2022)

INLET MANAGEMENT

Worksheet Protected

INLET NAME	DP1	DP2	DP3	DP4
Site Type (Urban or Rural)	URBAN	URBAN	URBAN	URBAN
Inlet Application (Street or Area)	STREET	STREET	STREET	STREET
Hydraulic Condition	In Sump	In Sump	On Grade	On Grade
Inlet Type	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{Known} (cfs)	5.3	5.7	6.8	7.0
Major Q_{Known} (cfs)	14.1	10.4	13.5	12.6

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

Receive Bypass Flow from:	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received
Minor Bypass Flow Received, Q_b (cfs)		0.0	0.0	0.0
Major Bypass Flow Received, Q_b (cfs)		0.0	0.0	0.0

Watershed Characteristics

Subcatchment Area (acres)				
Percent Impervious				
NRCS Soil Type				

Watershed Profile

Overland Slope (ft/ft)				
Overland Length (ft)				
Channel Slope (ft/ft)				
Channel Length (ft)				

Minor Storm Rainfall Input

Design Storm Return Period, T_r (years)				
One-Hour Precipitation, P_1 (inches)				
C_1				
C_2				
C_3				
User-defined C				
User-defined 5-yr C_5				
User-defined T_c				

Major Storm Rainfall Input

Design Storm Return Period, T_r (years)				
One-Hour Precipitation, P_1 (inches)				
C_1				
C_2				
C_3				
User-defined C				
User-defined 5-yr C_5				
User-defined T_c				

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	**5.3**	**5.7**	**6.8**	**7.0**
Major Total Design Peak Flow, Q (cfs)	**14.1**	**10.4**	**13.5**	**12.6**
Minor Flow Bypassed Downstream, Q_b (cfs)	N/A	N/A	0.0	0.0
Major Flow Bypassed Downstream, Q_b (cfs)	N/A	N/A	2.2	0.2

MHFD-Inlet, Version 5.02 (August 2022)

INLET MANAGEMENT

Worksheet Protected

INLET NAME	DP5	DP6	DP15	DP16	DP17
Site Type (Urban or Rural)	URBAN	URBAN	URBAN	URBAN	URBAN
Inlet Application (Street or Area)	STREET	STREET	STREET	STREET	STREET
Hydraulic Condition	In Sump	In Sump	On Grade	On Grade	On Grade
Inlet Type	CDOT Type R Curb Opening		CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{known} (cfs)	8.5	4.7	14.4	7.2	7.8
Major Q_{known} (cfs)	17.5	8.7	28.6	14.2	15.5

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received
Minor Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.0	0.0	0.0
Major Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.0	0.0	0.0

Watershed Characteristics

Subcatchment Area (acres)					
Percent Impervious					
NRCS Soil Type					

Watershed Profile

Overland Slope (ft/ft)					
Overland Length (ft)					
Channel Slope (ft/ft)					
Channel Length (ft)					

Minor Storm Rainfall Input

Design Storm Return Period, T_r (years)					
One-Hour Precipitation, P_1 (inches)					
C_1					
C_2					
C_3					
User-defined C					
User-defined 5-yr C_5					
User-defined T_c					

Major Storm Rainfall Input

Design Storm Return Period, T_r (years)					
One-Hour Precipitation, P_1 (inches)					
C_1					
C_2					
C_3					
User-defined C					
User-defined 5-yr C_5					
User-defined T_c					

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	**8.5**	**4.7**	**14.4**	**7.2**	**7.8**
Major Total Design Peak Flow, Q (cfs)	**17.5**	**8.7**	**28.6**	**14.2**	**15.5**
Minor Flow Bypassed Downstream, Q_b (cfs)	N/A	N/A	2.6	1.2	0.0
Major Flow Bypassed Downstream, Q_b (cfs)	N/A	N/A	11.7	5.6	0.9

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INLET MANAGEMENT

Worksheet Protected

INLET NAME	DP18	DP19
Site Type (Urban or Rural)	URBAN	URBAN
Inlet Application (Street or Area)	STREET	STREET
Hydraulic Condition	On Grade	On Grade
Inlet Type		

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{known} (cfs)	4.0	3.2
Major Q_{known} (cfs)	7.6	19.1

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	No Bypass Flow Received	No Bypass Flow Received
Minor Bypass Flow Received, Q_b (cfs)	0.0	0.0
Major Bypass Flow Received, Q_b (cfs)	0.0	0.0

Watershed Characteristics

Subcatchment Area (acres)		
Percent Impervious		
NRCS Soil Type		

Watershed Profile

Overland Slope (ft/ft)		
Overland Length (ft)		
Channel Slope (ft/ft)		
Channel Length (ft)		

Minor Storm Rainfall Input

Design Storm Return Period, T_r (years)		
One-Hour Precipitation, P_1 (inches)		
C_1		
C_2		
C_3		
User-defined C		
User-defined 5-yr C_5		
User-defined T_c		

Major Storm Rainfall Input

Design Storm Return Period, T_r (years)		
One-Hour Precipitation, P_1 (inches)		
C_1		
C_2		
C_3		
User-defined C		
User-defined 5-yr C_5		
User-defined T_c		

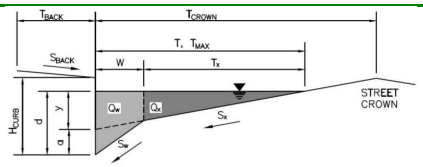
CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	**4.0**	**3.2**
Major Total Design Peak Flow, Q (cfs)	**7.6**	**19.1**
Minor Flow Bypassed Downstream, Q_b (cfs)		
Major Flow Bypassed Downstream, Q_b (cfs)		

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

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

Project: **MEADOWLAKE INDUSTRIAL**
Inlet ID: **DP1**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	13.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	26.0	ft
Gutter Width	W =	2.50	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.022	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	26.0	26.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	9.5	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

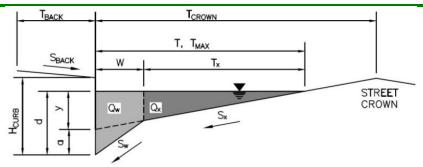
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	Q_{allow} =	**16.5**	**50.5**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 5.30 cfs on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design peak flow of 14.10 cfs on sheet 'Inlet Management'

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

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

Project: **MEADOWLAKE INDUSTRIAL**
Inlet ID: **DP2.0**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	13.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	26.0	ft
Gutter Width	W =	2.50	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.022	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	26.0	26.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	9.5	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	**Q_{allow} =**	**16.5**	**50.5**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 4.50 cfs on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design peak flow of 8.70 cfs on sheet 'Inlet Management'

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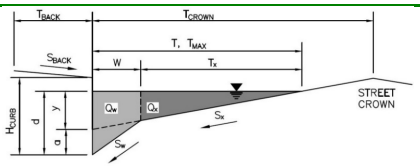
ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

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

Project: **MEADOWLAKE INDUSTRIAL**
Inlet ID: **DP5**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	2.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	15.0	ft
Gutter Width	W =	2.50	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.016	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	15.0	15.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.8	6.6	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☑	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**6.7**	**20.1**	**cfs**

WARNING: MINOR STORM max. allowable capacity is less than the design peak flow of 8.50 cfs on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design peak flow of 17.50 cfs on sheet 'Inlet Management'

NOTE: IGNORE MINOR & MAJOR STREET CAPACITY WARNINGS. BASIN FLOWS ARE DIVIDED BETWEEN TWO SEPARATE STREETS.

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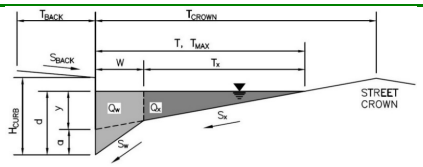
ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

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

Project: **MEADOWLAKE INDUSTRIAL**
Inlet ID: **DP6**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	2.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	15.0	ft
Gutter Width	W =	2.50	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.017	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	15.0	15.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.8	6.6	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☑	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**6.9**	**19.7**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 4.70 cfs on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design peak flow of 8.70 cfs on sheet 'Inlet Management'

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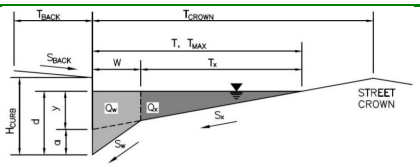
ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

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

Project: **MEADOWLAKE INDUSTRIAL**

Inlet ID: **DP11**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	13.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	24.0	ft
Gutter Width	W =	2.50	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.015	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	24.0	24.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	9.5	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	Q_{allow} =	**14.1**	**33.1**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 1.80 cfs on sheet 'Inlet Management'

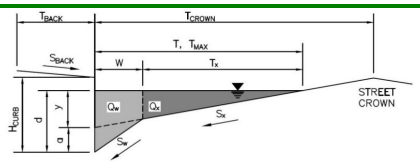
Major storm max. allowable capacity GOOD - greater than the design peak flow of 3.30 cfs on sheet 'Inlet Management'

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

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

Project: **MEADOWLAKE INDUSTRIAL**

Inlet ID: **DP14**



Gutter Geometry:			
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	16.2	ft
Gutter Width	W =	2.50	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.022	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	16.2	16.2	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.6	7.8	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☑	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**13.9**	**31.9**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 2.60 cfs on sheet 'Inlet Management'

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

INLET ON A CONTINUOUS GRADE

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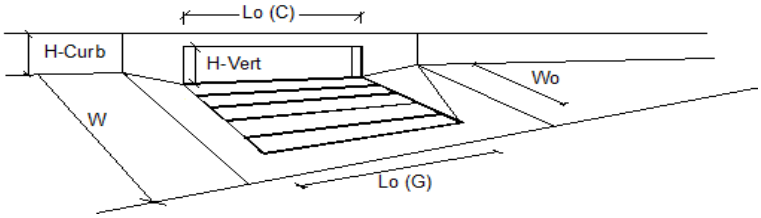


Design Information (Input)		MINOR	MAJOR	
Type of Inlet (CDOT Type R Curb Opening)	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	2	2	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	5.00	5.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	

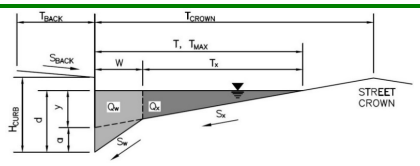
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**2.6**	**4.8**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.3**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**100**	**94**	**%**

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

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

Project: **MEADOWLAKE INDUSTRIAL**

Inlet ID: **DP15**



Gutter Geometry:			
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	16.2	ft
Gutter Width	W =	2.50	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.022	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	16.2	16.2	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.6	7.8	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☑	

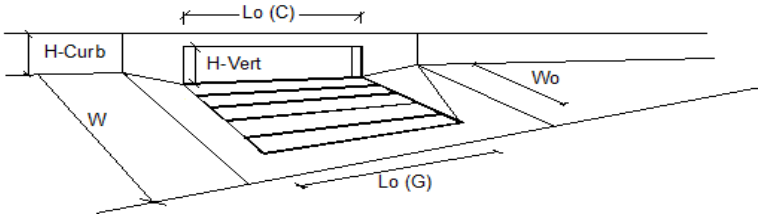
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**13.6**	**31.9**	**cfs**

WARNING: MINOR STORM max. allowable capacity is less than the design peak flow of 14.40 cfs on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design peak flow of 28.60 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.02 (August 2022)



Design Information (Input)	CDOT Type R Curb Opening	MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	3	3	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	5.00	5.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	

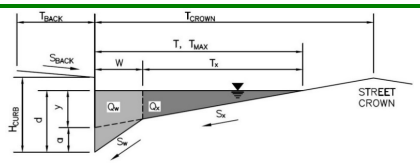
Street Hydraulics: WARNING: Q > ALLOWABLE Q FOR MINOR & MAJOR STORM		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**11.8**	**16.9**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**2.6**	**11.7**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**82**	**59**	**%**

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

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

Project: **MEADOWLAKE INDUSTRIAL**

Inlet ID: **DP16**



Gutter Geometry:			
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	16.2	ft
Gutter Width	W =	2.50	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.030	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	16.2	16.2	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.6	7.8	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☑	

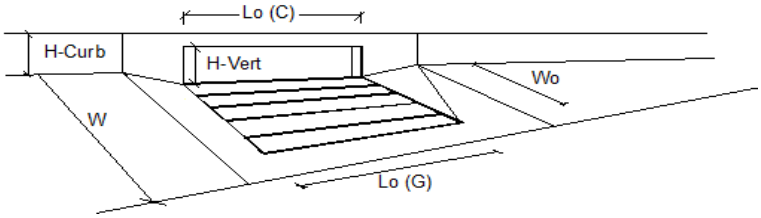
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**15.0**	**29.1**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 7.20 cfs on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design peak flow of 14.20 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.02 (August 2022)



Design Information (Input)		MINOR	MAJOR	
Type of Inlet (CDOT Type R Curb Opening)	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	2	2	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	5.00	5.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	

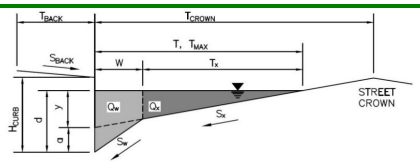
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**6.0**	**8.6**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**1.2**	**5.6**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**84**	**61**	**%**

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

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

Project: **MEADOWLAKE INDUSTRIAL**

Inlet ID: **DP17**



Gutter Geometry:			
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	16.2	ft
Gutter Width	W =	2.50	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.030	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	16.2	16.2	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.6	7.8	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☑	

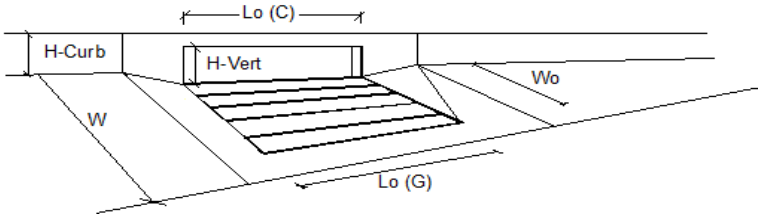
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**15.0**	**29.1**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 7.80 cfs on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design peak flow of 15.50 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.02 (August 2022)



Design Information (Input)		MINOR	MAJOR	
Type of Inlet (CDOT Type R Curb Opening)	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	4	4	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	5.00	5.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	

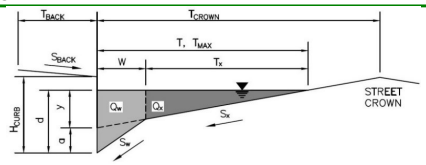
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**7.8**	**14.6**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.9**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**100**	**94**	**%**

MHFD-Inlet, Version 5.02 (August 2022)

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

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

Project: **MEADOWLAKE INDUSTRIAL**
Inlet ID: **DP18 - STREET CAPACITY**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	13.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	20.0	ft
Gutter Width	W =	2.50	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.040	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	20.0	20.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	9.2	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☑	

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

	Minor Storm	Major Storm	
Q_{allow} =	**13.8**	**48.3**	**cfs**

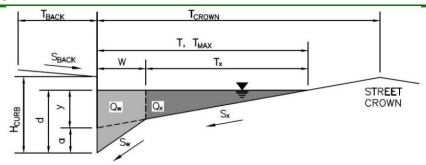
Minor storm max. allowable capacity GOOD - greater than the design peak flow of 4.00 cfs on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design peak flow of 7.60 cfs on sheet 'Inlet Management'

MHFD-Inlet, Version 5.02 (August 2022)

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

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

Project: **MEADOWLAKE INDUSTRIAL**
Inlet ID: **DP19 - STREET CAPACITY**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	13.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	20.0	ft
Gutter Width	W =	2.50	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.040	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

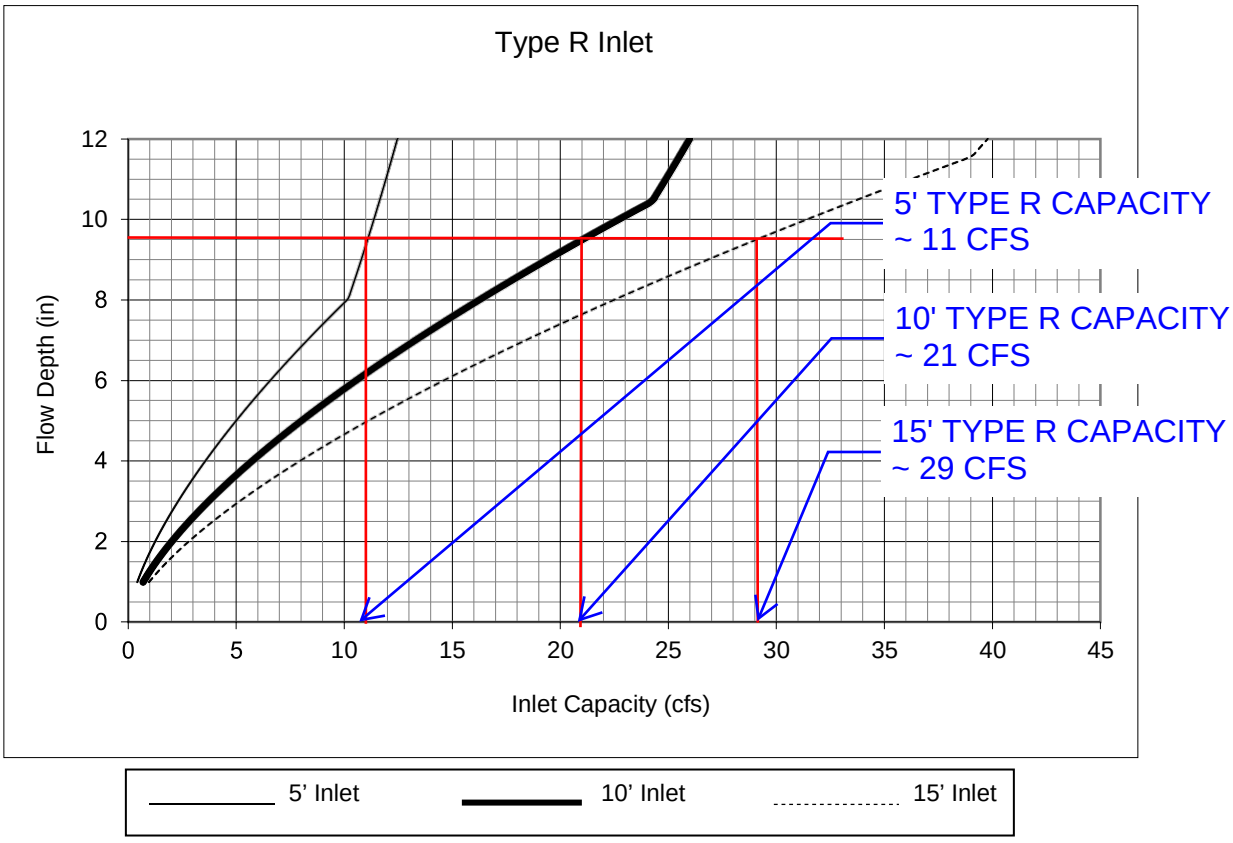
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	20.0	20.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	9.2	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☑	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**13.8**	**48.3**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 3.20 cfs on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design peak flow of 19.10 cfs on sheet 'Inlet Management'

SUMP INLETS ON PRIVATE INDUSTRIAL ROADS
(80' ROW, 48' PAVED WIDTH)

Figure 8-11. Inlet Capacity Chart Sump Conditions , Curb Opening (Type R) Inlet



DP1 Q100 = 14.1 CFS -> 10' TYPE R SUMP INLET

DP2 Q100 = 10.4 CFS -> 5' TYPE R SUMP INLET

DP11 Q100 = 3.3 CFS -> 5' TYPE R SUMP INLET

DP12 Q100 = 3.3 CFS -> 5' TYPE R SUMP INLET

DP18 Q100 = 7.6 CFS -> 5' TYPE R SUMP INLET

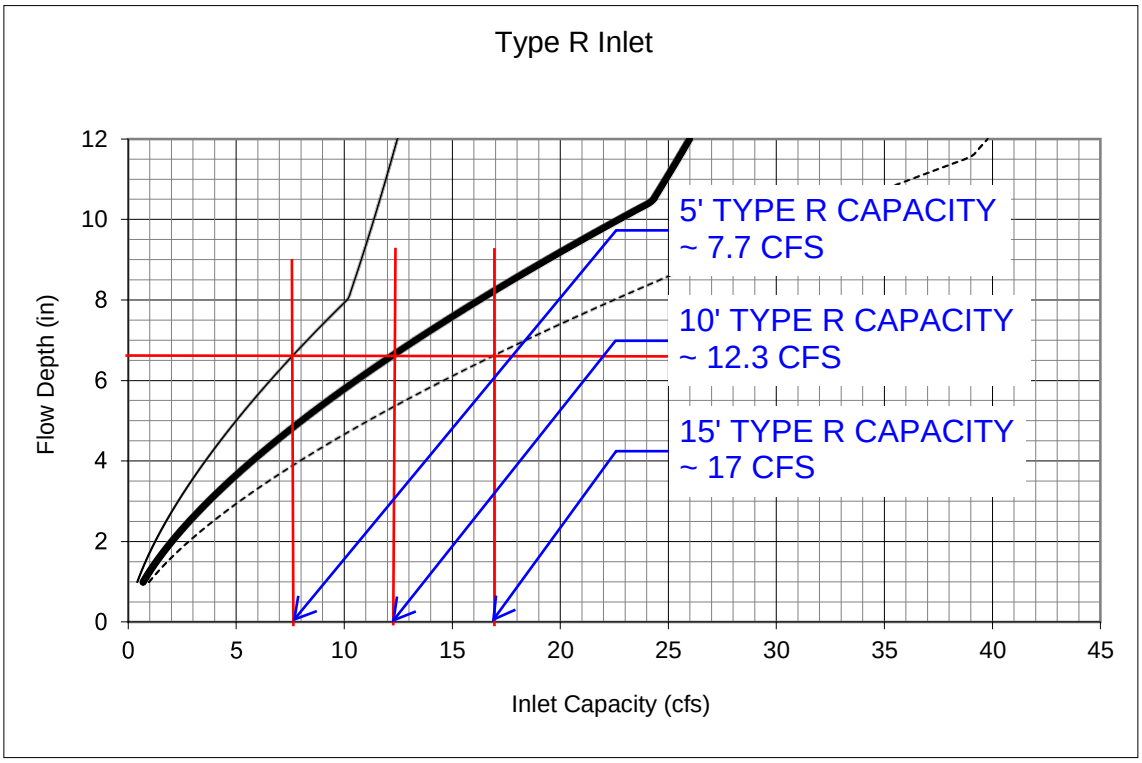
DP19 Q100 = 17.1 CFS -> 10' TYPE R SUMP INLET

Notes:

1. The standard inlet parameters must apply to use this chart.

SUMP INLETS ON PRIVATE ROADS
(50' EASEMENT, 30' PAVED WIDTH)

Figure 8-11. Inlet Capacity Chart Sump Conditions , Curb Opening (Type R) Inlet



DP5 Q100 = 17.1 CFS -> 15' TYPE R SUMP INLET

DP6 Q100 = 8.7 CFS -> 10' TYPE R SUMP INLET

Notes:

1. The standard inlet parameters must apply to use this chart.

Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, Jun 8 2023

BASIN G SWALE A (Q100 = DP7 = 30.3 cfs)

Trapezoidal

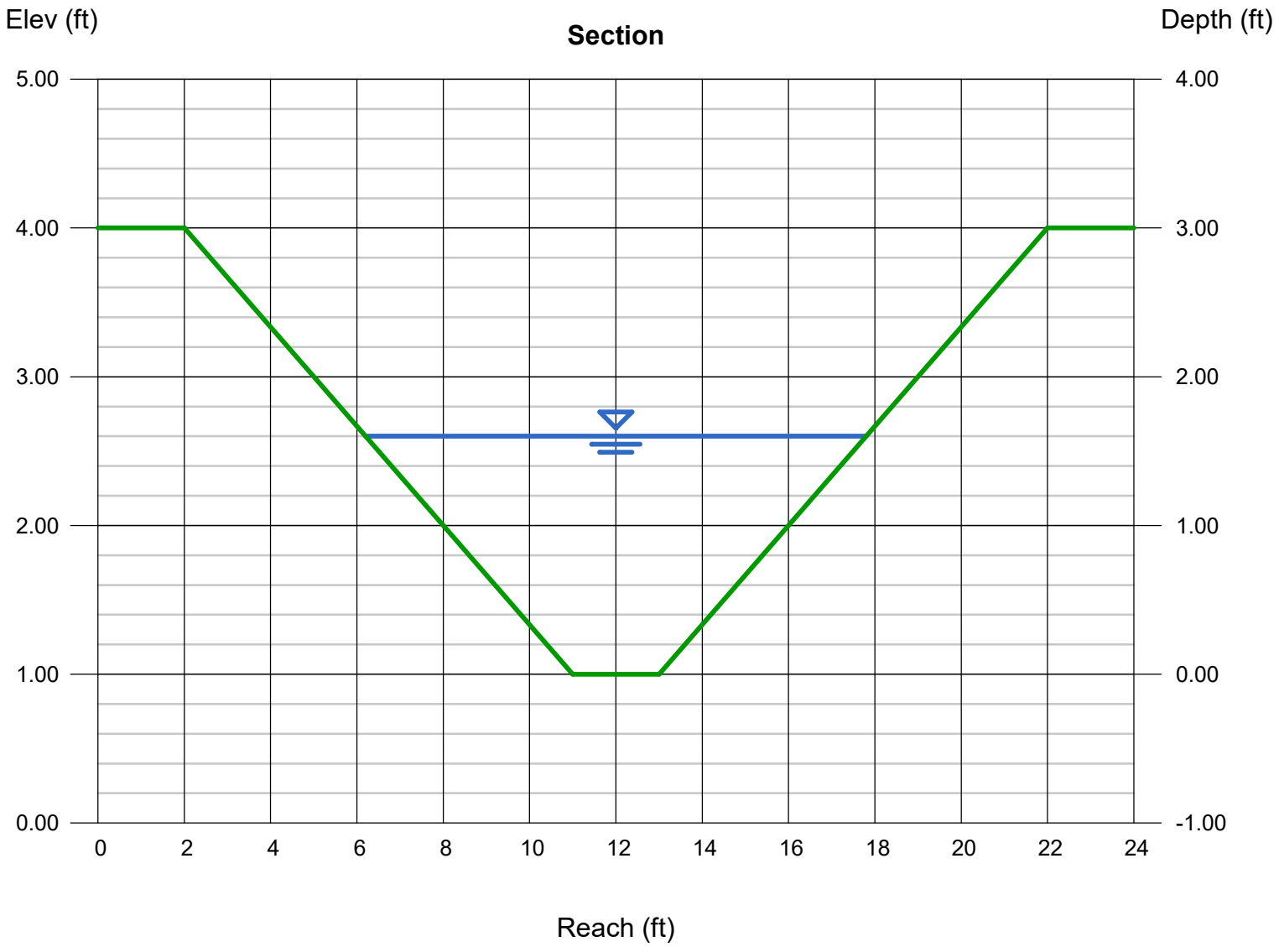
Bottom Width (ft)	= 2.00
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 3.00
Invert Elev (ft)	= 1.00
Slope (%)	= 0.50
N-Value	= 0.035

Calculations

Compute by:	Known Q
Known Q (cfs)	= 30.30

Highlighted

Depth (ft)	= 1.60
Q (cfs)	= 30.30
Area (sqft)	= 10.88
Velocity (ft/s)	= 2.78
Wetted Perim (ft)	= 12.12
Crit Depth, Yc (ft)	= 1.16
Top Width (ft)	= 11.60
EGL (ft)	= 1.72



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, Jun 8 2023

BASIN H SWALE A (Q100 = DP7 = 30.3 cfs)

Trapezoidal

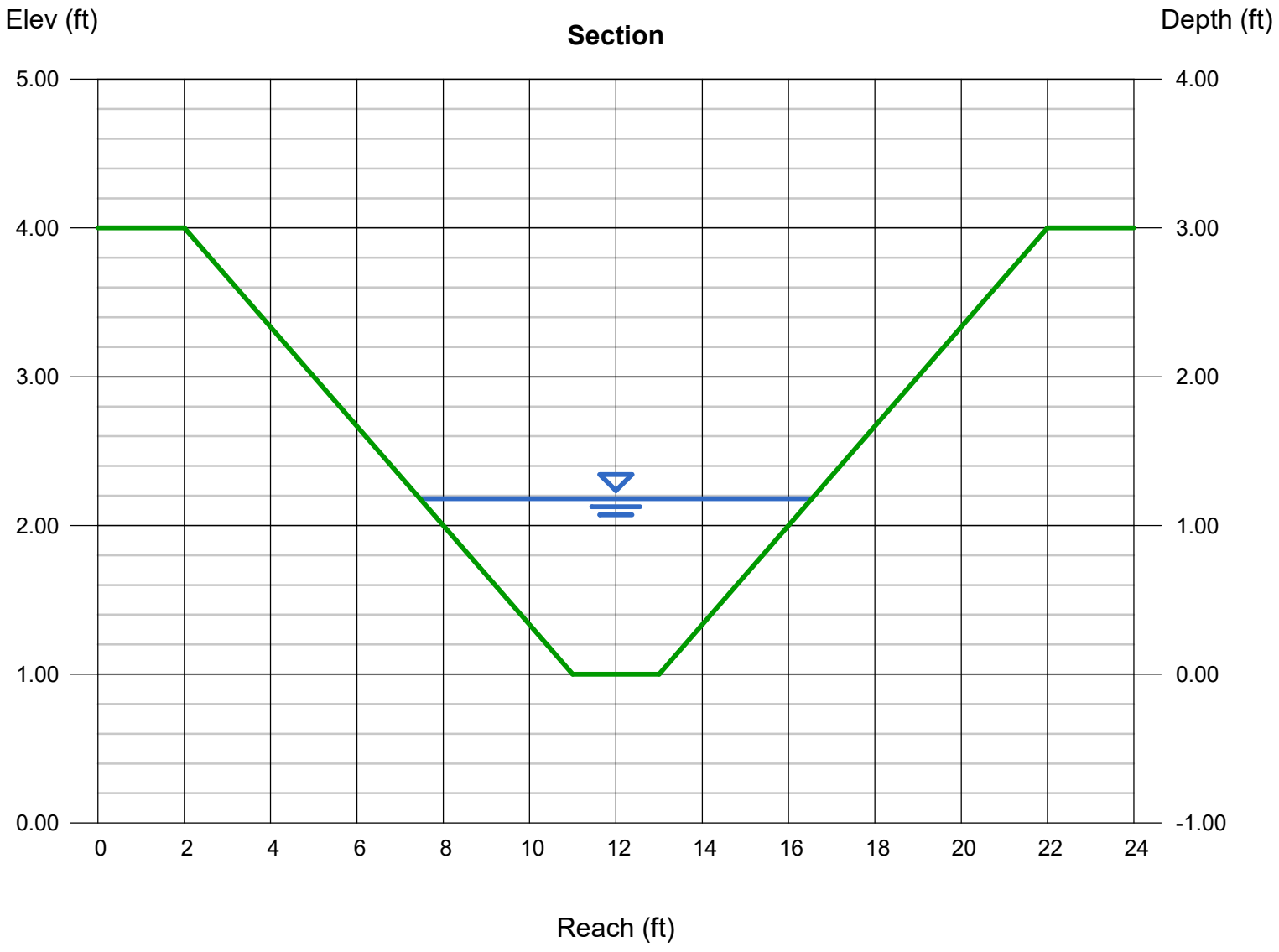
Bottom Width (ft)	= 2.00
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 3.00
Invert Elev (ft)	= 1.00
Slope (%)	= 2.25
N-Value	= 0.035

Calculations

Compute by:	Known Q
Known Q (cfs)	= 32.50

Highlighted

Depth (ft)	= 1.18
Q (cfs)	= 32.50
Area (sqft)	= 6.54
Velocity (ft/s)	= 4.97
Wetted Perim (ft)	= 9.46
Crit Depth, Yc (ft)	= 1.20
Top Width (ft)	= 9.08
EGL (ft)	= 1.56



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, Jun 8 2023

BASIN I SWALE A (Q100 = DP7 = 30.3 cfs)

Trapezoidal

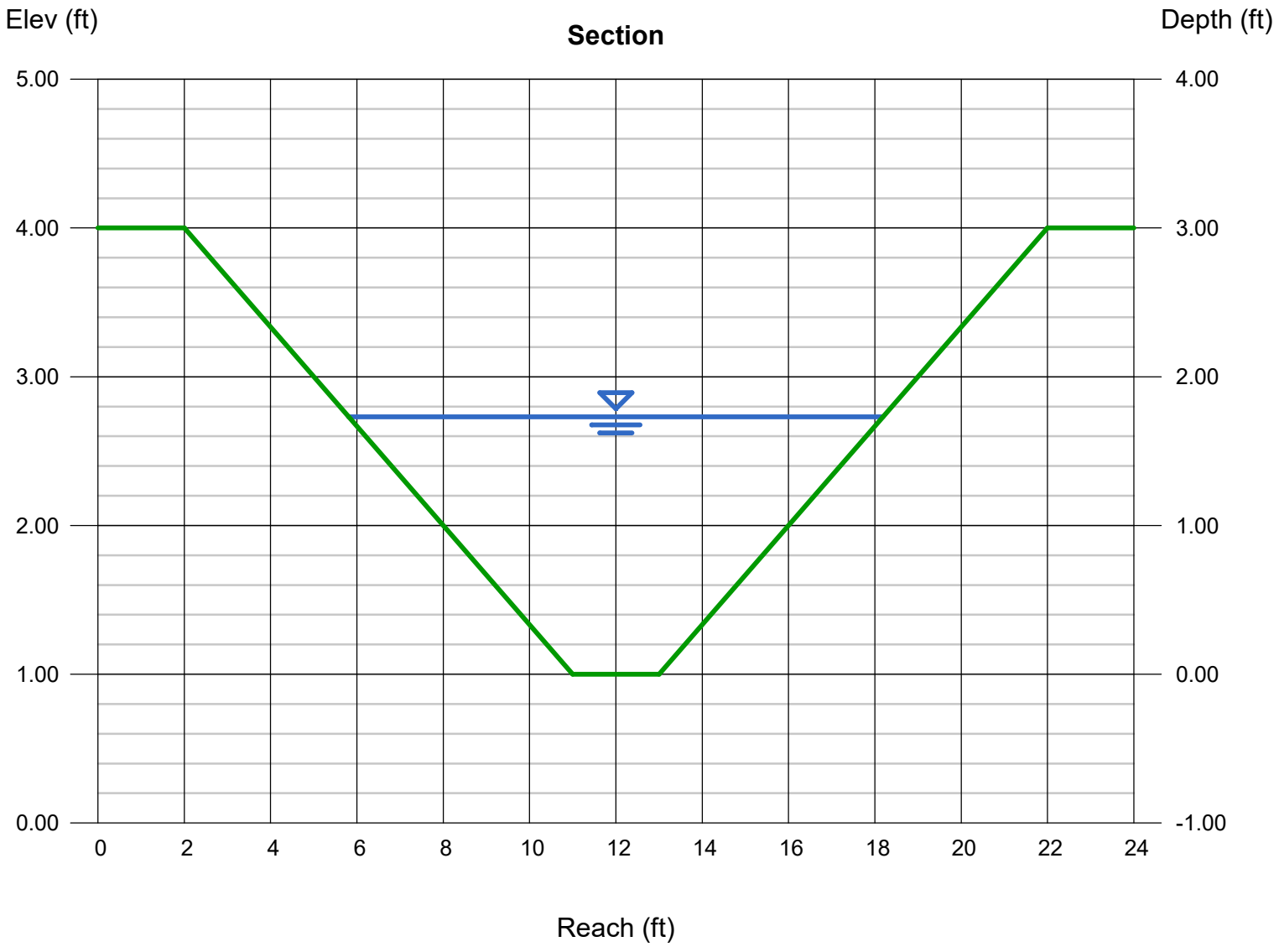
Bottom Width (ft)	= 2.00
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 3.00
Invert Elev (ft)	= 1.00
Slope (%)	= 0.44
N-Value	= 0.035

Calculations

Compute by:	Known Q
Known Q (cfs)	= 34.10

Highlighted

Depth (ft)	= 1.73
Q (cfs)	= 34.10
Area (sqft)	= 12.44
Velocity (ft/s)	= 2.74
Wetted Perim (ft)	= 12.94
Crit Depth, Yc (ft)	= 1.23
Top Width (ft)	= 12.38
EGL (ft)	= 1.85



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, Jun 8 2023

BASIN S SWALE B (Q100 = 5.9 CFS)

Trapezoidal

Bottom Width (ft)	= 2.00
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 2.64
Invert Elev (ft)	= 5.00
Slope (%)	= 0.87
N-Value	= 0.030

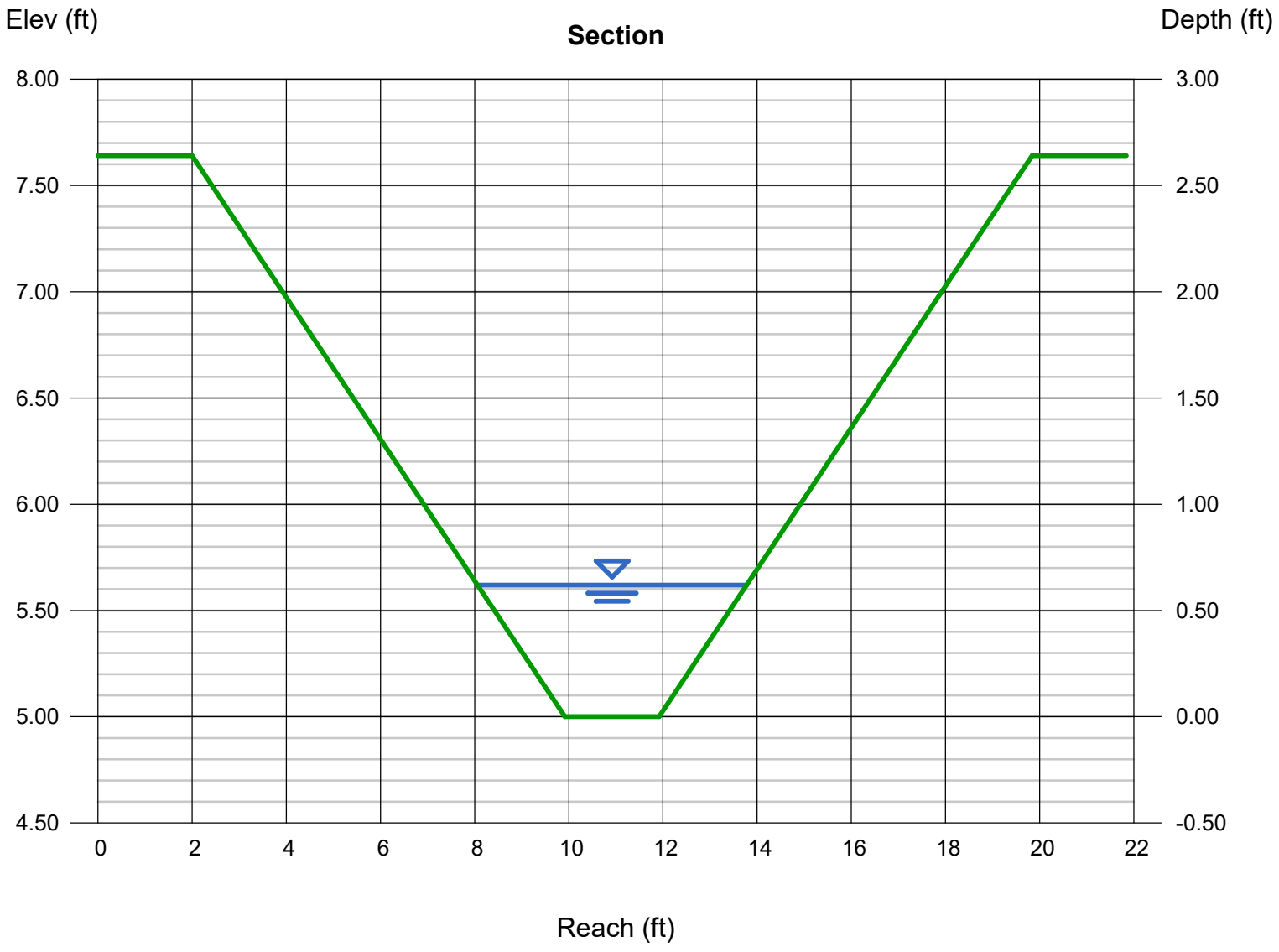
Calculations

Compute by:	Known Q
Known Q (cfs)	= 5.90

Highlighted

Depth (ft)	= 0.62
Q (cfs)	= 5.900
Area (sqft)	= 2.39
Velocity (ft/s)	= 2.47
Wetted Perim (ft)	= 5.92
Crit Depth, Yc (ft)	= 0.51
Top Width (ft)	= 5.72
EGL (ft)	= 0.71

Fr = 2.74/(sqrt(32.17*0.62))=0.61 < 0.9



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, Jun 8 2023

Basin OS1 Culvert

Invert Elev Dn (ft)	=	59.54
Pipe Length (ft)	=	76.61
Slope (%)	=	0.82
Invert Elev Up (ft)	=	60.17
Rise (in)	=	14.0
Shape	=	Elliptical
Span (in)	=	23.0
No. Barrels	=	1
n-Value	=	0.012
Culvert Type	=	Horizontal Ellipse Concrete
Culvert Entrance	=	Square edge w/headwall (H)
Coeff. K,M,c,Y,k	=	0.01, 2, 0.0398, 0.67, 0.5

Embankment

Top Elevation (ft)	=	62.75
Top Width (ft)	=	48.00
Crest Width (ft)	=	50.00

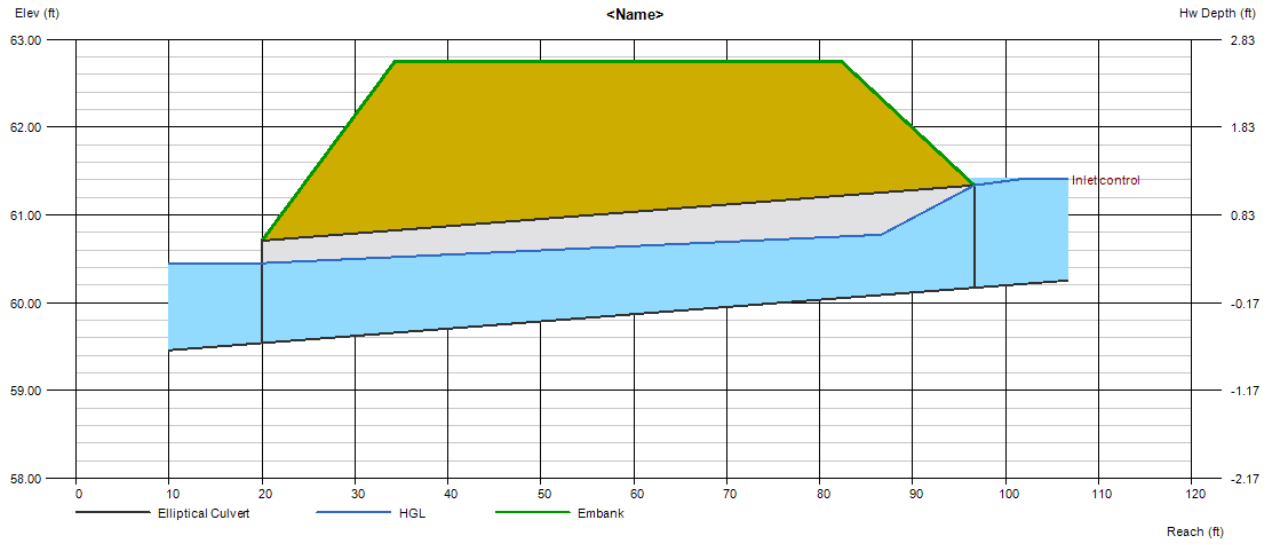
Culvert is not shown with headwall. Revise or change design.

Calculations

Qmin (cfs)	=	1.60
Qmax (cfs)	=	6.10
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	6.10
Qpipe (cfs)	=	5.73
Qovertop (cfs)	=	0.37
Veloc Dn (ft/s)	=	3.75
Veloc Up (ft/s)	=	5.57
HGL Dn (ft)	=	60.45
HGL Up (ft)	=	60.82
Hw Elev (ft)	=	61.41
Hw/D (ft)	=	1.06
Flow Regime	=	Inlet Control



Riprap Sizing - Pond A Spillway				
q (cfs/ft)	S (ft/ft)	C_f	n	D_{50} min. (in)
1.62	0.33	2	0	7.41

Type L Riprap (D_{50} = 9") will be utilized for the spillway protection

Riprap Sizing - Pond B Spillway				
q (cfs/ft)	S (ft/ft)	C_f	n	D_{50} min. (in)
2.97	0.33	2	0	10.41

Type M Riprap (D_{50} = 12") will be utilized for the spillway protection

Riprap Sizing - Pond A Outfall							
Pipe Dia (ft)	q (cfs/ft)	S (ft/ft)	C_f	n	D_{50} min. (in)	Length (ft, = 3x Pipe Dia)	Width (ft, = 3x Pipe Dia)
1.5	53.87	0.005	2	0	8.71	4.5	4.5

Type L Riprap (D_{50} = 9") will be utilized for the outfall protection

Riprap Sizing - Pond B Outfall							
Pipe Dia (ft)	q (cfs/ft)	S (ft/ft)	C_f	n	D_{50} min. (in)	Length (ft, = 3x Pipe Dia)	Width (ft, = 3x Pipe Dia)
1.5	35.60	0.005	2	0	6.91	4.5	4.5

Type L Riprap (D_{50} = 9") will be utilized for the outfall protection

$$D_{50} = 5.23\, S^{0.43}\, (1.35 C_f\, q)^{0.56}$$ Equation 13-9

Where:

D_{50} = median rock size (in)

S = longitudinal slope (ft/ft)

C_f = concentration factor (1.0 to 3.0)

q = unit discharge (cfs/ft)

When:

η (porosity) = 0.0 (i.e., for buried soil riprap)

APPENDIX D – WATER QUALITY & DETENTION

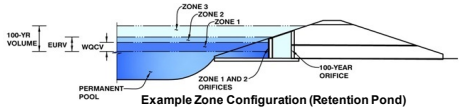
Provide forebay and trickle channel design calculations

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)

Project: Meadowlake Industrial F1

Basin ID: North Pond



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	**EDB**	
Watershed Area =	34.01	acres
Watershed Length =	2,185	ft
Watershed Length to Centroid =	1,100	ft
Watershed Slope =	0.015	ft/ft
Watershed Imperviousness =	68.00%	percent
Percentage Hydrologic Soil Group A =	95.0%	percent
Percentage Hydrologic Soil Group B =	5.0%	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) =	0.755	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	2.888	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	2.145	acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	2.803	acre-feet	1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	3.330	acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	4.040	acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	4.703	acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	5.508	acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 3.14 in.) =	7.275	acre-feet		inches
Approximate 2-yr Detention Volume =	1.898	acre-feet		
Approximate 5-yr Detention Volume =	2.482	acre-feet		
Approximate 10-yr Detention Volume =	2.994	acre-feet		
Approximate 25-yr Detention Volume =	3.572	acre-feet		
Approximate 50-yr Detention Volume =	3.917	acre-feet		
Approximate 100-yr Detention Volume =	4.274	acre-feet		

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	0.755	acre-feet
Zone 2 Volume (EURV - Zone 1) =	2.133	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	1.386	acre-feet
Total Detention Basin Volume =	4.274	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	

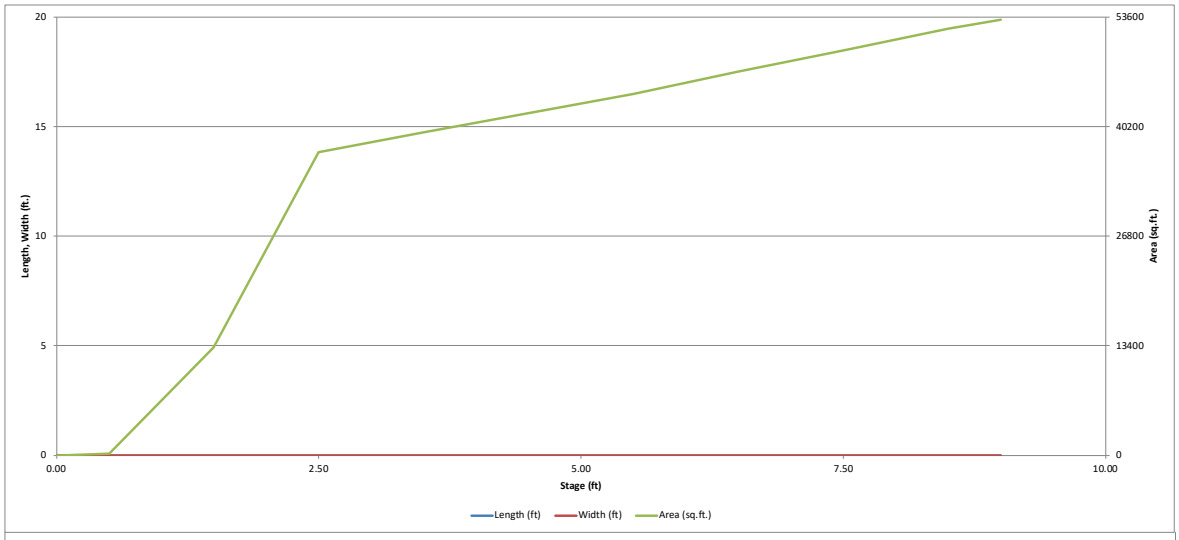
Initial Surcharge Area (A_{ISV}) =	user	ft^2
Surcharge Volume Length (L_{ISV}) =	user	ft
Surcharge Volume Width (W_{ISV}) =	user	ft
Depth of Basin Floor (H_{FLOOR}) =	user	ft
Length of Basin Floor (L_{FLOOR}) =	user	ft
Width of Basin Floor (W_{FLOOR}) =	user	ft
Area of Basin Floor (A_{FLOOR}) =	user	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

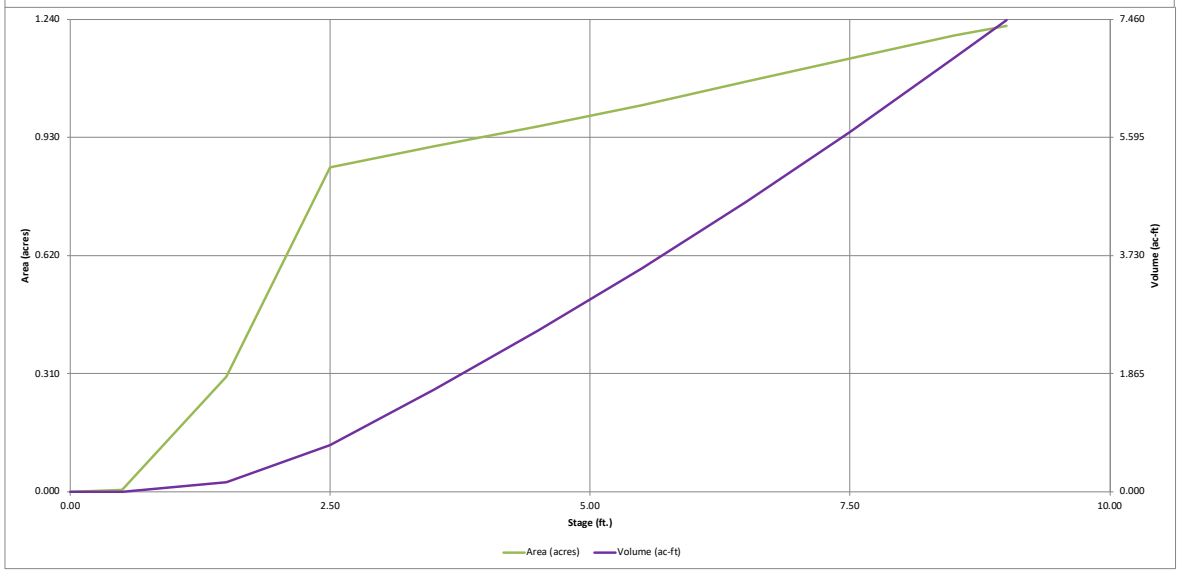
Depth Increment = ft

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)
6759.5 **Top of Micropool**	--	0.00	--	--	--	11	0.000		
6760	--	0.50	--	--	--	215	0.005	56	0.001
6761	--	1.50	--	--	--	13,184	0.303	6,756	0.155
6762	--	2.50	--	--	--	37,092	0.852	31,893	0.732
6763	--	3.50	--	--	--	39,470	0.906	70,174	1.611
6764	--	4.50	--	--	--	41,805	0.960	110,812	2.544
6765	--	5.50	--	--	--	44,176	1.014	153,802	3.531
6766	--	6.50	--	--	--	46,929	1.077	199,355	4.577
6767	--	7.50	--	--	--	49,516	1.137	247,577	5.684
6768	--	8.50	--	--	--	52,190	1.198	298,430	6.851
6768.5	--	9.00	--	--	--	53,285	1.223	324,799	7.456

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)





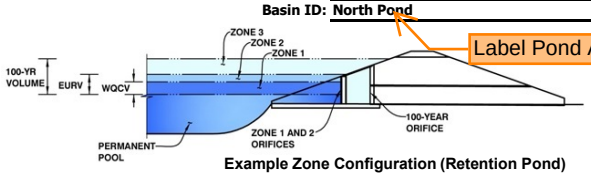
DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)

Project: Meadowlake Industrial F1

Basin ID: North Pond

Label Pond A to match plans



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	2.53	0.755	Orifice Plate
Zone 2 (EURV)	4.86	2.133	Orifice Plate
Zone 3 (100-year)	6.22	1.386	Weir&Pipe (Restrict)
Total (all zones)		4.274	

Many of the elevations on the pond detail sheets are incorrect so a more thorough review of this spreadsheet will be done when that is corrected.

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

Underdrain Orifice Invert Depth =	N/A	ft (distance below the filtration media surface)	Underdrain Orifice Area =	N/A	ft²
Underdrain Orifice Diameter =	N/A	inches	Underdrain Orifice Centroid =	N/A	feet

Calculated Parameters for Underdrain

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

Centroid of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)	WQ Orifice Area per Row =	N/A	ft²
Depth at top of Zone using Orifice Plate =	4.00	ft (relative to basin bottom at Stage = 0 ft)	Elliptical Half-Width =	N/A	feet
Orifice Plate: Orifice Vertical Spacing =	N/A	inches	Elliptical Slot Centroid =	N/A	feet
Orifice Plate: Orifice Area per Row =	N/A	sq. inches	Elliptical Slot Area =	N/A	ft²

unable to verify, pond details elevations are incorrect

Input these.

Calculated Parameters for Plate

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

Doesn't match plans.

	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	0.50	2.38					
Orifice Area (sq. inches)	2.65	2.65	12.00					

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

User Input: Vertical Orifice (Circular or Rectangular)

	Not Selected	Not Selected			Not Selected	Not Selected	
Invert of Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Area =	N/A	N/A	ft²
Depth at top of Zone using Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Centroid =	N/A	N/A	feet
Vertical Orifice Diameter =	N/A	N/A	inches				

Calculated Parameters for Vertical Orifice

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

	Zone 3 Weir	Not Selected			Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	4.50	N/A	ft (relative to basin bottom at Stage = 0 ft)	Height of Grate Upper Edge, H_t =	4.50	N/A	feet
Overflow Weir Front Edge Length =	3.00	N/A	feet	Overflow Weir Slope Length =	3.00	N/A	feet
Overflow Weir Grate Slope =	0.00	N/A	H:V	Grate Open Area / 100-yr Orifice Area =	6.21	N/A	
Horiz. Length of Weir Sides =	3.00	N/A	feet	Overflow Grate Open Area w/o Debris =	6.26	N/A	ft²
Overflow Grate Type =	Type C Grate	N/A		Overflow Grate Open Area w/ Debris =	3.13	N/A	ft²
Debris Clogging % =	50%	N/A	%				

Calculated Parameters for Overflow Weir

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

	Zone 3 Restrictor	Not Selected			Zone 3 Restrictor	Not Selected	
Depth to Invert of Outlet Pipe =	0.50	N/A	ft (distance below basin bottom at Stage = 0 ft)	Outlet Orifice Area =	1.01	N/A	ft²
Outlet Pipe Diameter =	18.00	N/A	inches	Outlet Orifice Centroid =	0.48	N/A	feet
Restrictor Plate Height Above Pipe Invert =	10.00		inches	Half-Central Angle of Restrictor Plate on Pipe =	1.68	N/A	radians

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

Does not match plans

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	7.20	ft (relative to basin bottom at Stage = 0 ft)	Spillway Design Flow Depth=	0.93	feet
Spillway Crest Length =	27.00	feet	Stage at Top of Freeboard =	9.13	feet
Spillway End Slopes =	4.00	H:V	Basin Area at Top of Freeboard =	1.22	acres
Freeboard above Max Water Surface =	1.00	feet	Basin Volume at Top of Freeboard =	7.46	acre-ft

The plans show 5:1 slopes. Verify and update so both match.

The plans show 18'. Verify and update so both match.

Calculated Parameters for Spillway

Routed Hydrograph Results

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

Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	N/A	N/A	1.19	1.50	1.75	2.00	2.25	2.52	3.14
CUHP Runoff Volume (acre-ft) =	0.755	2.888	2.145	2.803	3.330	4.040	4.703	5.508	7.275
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	2.145	2.803	3.330	4.040	4.703	5.508	7.275
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	0.2	0.4	0.5	5.9	10.6	17.0	30.1
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A	1.4	3.8	7.8	13.4	18.1	23.3	
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.04	0.11	0.23	0.39	0.53	0.68	0.89
Peak Inflow Q (cfs) =	N/A	N/A	29.5	38.4	45.1	57.8	68.2	80.8	107.0
Peak Outflow Q (cfs) =	0.4	4.8	0.8	1.5	5.6	11.1	11.5	12.1	21.2
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.4	0.7	0.8	0.6	0.5	0.7
Structure Controlling Flow =	Plate	Overflow Weir 1	Plate	Overflow Weir 1	Overflow Weir 1	Outlet Plate 1	Outlet Plate 1	Outlet Plate 1	Spillway
Max Velocity through Grate 1 (fps) =	N/A	0.67	N/A	0.1	0.7	1.6	1.7	1.7	1.9
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	66	61	68	68	67	66	65	63
Time to Drain 99% of Inflow Volume (hours) =	**40**	71	65	72	73	72	72	72	72
Maximum Ponding Depth (ft) =	2.53	4.86	3.93	4.59	4.88	5.16	5.57	6.22	7.41
Area at Maximum Ponding Depth (acres) =	0.85	0.98	0.93	0.96	0.98	1.00	1.02	1.06	1.13
Maximum Volume Stored (acre-ft) =	0.758	2.893	2.006	2.621	2.913	3.179	3.602	4.267	5.570

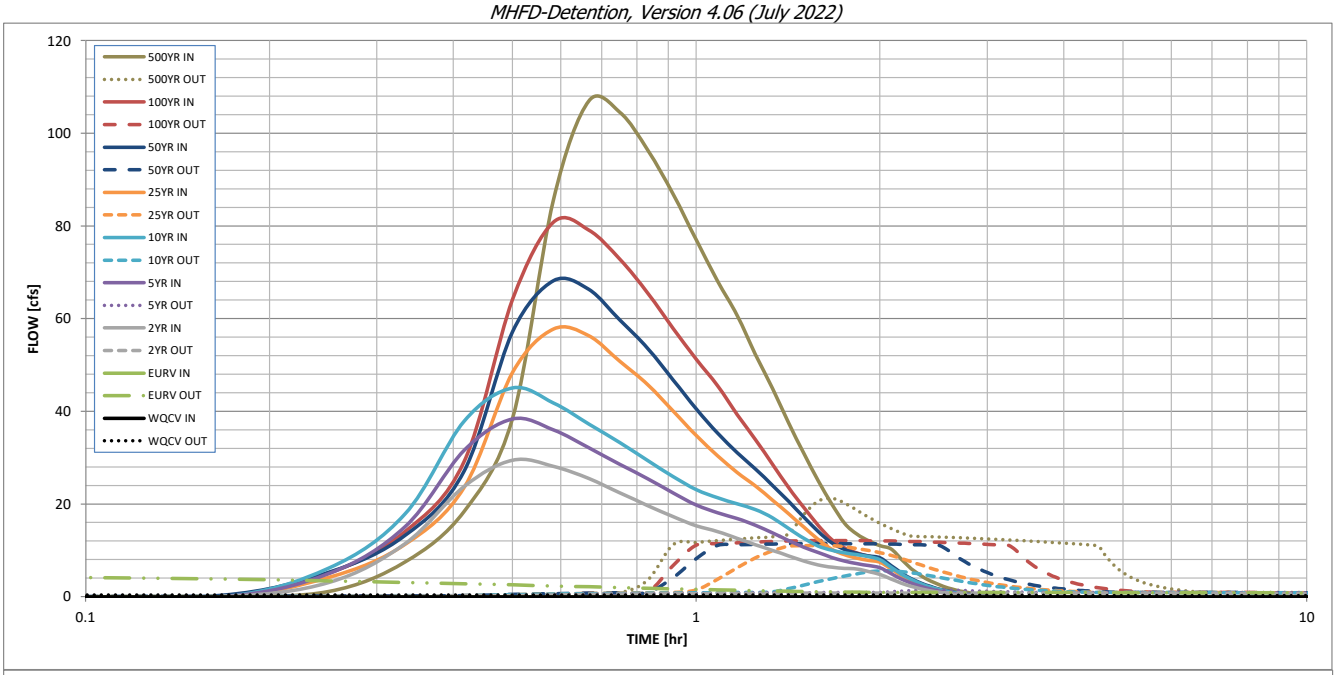
Why are all these values N/A?

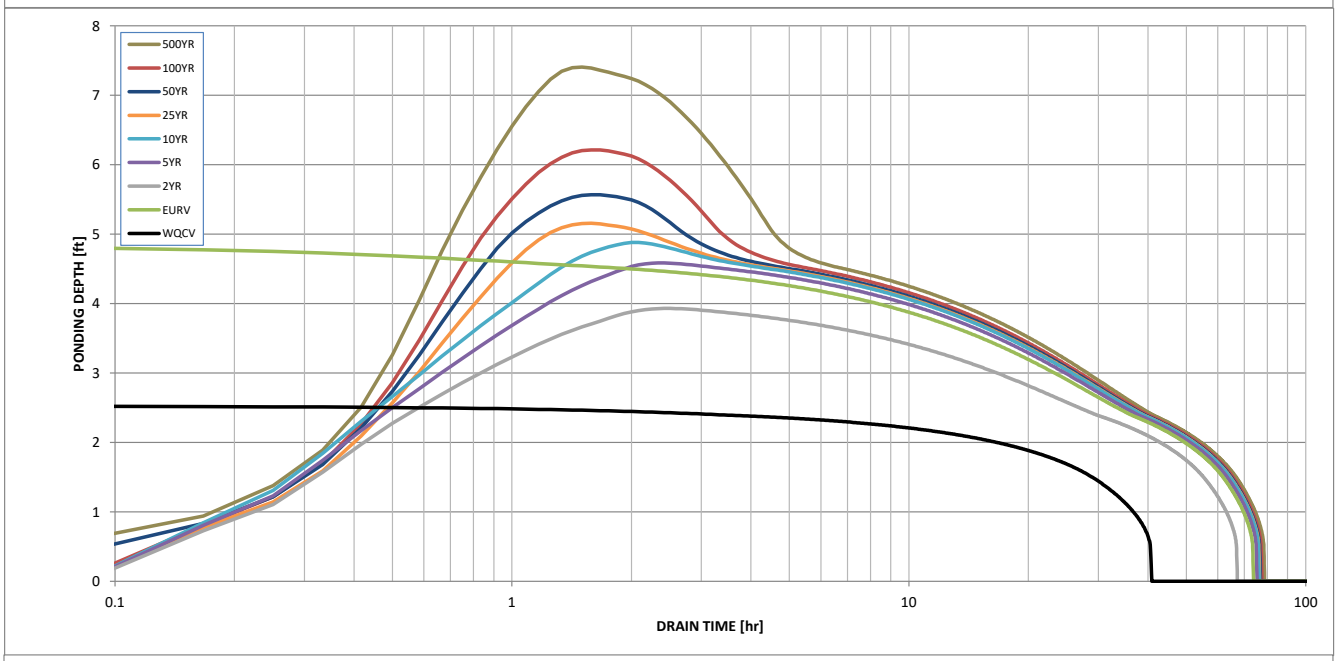
PREDEVELOPMENT PEAK FLOWS WERE CALCULATED FOR THE DEVELOPED CONDITIONS TRIBUTARY BASINS FOR POND A WITH EXISTING CONDITIONS LAND USES TO MORE ACCURATELY CALCULATE THE 'RATIO PEAK OUTFLOW TO PREDEVELOPMENT Q'. COLORADO SPRINGS DCM VOL. 1 IDF CURVE AND EL PASO COUNTY LAND USE COEFFICIENTS WERE USED.

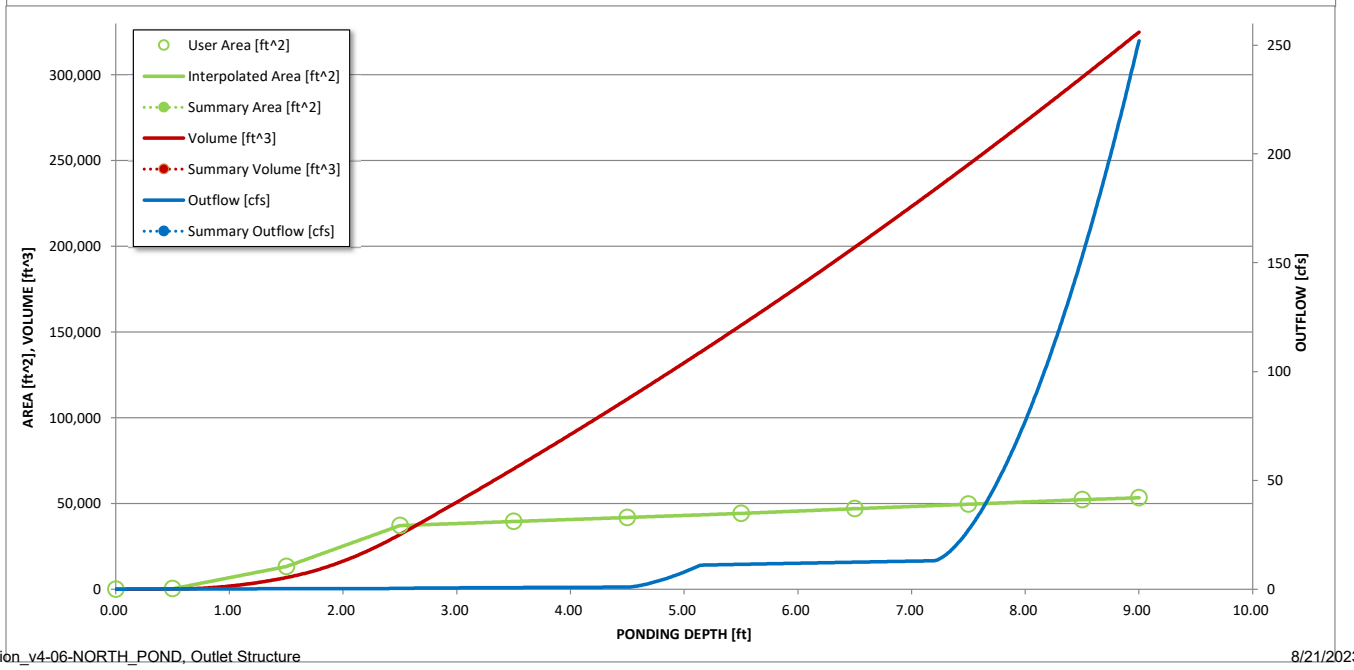
Provide hydrology calcs to support the override predevelopment Q - the existing condition Q's are not comparable because the basins analyzed are drastically different from the proposed condition.

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)







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.

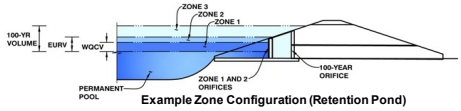
	SOURCE	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP
Time Interval	TIME	WQCV [cfs]	EURV [cfs]	2 Year [cfs]	5 Year [cfs]	10 Year [cfs]	25 Year [cfs]	50 Year [cfs]	100 Year [cfs]	500 Year [cfs]
5.00 min	0:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.35	0.03	1.12
	0:15:00	0.00	0.00	3.08	5.01	6.21	4.18	5.26	5.10	7.49
	0:20:00	0.00	0.00	11.42	15.11	17.83	11.29	13.20	14.07	18.43
	0:25:00	0.00	0.00	23.83	31.62	37.90	23.57	27.14	29.15	38.43
	0:30:00	0.00	0.00	29.48	38.37	45.06	48.36	57.15	64.09	85.59
	0:35:00	0.00	0.00	28.15	35.99	41.85	57.78	68.19	80.80	107.03
	0:40:00	0.00	0.00	25.54	32.15	37.29	56.30	66.32	79.13	104.54
	0:45:00	0.00	0.00	22.44	28.54	33.24	50.79	59.68	72.84	96.35
	0:50:00	0.00	0.00	19.66	25.46	29.38	45.74	53.59	65.48	86.90
	0:55:00	0.00	0.00	17.28	22.42	25.93	40.08	46.82	57.94	76.96
	1:00:00	0.00	0.00	15.34	19.80	23.09	34.77	40.50	51.23	68.10
	1:05:00	0.00	0.00	14.06	18.12	21.35	30.40	35.32	45.57	60.77
	1:10:00	0.00	0.00	12.63	16.89	20.06	26.84	31.11	39.34	52.33
	1:15:00	0.00	0.00	11.25	15.43	18.82	23.91	27.61	33.94	44.90
	1:20:00	0.00	0.00	10.02	13.77	17.03	20.86	24.02	28.54	37.57
	1:25:00	0.00	0.00	8.83	12.14	14.72	17.94	20.59	23.58	30.91
	1:30:00	0.00	0.00	7.73	10.71	12.62	15.04	17.19	19.26	25.11
	1:35:00	0.00	0.00	6.87	9.58	10.98	12.40	14.10	15.44	19.99
	1:40:00	0.00	0.00	6.38	8.49	10.04	10.28	11.62	12.33	15.85
	1:45:00	0.00	0.00	6.15	7.69	9.48	9.06	10.22	10.56	13.51
	1:50:00	0.00	0.00	6.01	7.14	9.08	8.30	9.35	9.47	12.04
	1:55:00	0.00	0.00	5.41	6.72	8.65	7.82	8.80	8.73	11.04
	2:00:00	0.00	0.00	4.81	6.26	7.99	7.46	8.40	8.20	10.32
	2:05:00	0.00	0.00	3.84	5.02	6.40	6.02	6.77	6.51	8.15
	2:10:00	0.00	0.00	2.95	3.84	4.90	4.58	5.14	4.87	6.08
	2:15:00	0.00	0.00	2.26	2.95	3.74	3.49	3.92	3.66	4.56
	2:20:00	0.00	0.00	1.73	2.24	2.83	2.65	2.97	2.78	3.46
	2:25:00	0.00	0.00	1.31	1.68	2.11	1.99	2.23	2.10	2.60
	2:30:00	0.00	0.00	0.98	1.24	1.56	1.47	1.65	1.56	1.94
	2:35:00	0.00	0.00	0.72	0.90	1.16	1.08	1.20	1.15	1.43
	2:40:00	0.00	0.00	0.52	0.65	0.86	0.81	0.90	0.86	1.07
	2:45:00	0.00	0.00	0.36	0.46	0.60	0.58	0.65	0.62	0.76
	2:50:00	0.00	0.00	0.23	0.31	0.39	0.39	0.43	0.41	0.51
	2:55:00	0.00	0.00	0.13	0.19	0.23	0.23	0.26	0.25	0.30
	3:00:00	0.00	0.00	0.06	0.09	0.11	0.12	0.13	0.12	0.15
	3:05:00	0.00	0.00	0.02	0.03	0.04	0.04	0.04	0.04	0.05
	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

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 =	17.81	acres
Watershed Length =	1,280	ft
Watershed Length to Centroid =	640	ft
Watershed Slope =	0.020	ft/ft
Watershed Imperviousness =	74.00%	percent
Percentage Hydrologic Soil Group A =	95.0%	percent
Percentage Hydrologic Soil Group B =	5.0%	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) =	0.437	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	1.684	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	1.208	acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	1.572	acre-feet	1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	1.863	acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	2.233	acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	2.582	acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	2.997	acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 3.14 in.) =	3.911	acre-feet		inches
Approximate 2-yr Detention Volume =	1.111	acre-feet		
Approximate 5-yr Detention Volume =	1.449	acre-feet		
Approximate 10-yr Detention Volume =	1.741	acre-feet		
Approximate 25-yr Detention Volume =	2.066	acre-feet		
Approximate 50-yr Detention Volume =	2.258	acre-feet		
Approximate 100-yr Detention Volume =	2.447	acre-feet		

Define Zones and Basin Geometry

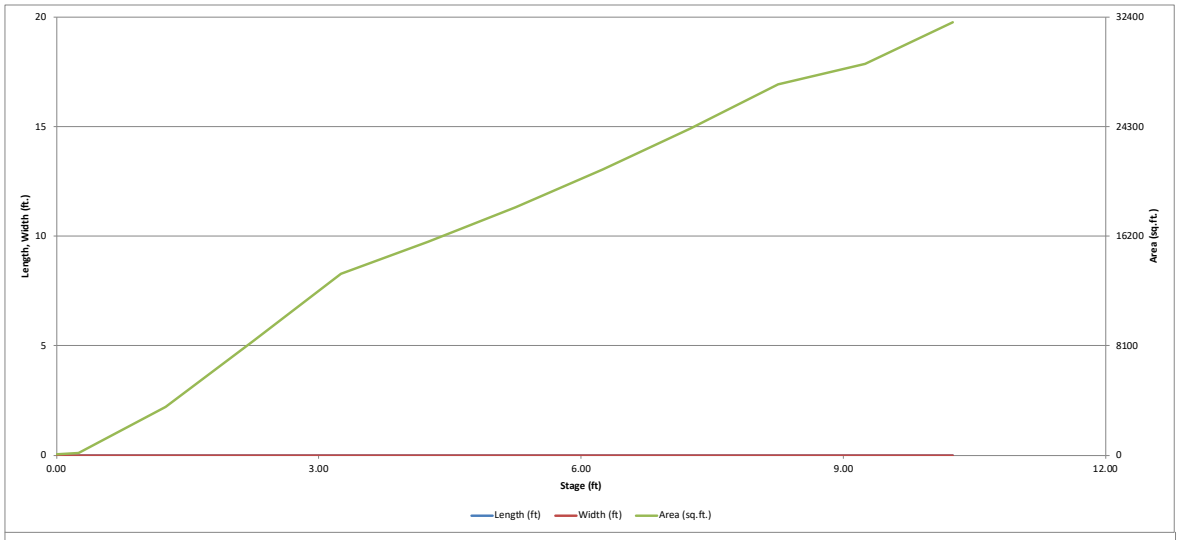
Zone 1 Volume (WQCV) =	0.437	acre-feet
Zone 2 Volume (EURV - Zone 1) =	1.247	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	0.763	acre-feet
Total Detention Basin Volume =	2.447	acre-feet
Initial Surcharge Volume (ISV) =	user	ft^3
Initial Surcharge Depth (ISD) =	user	ft
Total Available Detention Depth (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

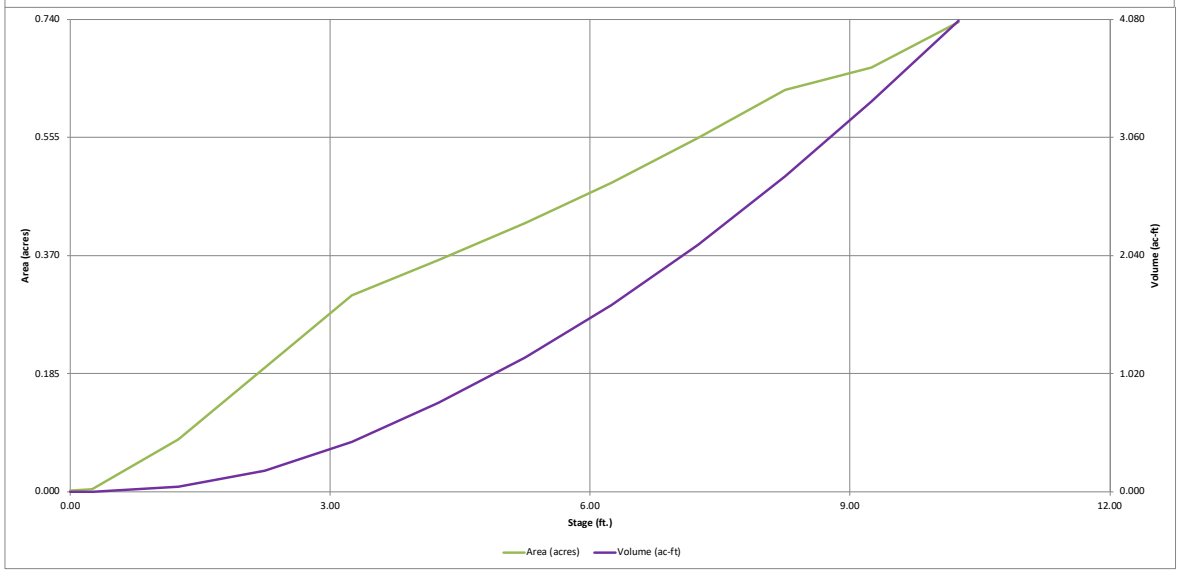
Depth Increment = ft

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)
6729.75 **Top of Micropool**	--	0.00	--	--	--	100	0.002		
6730	--	0.25	--	--	--	161	0.004	33	0.001
6731	--	1.25	--	--	--	3,554	0.082	1,890	0.043
6732	--	2.25	--	--	--	8,459	0.194	7,897	0.181
6733	--	3.25	--	--	--	13,394	0.307	18,823	0.432
6734	--	4.25	--	--	--	15,797	0.363	33,419	0.767
6735	--	5.25	--	--	--	18,327	0.421	50,481	1.159
6736	--	6.25	--	--	--	21,107	0.485	70,198	1.612
6737	--	7.25	--	--	--	24,138	0.554	92,820	2.131
6738	--	8.25	--	--	--	27,420	0.629	118,599	2.723
6739	--	9.25	--	--	--	28,927	0.664	146,773	3.369
6740	--	10.25	--	--	--	32,059	0.736	177,266	4.069

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)



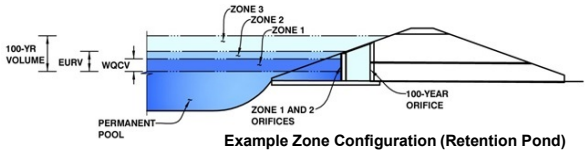


DETENTION BASIN OUTLET STRUCTURE DESIGN

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)	3.27	0.437	Orifice Plate
Zone 2 (EURV)	6.40	1.247	Orifice Plate
Zone 3 (100-year)	7.80	0.763	Weir&Pipe (Restrict)
Total (all zones)		2.447	

Many of the elevations on the pond detail sheets are incorrect so a more thorough review of this spreadsheet will be done when that is corrected.

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

Underdrain Orifice Invert Depth =	N/A	ft (distance below the filtration media surface)	Underdrain Orifice Area =	N/A	ft²
Underdrain Orifice Diameter =	N/A	inches	Underdrain Orifice Centroid =	N/A	feet

Calculated Parameters for Underdrain

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

Centroid of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)	WQ Orifice Area per Row =	N/A	ft²
Depth at top of Zone using Orifice Plate =	3.50	ft (relative to basin bottom at Stage = 0 ft)	Elliptical Half-Width =	N/A	feet
Orifice Plate: Orifice Vertical Spacing =	N/A	inches	Elliptical Slot Centroid =	N/A	feet
Orifice Plate: Orifice Area per Row =	N/A	sq. inches	Elliptical Slot Area =	N/A	ft²

Calculated Parameters for Plate

All highlighted values either do not match plans or could not be verified. Update plan details and verify everything matches this spreadsheet.

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	0.50	3.00					
Orifice Area (sq. inches)	1.40	1.40	6.00					

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

User Input: Vertical Orifice (Circular or Rectangular)

	Not Selected	Not Selected			Not Selected	Not Selected	
Invert of Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Area =	N/A	N/A	ft²
Depth at top of Zone using Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Centroid =	N/A	N/A	feet
Vertical Orifice Diameter =	N/A	N/A	inches				

Calculated Parameters for Vertical Orifice

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

	Zone 3 Weir	Not Selected			Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	6.40	N/A	ft (relative to basin bottom at Stage = 0 ft)	Height of Grate Upper Edge, H_t =	6.40	N/A	feet
Overflow Weir Front Edge Length =	3.00	N/A	feet	Overflow Weir Slope Length =	3.00	N/A	feet
Overflow Weir Grate Slope =	0.00	N/A	H:V	Grate Open Area / 100-yr Orifice Area =	7.63	N/A	
Horiz. Length of Weir Sides =	3.00	N/A	feet	Overflow Grate Open Area w/o Debris =	6.26	N/A	ft²
Overflow Grate Type =	Type C Grate	N/A		Overflow Grate Open Area w/ Debris =	3.13	N/A	ft²
Debris Clogging % =	50%	N/A	%				

Calculated Parameters for Overflow Weir

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

	Zone 3 Restrictor	Not Selected			Zone 3 Restrictor	Not Selected	
Depth to Invert of Outlet Pipe =	2.50	N/A	ft (distance below basin bottom at Stage = 0 ft)	Outlet Orifice Area =	0.82	N/A	ft²
Outlet Pipe Diameter =	18.00	N/A	inches	Outlet Orifice Centroid =	0.41	N/A	feet
Restrictor Plate Height Above Pipe Invert =	8.50		inches	Half-Central Angle of Restrictor Plate on Pipe =	1.52	N/A	radians

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	7.50	ft (relative to basin bottom at Stage = 0 ft)	Spillway Design Flow Depth=	0.89	feet
Spillway Crest Length =	18.00	feet	Stage at Top of Freeboard =	9.39	feet
Spillway End Slopes =	4.00	H:V	Basin Area at Top of Freeboard =	0.67	acres
Freeboard above Max Water Surface =	1.00	feet	Basin Volume at Top of Freeboard =	3.46	acre-ft

Calculated Parameters for Spillway

Routed Hydrograph Results

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

Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	N/A	N/A	1.19	1.50	1.75	2.00	2.25	2.52	3.14
CUHP Runoff Volume (acre-ft) =	0.437	1.684	1.208	1.572	1.863	2.233	2.582	2.997	3.911
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	1.208	1.572	1.863	2.233	2.582	2.997	3.911
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	0.1	0.3	0.4	4.1	7.3	11.3	19.9
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A	1.1	2.9	5.9	10.1	13.7	17.6	
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.06	0.16	0.33	0.57	0.77	0.99	1.12
Peak Inflow Q (cfs) =	N/A	N/A	20.7	26.5	30.7	38.4	44.8	53.4	69.6
Peak Outflow Q (cfs) =	0.3	0.6	0.5	0.6	1.4	4.7	9.0	12.2	27.5
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.2	0.2	0.5	0.7	0.7	1.4
Structure Controlling Flow =	Plate	Overflow Weir 1	Plate	Plate	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	0.1	0.7	1.3	1.8	1.9
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	66	58	65	69	68	66	65	62
Time to Drain 99% of Inflow Volume (hours) =	**40**	71	62	69	74	73	73	72	71
Maximum Ponding Depth (ft) =	3.27	6.40	5.19	5.98	6.52	6.76	6.97	7.36	7.91
Area at Maximum Ponding Depth (acres) =	0.31	0.49	0.42	0.47	0.50	0.52	0.53	0.56	0.60
Maximum Volume Stored (acre-ft) =	0.438	1.685	1.130	1.483	1.745	1.862	1.978	2.187	2.507

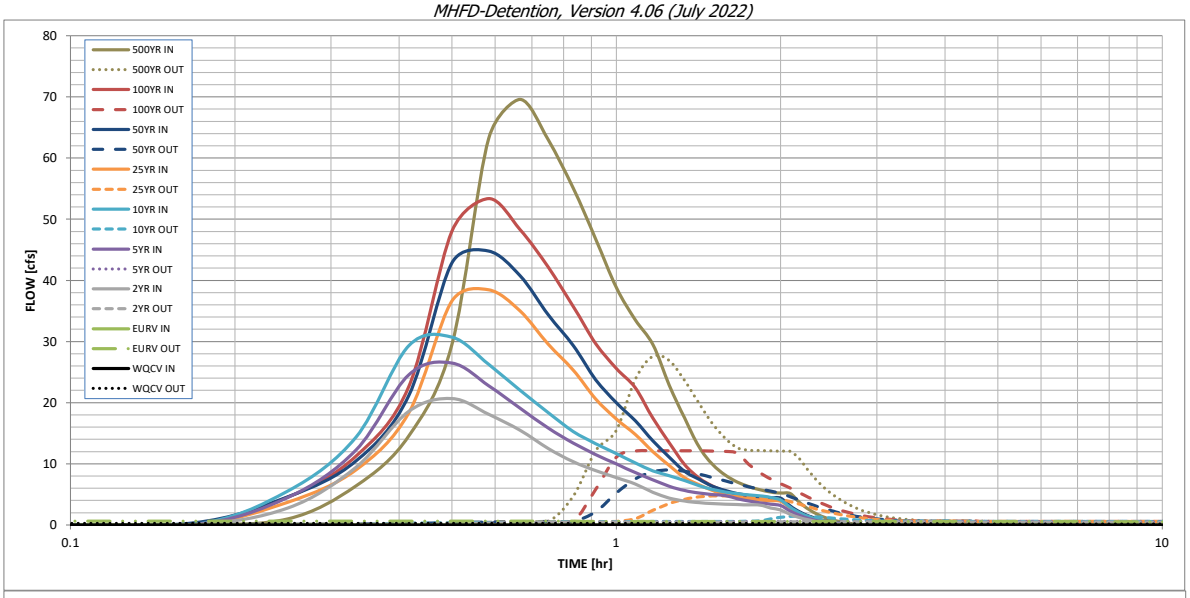
Why are all these values N/A?

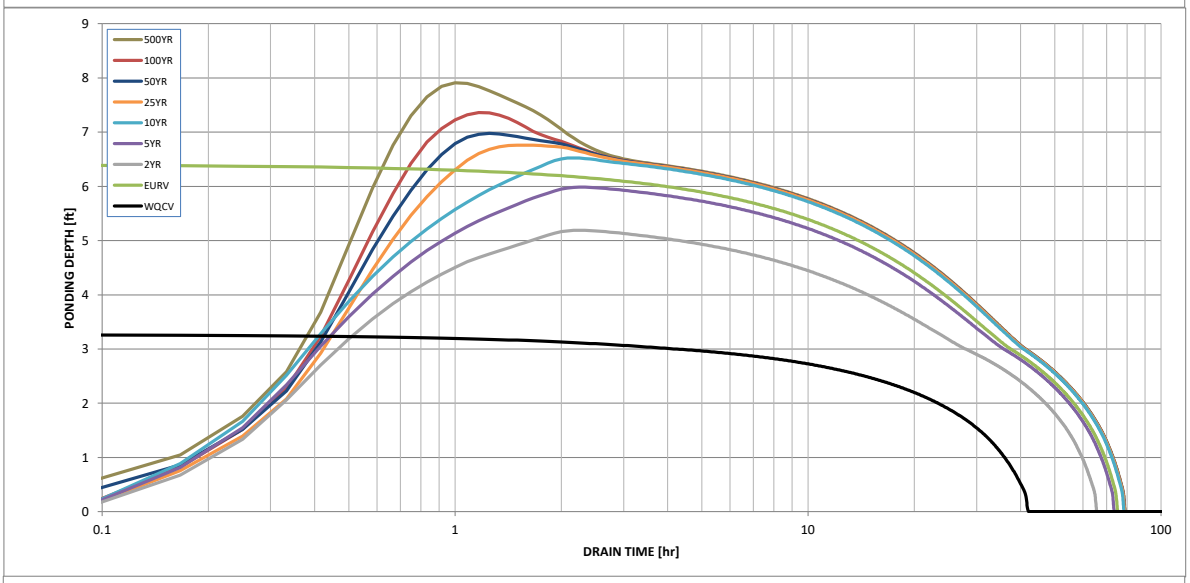
PREDEVELOPMENT PEAK FLOWS WERE CALCULATED FOR THE DEVELOPED CONDITIONS TRIBUTARY BASINS FOR POND A WITH EXISTING CONDITIONS LAND USES TO MORE ACCURATELY CALCULATE THE 'RATIO PEAK OUTFLOW TO PREDEVELOPMENT Q'. COLORADO SPRINGS DCM VOL. 1 IDF CURVE AND EL PASO COUNTY LAND USE COEFFICIENTS WERE USED. 500-YEAR EVENT RATIO CAN BE IGNORED AS THERE ARE NO IDF PARAMETERS FOR 500-YEAR EVENTS.

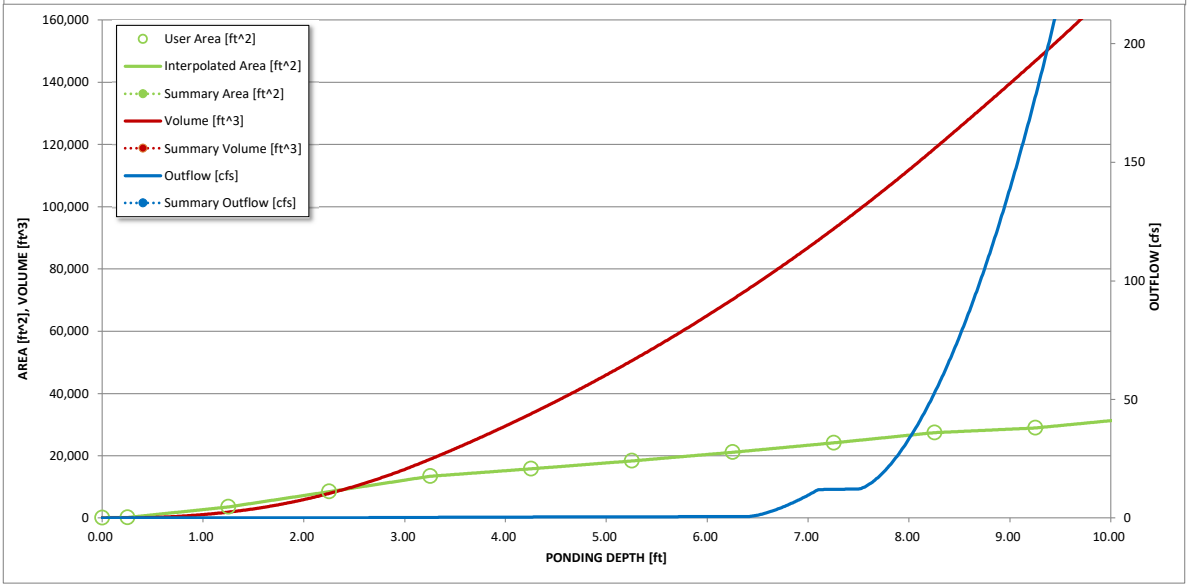
Provide hydrology calcs to support the override predevelopment Q - the existing condition Q's are not comparable because the basins analyzed are drastically different from the proposed condition.

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

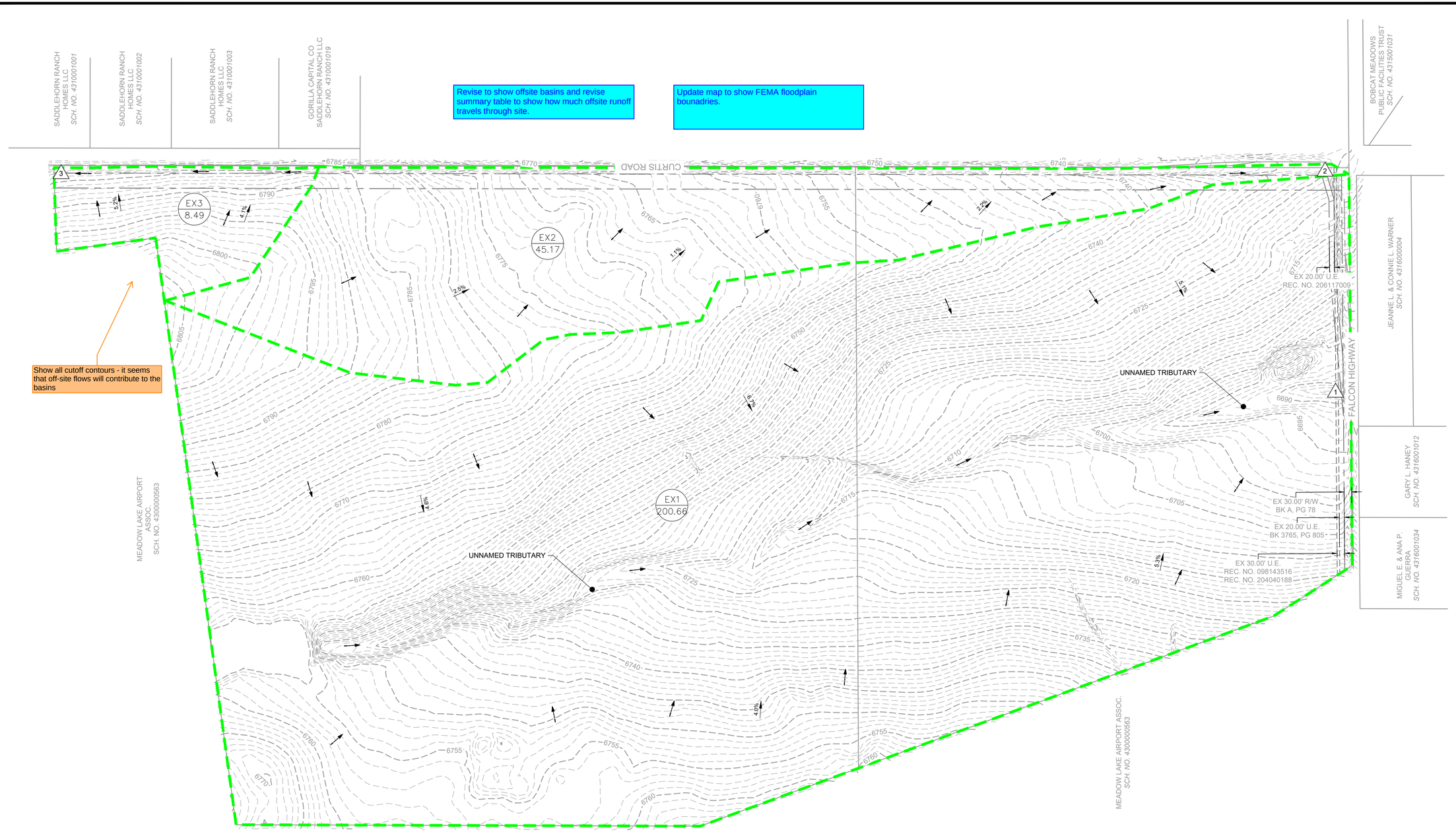
Outflow Hydrograph Workbook Filename: _____

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	0.31	0.03	1.00
	0:15:00	0.00	0.00	2.75	4.48	5.55	3.72	4.60	4.53	6.38
	0:20:00	0.00	0.00	9.43	12.25	14.35	9.01	10.45	11.24	14.55
	0:25:00	0.00	0.00	18.57	24.55	29.30	18.32	21.11	22.60	29.52
	0:30:00	0.00	0.00	20.69	26.47	30.70	36.61	42.87	48.03	63.23
	0:35:00	0.00	0.00	18.09	22.77	26.25	38.43	44.78	53.38	69.60
	0:40:00	0.00	0.00	15.47	19.11	22.00	34.98	40.75	48.31	62.98
	0:45:00	0.00	0.00	12.52	15.84	18.38	29.58	34.37	42.19	55.10
	0:50:00	0.00	0.00	10.33	13.41	15.30	25.34	29.35	35.76	46.79
	0:55:00	0.00	0.00	8.89	11.50	13.30	20.60	23.77	29.67	38.82
	1:00:00	0.00	0.00	7.75	9.97	11.66	17.34	19.98	25.60	33.55
	1:05:00	0.00	0.00	6.69	8.57	10.13	14.79	17.03	22.45	29.53
	1:10:00	0.00	0.00	5.35	7.39	8.86	12.00	13.76	17.46	22.84
	1:15:00	0.00	0.00	4.40	6.32	8.04	9.72	11.08	13.46	17.50
	1:20:00	0.00	0.00	3.91	5.63	7.28	7.74	8.78	9.89	12.80
	1:25:00	0.00	0.00	3.64	5.24	6.42	6.60	7.47	7.71	9.92
	1:30:00	0.00	0.00	3.49	4.97	5.83	5.63	6.35	6.38	8.14
	1:35:00	0.00	0.00	3.40	4.80	5.40	4.98	5.62	5.53	7.02
	1:40:00	0.00	0.00	3.33	4.28	5.11	4.55	5.13	4.96	6.25
	1:45:00	0.00	0.00	3.28	3.90	4.90	4.28	4.81	4.58	5.74
	1:50:00	0.00	0.00	3.25	3.62	4.76	4.08	4.59	4.32	5.39
	1:55:00	0.00	0.00	2.78	3.42	4.51	3.96	4.45	4.18	5.21
	2:00:00	0.00	0.00	2.43	3.17	4.06	3.88	4.36	4.13	5.15
	2:05:00	0.00	0.00	1.72	2.25	2.87	2.75	3.09	2.93	3.65
	2:10:00	0.00	0.00	1.19	1.55	1.99	1.91	2.15	2.05	2.55
	2:15:00	0.00	0.00	0.81	1.06	1.37	1.32	1.48	1.42	1.76
	2:20:00	0.00	0.00	0.54	0.69	0.91	0.88	0.99	0.95	1.18
	2:25:00	0.00	0.00	0.34	0.45	0.59	0.58	0.65	0.62	0.77
	2:30:00	0.00	0.00	0.20	0.29	0.37	0.37	0.42	0.40	0.50
	2:35:00	0.00	0.00	0.11	0.16	0.20	0.21	0.24	0.23	0.28
	2:40:00	0.00	0.00	0.04	0.07	0.09	0.10	0.11	0.10	0.13
	2:45:00	0.00	0.00	0.01	0.02	0.02	0.03	0.03	0.03	0.03
	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



These existing drainage maps are much larger than the proposed. The existing maps and proposed maps should be looking at approximately the same areas for comparison between the existing and developed conditions.

SUMMARY RUNOFF TABLE				
BASIN	AREA (ac)	% IMPERVIOUS	Q_5 (cfs)	Q_{100} (cfs)
EX1	200.66	2	18.9	126.8
EX2	45.17	6	5.1	26.7
EX3	8.49	2	1.5	9.8

DESIGN POINT SUMMARY TABLE			
DESIGN POINT	CONTRIBUTING BASINS	ΣQ_5 (cfs)	ΣQ_{100} (cfs)
1	EX1	18.9	126.8
2	EX2	5.1	26.7
3	EX3	1.5	9.8

NORTH
0 200
100

HRGreen

MEADOW LAKE INDUSTRIAL FILING NO. 1

Job No.:	2202774
Prepared By:	NQJ
Date:	8/24/2023

EX DRAINAGE MAP

FIG.01

BULLARD, ABBY, 8/25/2023 10:06 AM

Update to include offsite flows.

Show proposed contour tie ins to existing.

comments have been provided on the Preliminary Plan to provide turnarounds at the north and southerly end of Greenfield Ave. Please account for this in your design.

please indicate the required easement width to contain the flow within swale and coordinate with project planner so that it is indicated in the preliminary plan

Ponds must have a demonstrated suitable outfall. Currently there is no evidence of an existing channel and the concentrated flow from the pond outfall will create erosion problems. Address this in design and in text.

Consider putting a spreader here since the point flow from this pipe will discharge here and is at risk to cause erosion.

Show proposed contour tie ins to existing.

Revise to show a blowup of this section where the swale meets pond. Need additional clarity as to how swale will enter pond.

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.

Discuss/analyze outfall in the report contents. Per ECM 3.2.4 developed flows shall discharge to a hydraulically adequate natural swale or manmade system. Determine if this roadside ditch is stable enough as well as if it has enough capacity for developed flows.

please indicate the required easement width to contain the flow within swale and coordinate with project planner so that it is indicated in the preliminary plan

fix conflicting flow arrows

Note, per ECM any swale that conveys more than 15 cfs requires a drainage easement.

MATCHLINE SEE LEFT

MATCHLINE SEE RIGHT

SADDLEHORN RANCH HOMES LLC SCH. NO. 4310001002

SADDLEHORN RANCH HOMES LLC SCH. NO. 4310001003

GORILLA CAPITAL CO SADDLEHORN RANCH LLC SCH. NO. 4310001019

MEADOWLAKE DEVELOPMENTS, LLC SCH. NO. 4300000638

MEADOW LAKE AIRPORT ASSOC. SCH. NO. 4300000563

EX GAS TO REMAIN (TYP.)

EX FIBER OPTIC TO REMAIN (TYP.)

EX 30.00' ROW BK A, PG78

CURTIS ROAD

SWALE A

SWALE B

POND A

POND B

PROPOSED OUTFALL POINT

WILD IRIS WAY (PRIVATE) URBAN LOCAL

GREENFIELD AVE (PUBLIC) URBAN COLLECTOR

SAGEBRUSH ST (PUBLIC) URBAN COLLECTOR

ACCESS ROAD

MARIPOSA LILY CT (PRIVATE) URBAN LOCAL

WILDFLOWER CT (PRIVATE) URBAN LOCAL

PR LOT LINE (TYP.)

PR 50.00' TRAVEL ESMT

PR 10.00' UTILITY & DRAINAGE ESMT (TYP.)

PR 80.00' ROW

OUTLET STRUCTURE

CONCRETE FOREBAY

3.00' CONCRETE T.C

10.00' POND BERM

VICINITY MAP
SCALE: NTS

SUMMARY RUNOFF TABLE

BASIN	AREA (ac)	% IMPERVIOUS	Q_5 (cfs)	Q_{100} (cfs)
A	4.79	33	5.3	14.1
B	1.68	97	5.7	10.4
C	2.93	80	6.8	13.5
D	2.92	80	7.0	14.0
E	3.54	80	8.5	16.9
F	1.70	93	4.7	8.7
G	9.87	76	14.9	30.3
H	2.33	70	4.6	9.6
I	1.25	68	2.5	5.2
J	3.00	26	2.7	8.6
K	0.42	90	1.8	3.3
L	0.42	90	1.8	3.3
N	6.01	80	14.4	28.6
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	1.11	96	3.2	6.2
S	0.85	90	1.7	1.7
T	1.19	96	3.3	2.4

ABLE

		(Q_{100} (cfs))	ΣQ_{100} (cfs)
1	A	5.3	14.1
2	B	5.7	10.4
2.1	DP1,DP2	9.9	22.2
3	C	6.8	13.5
4	D	7.0	14.0
4.1	DP3,DP4	13.2	24.8
5	E	8.5	16.9
5.1	DP2.1,DP5	16.0	32.6
5.2	DP4.1,5.1	26.5	51.6
6	F	4.7	8.7
6.1	DP5.2,DP6	30.6	58.3
7	G	14.9	30.3
8	DP7,H	15.9	32.5
9	I,DP8	16.7	34.1
10	DP6.1,J	32.9	64.9
11	K	1.8	3.3
12	L	1.8	3.3
13	OS1	1.6	6.1
15	N	14.4	28.6
16	O	7.2	14.2
17	P	7.8	15.5
17.1	DP16,DP17	13.5	22.7
18	Q	4.0	7.6
19	DP15,DP16,R	6.3	17.1
21	DP12.1,S	2.5	59.6
22	DP20.1,DP21,T	30.3	68.9

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 — X
- DESIGN POINT — X, 1.25 — BASIN DESIGNATION, AREA (AC.)

HR GREEN Xrefs: xv-ulti-2774, xc-dsgn-2774, xc-cov-2774, xv-dsgn-2774, xv-cov-2774, Key_Map, Legend_FDR_Map

DRAWN BY: AB/DH	JOB DATE: 8/25/2023	BAR IS ONE INCH ON OFFICIAL DRAWINGS.	
APPROVED: CM	JOB NUMBER: 2202774	0 1"	
CAD DATE: 8/25/2023		IF NOT ONE INCH, ADJUST SCALE ACCORDINGLY.	
CAD FILE: J:\2022\2202774\CAD\Dwgs\C\Drainage\Pr_Drainage_Map			

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 FILING NO. 1
MEADOWLAKE DEVELOPMENTS, LLC
EL PASO COUNTY, CO

DRAINAGE MAPS
PROPOSED DRAINAGE MAP

SHEET DR 2

V1_Drainage Report - Preliminary.pdf Markup Summary 10-24-2023

Daniel Torres (8)

Author: Daniel Torres
Subject: Callout
Page Label: 5
Date: 10/24/2023 11:35:19 AM
Status:
Color:
Layer:
Space:

it does not appear that there is undeveloped area in basin B as it is all lots and roadway. revise

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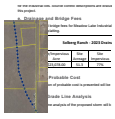
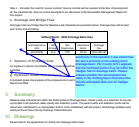
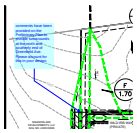


Author: Daniel Torres
Subject: Image
Page Label: 8
Date: 10/24/2023 12:55:20 PM
Status:
Color:
Layer:
Space:



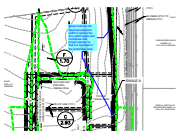
Author: Daniel Torres
Subject: Callout
Page Label: 8
Date: 10/24/2023 4:34:24 PM
Status:
Color:
Layer:
Space:

previously in the narrative it was stated that the site is primarily in the solberg ranch drainage basin. Per County GIS it appears that the northeast portion may be within the Haegler Ranch drainage basin. Please indicate whether this development lies solely in the Solberg basin otherwise also include anticipated fees due for Haegler Ranch.



Author: Daniel Torres
Subject: Callout
Page Label: [1] 24x36
Date: 10/24/2023 11:03:24 AM
Status:
Color:
Layer:
Space:

comments have been provided on the Preliminary Plan to provide turnarounds at the north and southerly end of Greenfield Ave. Please account for this in your design.



Author: Daniel Torres
Subject: Callout
Page Label: [1] 24x36
Date: 10/24/2023 11:47:40 AM
Status:
Color:
Layer:
Space:

please indicate the required easement width to contain the flow within swale and coordinate with project planner so that it is indicated in the preliminary plan

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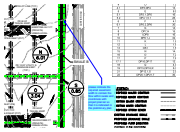
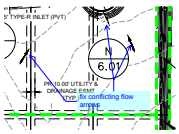


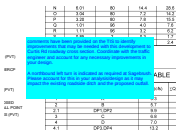
Author: Daniel Torres
Subject: Callout
Page Label: [1] 24x36
Date: 10/24/2023 11:52:42 AM
Status:
Color:
Layer:
Space:

please indicate the required easement width to contain the flow within swale and coordinate with project planner so that it is indicated in the preliminary plan



Author: Daniel Torres
Subject: Callout
Page Label: [1] 24x36
Date: 10/24/2023 11:57:13 AM
Status:
Color:
Layer:
Space:

fix conflicting flow arrows



Author: Daniel Torres
Subject: Text Box
Page Label: [1] 24x36
Date: 10/24/2023 1:00:58 PM
Status:
Color:
Layer:
Space:

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.

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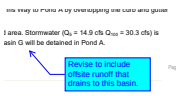
lpackman (16)



Author: lpackman
Subject: Callout
Page Label: 5
Date: 10/16/2023 3:39:10 PM
Status:
Color:
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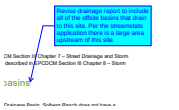
Space:

Revise to include offsite runoff that drains to this basin.



Author: lpackman
Subject: Callout
Page Label: 5
Date: 10/17/2023 9:38:09 AM
Status:
Color:
Layer:
Space:

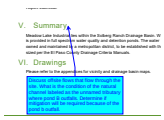
Revise drainage report to include all of the offsite basins that drain to this site. Per the streamstats application there is a large area upstream of this site.

Author: lpackman
Subject: Callout
Page Label: 7
Date: 10/16/2023 3:06:52 PM
Status:
Color:
Layer:
Space:

For both narratives expand more on the ultimate outfall each pond will drain to. Per ECM 3.2.4 developed flows need to drain to a system that is hydraulically adequate. Analyze outfalls for each pond.

Author: lpackman
Subject: Callout
Page Label: 8
Date: 10/17/2023 9:50:37 AM
Status:
Color:
Layer:
Space:

Revise to explain whether downstream facilities/ natural swales are hydraulically adequate to handle developed flows. What are the ultimate destinations for each outfall? Are developed flows a major increase compared to historic flows? Explain.



Author: lpackman
Subject: Callout
Page Label: 8
Date: 10/24/2023 4:47:48 PM
Status:
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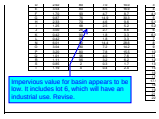
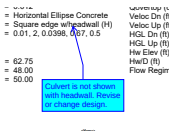
Layer:
Space:

Discuss offsite flows that flow through the site. What is the condition of the natural channel labeled as the unnamed tributary where pond B outfalls. Determine if mitigation will be required because of the pond b outfall.



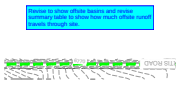
Author: lpackman
Subject: Callout
Page Label: 24
Date: 10/17/2023 1:12:06 PM
Status:
Color:
Layer:
Space:

Impervious value for basin appears to be low. It includes lot 6, which will have an industrial use. Revise.



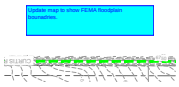
Author: lpackman
Subject: Callout
Page Label: 52
Date: 10/17/2023 7:26:23 AM
Status:
Color:
Layer:
Space:

Culvert is not shown with headwall. Revise or change design.



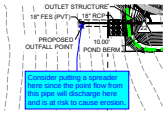
Author: lpackman
Subject: Text Box
Page Label: 66
Date: 10/16/2023 3:40:03 PM
Status:
Color:
Layer:
Space:

Revise to show offsite basins and revise summary table to show how much offsite runoff travels through site.



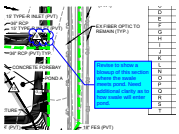
Author: lpackman
Subject: Text Box
Page Label: 66
Date: 10/17/2023 9:43:29 AM
Status:
Color:
Layer:
Space:

Update map to show FEMA floodplain boundaries.



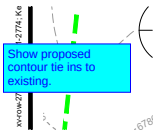
Author: lpackman
Subject: Callout
Page Label: [1] 24x36
Date: 10/16/2023 3:14:18 PM
Status:
Color:
Layer:
Space:

Consider putting a spreader here since the point flow from this pipe will discharge here and is at risk to cause erosion.



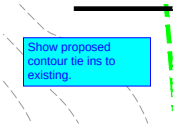
Author: lpackman
Subject: Cloud+
Page Label: [1] 24x36
Date: 10/24/2023 4:54:41 PM
Status:
Color:
Layer:
Space:

Revise to show a blowup of this section where the swale meets pond. Need additional clarity as to how swale will enter pond.



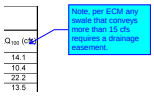
Author: lpackman
Subject: Text Box
Page Label: [1] 24x36
Date: 10/16/2023 3:36:56 PM
Status:
Color:
Layer:
Space:

Show proposed contour tie ins to existing.



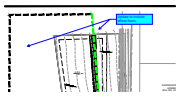
Author: lpackman
Subject: Text Box
Page Label: [1] 24x36
Date: 10/16/2023 3:36:50 PM
Status:
Color:
Layer:
Space:

Show proposed contour tie ins to existing.



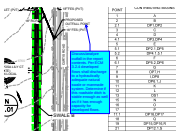
Author: lpackman
Subject: Callout
Page Label: [1] 24x36
Date: 10/16/2023 3:48:48 PM
Status:
Color:
Layer:
Space:

Note, per ECM any swale that conveys more than 15 cfs requires a drainage easement.



Author: lpackman
Subject: Callout
Page Label: [1] 24x36
Date: 10/16/2023 3:50:07 PM
Status:
Color:
Layer:
Space:

Update to include offsite flows.



Author: lpackman
Subject: Callout
Page Label: [1] 24x36
Date: 10/24/2023 4:53:23 PM
Status:
Color:
Layer:
Space:

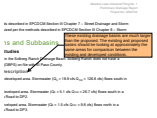
Discuss/analyze outfall in the report contents. Per ECM 3.2.4 developed flows shall discharge to a hydraulically adequate natural swale or manmade system. Determine if this roadside ditch is stable enough as well as if it has enough capacity for developed flows.

Mikayla Hartford (53)

Author: Mikayla Hartford
Subject: SW - Textbox
Page Label: 1
Date: 10/16/2023 12:31:10 PM
Status:
Color:
Layer:
Space:

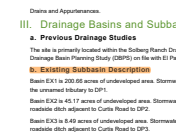
SP236

Author: Mikayla Hartford
Subject: Stamp - Stormwater Comment Legend
Page Label: 1
Date: 10/17/2023 12:07:20 PM
Status:
Color:
Layer:
Space:



Author: Mikayla Hartford
Subject: SW - Textbox
Page Label: 5
Date: 10/17/2023 3:20:28 PM
Status:
Color:
Layer:
Space:

These existing drainage basins are much larger than the proposed. The existing and proposed basins should be looking at approximately the same areas for comparison between the existing and developed conditions.



Author: Mikayla Hartford
Subject: SW - Highlight
Page Label: 5
Date: 10/17/2023 3:20:21 PM
Status:
Color:
Layer:
Space:

b. Existing Subbasin Description

Author: Mikayla Hartford
Subject: SW - Highlight
Page Label: 7
Date: 10/17/2023 4:25:08 PM
Status:
Color:
Layer:
Space:

. A 10’ access and
maintenance road is provided to the bottom of the pond to facilitate future maintenance

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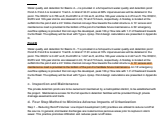
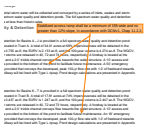


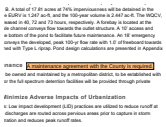
Author: Mikayla Hartford
Subject: SW - Highlight
Page Label: 7
Date: 10/17/2023 4:25:14 PM
Status:
Color:
Layer:
Space:

A 10’ access and
maintenance road is provided to the bottom of the pond to facilitate future maintenance



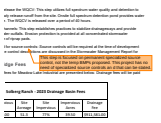
Author: Mikayla Hartford
Subject: SW - Textbox with Arrow
Page Label: 7
Date: 10/18/2023 7:39:30 AM
Status:
Color:
Layer:
Space:

Stabilized access ramp shall be a minimum of 15ft wide and no greater than 12% slope, in accordance with DCMv1, Chap 11.2.2.



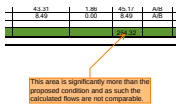
Author: Mikayla Hartford
Subject: SW - Textbox
Page Label: 7
Date: 10/18/2023 8:24:06 AM
Status:
Color:
Layer:
Space:

A maintenance agreement with the County is required.



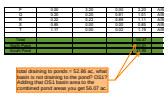
Author: Mikayla Hartford
Subject: SW - Textbox with Arrow
Page Label: 8
Date: 10/18/2023 8:25:08 AM
Status:
Color:
Layer:
Space:

This step is focused on permanent specialized source control, not the temp BMPs proposed. This project has no need of specialized source controls an d that can be stated.



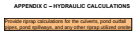
Author: Mikayla Hartford
Subject: SW - Textbox with Arrow
Page Label: 20
Date: 10/17/2023 4:07:15 PM
Status:
Color:
Layer:
Space:

This area is significantly more than the proposed condition and as such the calculated flows are not comparable.



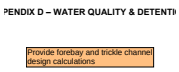
Author: Mikayla Hartford
Subject: SW - Textbox with Arrow
Page Label: 25
Date: 10/17/2023 4:09:15 PM
Status:
Color:
Layer:
Space:

total draining to ponds = 52.86 ac, what basin is not draining to the pond? OS1? Adding that OS1 basin area to the combined pond areas you get 56.07 ac.



Author: Mikayla Hartford
Subject: SW - Textbox
Page Label: 31
Date: 10/17/2023 4:11:40 PM
Status:
Color:
Layer:
Space:

Provide riprap calculations for the culverts, pond outfall pipes, pond spillways, and any other riprap utilized onsite



Author: Mikayla Hartford
Subject: SW - Textbox
Page Label: 54
Date: 10/18/2023 9:09:19 AM
Status:
Color:
Layer:
Space:

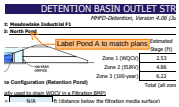
Provide forebay and trickle channel design calculations

Author: Mikayla Hartford
Subject: SW - Textbox with Arrow
Page Label: 57
Date: 10/18/2023 8:33:03 AM
Status:
Color:
Layer:
Space:

Provide hydrology calcs to support the override predevelopment Q - the existing condition Q's are not comparable because the basins analyzed are drastically different from the proposed condition.

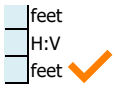
Author: Mikayla Hartford
Subject: SW - Textbox with Arrow
Page Label: 57
Date: 10/18/2023 8:35:10 AM
Status:
Color:
Layer:
Space:

Why are all these values N/A?

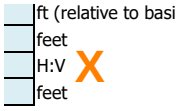


Author: Mikayla Hartford
Subject: SW - Textbox with Arrow
Page Label: 57
Date: 10/18/2023 8:37:21 AM
Status:
Color:
Layer:
Space:

Label Pond A to match plans

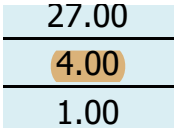


Author: Mikayla Hartford
Subject: Checkmark
Page Label: 57
Date: 10/18/2023 8:41:14 AM
Status:
Color:
Layer:
Space:



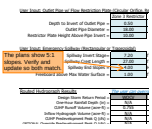
Author: Mikayla Hartford
Subject: Text Box
Page Label: 57
Date: 10/18/2023 8:41:25 AM
Status:
Color:
Layer:
Space:

X



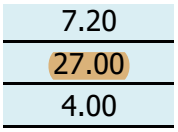
Author: Mikayla Hartford
Subject: SW - Highlight
Page Label: 57
Date: 10/18/2023 8:41:30 AM
Status:
Color:
Layer:
Space:

4.00



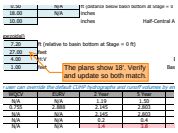
Author: Mikayla Hartford
Subject: SW - Textbox with Arrow
Page Label: 57
Date: 10/18/2023 8:42:05 AM
Status:
Color:
Layer:
Space:

The plans show 5:1 slopes. Verify and update so both match.



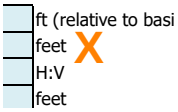
Author: Mikayla Hartford
Subject: SW - Highlight
Page Label: 57
Date: 10/18/2023 8:46:50 AM
Status:
Color:
Layer:
Space:

27.00



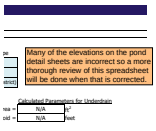
Author: Mikayla Hartford
Subject: SW - Textbox with Arrow
Page Label: 57
Date: 10/18/2023 8:47:25 AM
Status:
Color:
Layer:
Space:

The plans show 18'. Verify and update so both match.



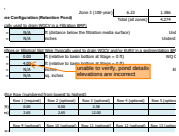
Author: Mikayla Hartford
Subject: Text Box
Page Label: 57
Date: 10/18/2023 8:47:28 AM
Status:
Color:
Layer:
Space:

X



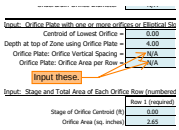
Author: Mikayla Hartford
Subject: SW - Textbox
Page Label: 57
Date: 10/18/2023 9:01:32 AM
Status:
Color:
Layer:
Space:

Many of the elevations on the pond detail sheets are incorrect so a more thorough review of this spreadsheet will be done when that is corrected.



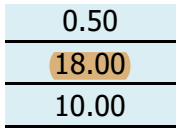
Author: Mikayla Hartford
Subject: SW - Textbox with Arrow
Page Label: 57
Date: 10/18/2023 9:08:15 AM
Status:
Color:
Layer:
Space:

unable to verify, pond details elevations are incorrect



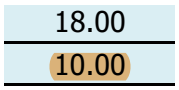
Author: Mikayla Hartford
Subject: SW - Textbox with Arrow
Page Label: 57
Date: 10/18/2023 9:08:46 AM
Status:
Color:
Layer:
Space:

Input these.



Author: Mikayla Hartford
Subject: SW - Highlight
Page Label: 57
Date: 10/18/2023 9:23:34 AM
Status:
Color:
Layer:
Space:

18.00



Author: Mikayla Hartford
Subject: SW - Highlight
Page Label: 57
Date: 10/18/2023 9:23:37 AM
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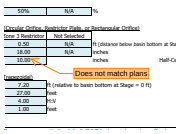
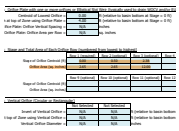
Color:
Layer:
Space:

10.00



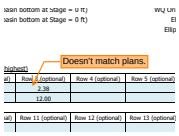
Author: Mikayla Hartford
Subject: SW - Textbox with Arrow
Page Label: 57
Date: 10/18/2023 9:23:56 AM
Status:
Color:
Layer:
Space:

Does not match plans



Author: Mikayla Hartford
Subject: SW - Highlight
Page Label: 57
Date: 10/18/2023 9:24:09 AM
Status:
Color:
Layer:
Space:

0.00 0.50 2.38
Orifice Area (sq. inches) 2.65 2.65 12.00



Author: Mikayla Hartford
Subject: SW - Textbox with Arrow
Page Label: 57
Date: 10/18/2023 9:24:23 AM
Status:
Color:
Layer:
Space:

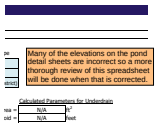
Doesn't match plans.

Author: Mikayla Hartford
Subject: SW - Textbox with Arrow
Page Label: 62
Date: 10/18/2023 9:24:56 AM
Status:
Color:
Layer:
Space:

Provide hydrology calcs to support the override predevelopment Q - the existing condition Q's are not comparable because the basins analyzed are drastically different from the proposed condition.

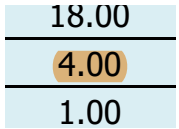
Author: Mikayla Hartford
Subject: SW - Textbox with Arrow
Page Label: 62
Date: 10/18/2023 9:24:56 AM
Status:
Color:
Layer:
Space:

Why are all these values N/A?



Author: Mikayla Hartford
Subject: SW - Textbox
Page Label: 62
Date: 10/18/2023 9:25:08 AM
Status:
Color:
Layer:
Space:

Many of the elevations on the pond detail sheets are incorrect so a more thorough review of this spreadsheet will be done when that is corrected.



Author: Mikayla Hartford
Subject: SW - Highlight
Page Label: 62
Date: 10/18/2023 9:51:31 AM
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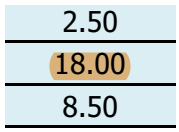
Color:
Layer:
Space:

4.00



Author: Mikayla Hartford
Subject: SW - Highlight
Page Label: 62
Date: 10/18/2023 9:53:16 AM
Status:
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Space:

18.00

18.00
8.50

Author: Mikayla Hartford
Subject: SW - Highlight
Page Label: 62
Date: 10/18/2023 9:53:35 AM
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Color:
Layer:
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8.50

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ne 3 Restrict
2.50
18.00

Author: Mikayla Hartford
Subject: SW - Highlight
Page Label: 62
Date: 10/18/2023 9:53:37 AM
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Layer:
Space:

2.50

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apezoidal)
7.50
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Author: Mikayla Hartford
Subject: SW - Highlight
Page Label: 62
Date: 10/18/2023 9:53:38 AM
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Layer:
Space:

7.50

Zone 3 Weir
6.40
3.00

Author: Mikayla Hartford
Subject: SW - Highlight
Page Label: 62
Date: 10/18/2023 9:53:42 AM
Status:
Color:
Layer:
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6.40

6.40
3.00
0.00

Author: Mikayla Hartford
Subject: SW - Highlight
Page Label: 62
Date: 10/18/2023 9:53:49 AM
Status:
Color:
Layer:
Space:

3.00

3.00
0.00
3.00

Author: Mikayla Hartford
Subject: SW - Highlight
Page Label: 62
Date: 10/18/2023 9:53:58 AM
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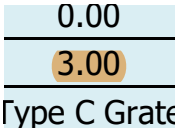
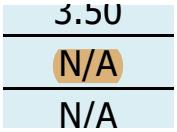
Color:
Layer:
Space:

0.0



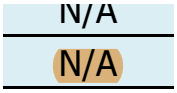
Author: Mikayla Hartford
Subject: SW - Highlight
Page Label: 62
Date: 10/18/2023 9:53:59 AM
Status:
Color:
Layer:
Space:

3.00



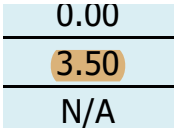
Author: Mikayla Hartford
Subject: SW - Highlight
Page Label: 62
Date: 10/18/2023 9:54:09 AM
Status:
Color:
Layer:
Space:

N/A



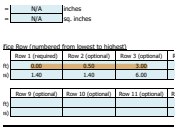
Author: Mikayla Hartford
Subject: SW - Highlight
Page Label: 62
Date: 10/18/2023 9:54:10 AM
Status:
Color:
Layer:
Space:

N/A



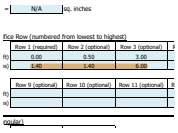
Author: Mikayla Hartford
Subject: SW - Highlight
Page Label: 62
Date: 10/18/2023 9:54:17 AM
Status:
Color:
Layer:
Space:

3.50



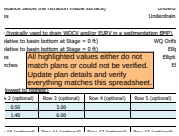
Author: Mikayla Hartford
Subject: SW - Highlight
Page Label: 62
Date: 10/18/2023 9:54:20 AM
Status:
Color:
Layer:
Space:

0.00 0.50 3.00



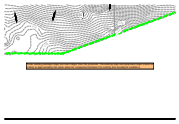
Author: Mikayla Hartford
Subject: SW - Highlight
Page Label: 62
Date: 10/18/2023 9:54:23 AM
Status:
Color:
Layer:
Space:

1.40 1.40 6.00



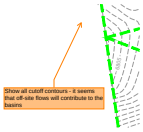
Author: Mikayla Hartford
Subject: SW - Textbox
Page Label: 62
Date: 10/18/2023 9:55:18 AM
Status:
Color:
Layer:
Space:

All highlighted values either do not match plans or could not be verified. Update plan details and verify everything matches this spreadsheet.



Author: Mikayla Hartford
Subject: SW - Textbox
Page Label: 66
Date: 10/17/2023 3:14:11 PM
Status:
Color:
Layer:
Space:

These existing drainage maps are much larger than the proposed. The existing maps and proposed maps should be looking at approximately the same areas for comparison between the existing and developed conditions.



Author: Mikayla Hartford
Subject: SW - Textbox with Arrow
Page Label: 66
Date: 10/17/2023 3:21:47 PM
Status:
Color:
Layer:
Space:

Show all cutoff contours - it seems that off-site flows will contribute to the basins

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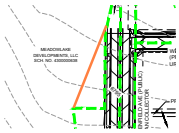
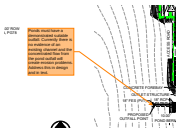


Author: Mikayla Hartford
Subject: Line
Page Label: [1] 24x36
Date: 10/17/2023 3:22:15 PM
Status:
Color:
Layer:
Space:



Author: Mikayla Hartford
Subject: SW - Textbox with Arrow
Page Label: [1] 24x36
Date: 10/17/2023 3:24:02 PM
Status:
Color:
Layer:
Space:

Ponds must have a demonstrated suitable outfall. Currently there is no evidence of an existing channel and the concentrated flow from the pond outfall will create erosion problems. Address this in design and in text.