PRELIMINARY DRAINAGE REPORT
FOR
HONOR CHARTER SCHOOL
LOCATED AT
8250 BENT GRASS MEADOWS DRIVE
PEYTON, EL PASO COUNTY, CO 80831

Prepared for:

Highmark School Development
10808 S. River Front Parkway Suite 3126B
South Jordan, Utah 84095

Prepared by:

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April 2026

DEVELOPER'S STATEMENT

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

_____
Business Name
By: _____
Title: _____
Address: _____

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 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.

_____ _____
Brian Campbell, P.E. #40196 Date

EL PASO COUNTY

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

_____ _____
Joshua Palmer, P.E. Date
County Engineer / ECM Administrator

TABLE OF CONTENTS

1. GENERAL SITE LOCATION AND DESCRIPTION

A. LOCATION

The Site is located 8250 Bent Grass Meadows Drive located near Falcon in El Paso County, Colorado. The Site is bounded to the north by Woodmen Hills Filing No. 3, to the east by residential, to the south by Bent Grass Meadows Drive, and to the west by Falcon Meadows at Bent Grass Residential Filing No. 2.

B. DESCRIPTION OF PROPERTY

The Site consists of approximately 8.98 acres of existing, undeveloped land that is currently housing a local sediment pond for drainage from surrounding developments. To the north, the ground surface is covered with native grass and weeds, with some small trees in the vicinity. The existing topography is generally sloping to the southeast across the Site although there is a roughly defined swale along the west side of the site that captures existing off-site flows from the north and west and conveys them to the existing on-site sediment pond. The existing sediment pond is allowing 63.5 cfs to discharge in the 100-year event. The flows through this site outfall over the curb to Bent Grass Meadows Drive and are generally then conveyed to the east to the roadside drainage swale along the west side of Meridian Road. A portion of flows are assumed to be bypassing through the neighborhood to the south via curb and gutter and ultimately discharging through Bent Grass Pond 1. Per descriptions in the MDDP, the existing conditions currently allow 33.2 cfs of the 100-yr storm flow to be conveyed in the Bent Grass Meadows Roadway. The remainder of flows (30.3 cfs) are assumed to outfall through Bent Grass Residential Filing No.1 through Bent Grass Pond 1. These flows were not described in the Bent Grass Residential Filing No. 1 drainage report but were documented in the MDDP. This site is not in the 100 or 500 yr floodplain and it is in FEMA Zone x per the Firmette in Appendix C.

According to the Natural Resources Conversation Service (NRCS) Web Soil Survey, the native soils in this area are primarily Columbine gravelly sandy loam, 0 to 3 percent slopes (Map Unit Symbol #19), which is a Type A soil from 0 to 14 inches, and Type C from 14 to 60 inches.

Please refer to the NRCS soils information in the Appendix G.

Existing drainage facilities downstream of the site include existing culverts at the intersection of Bent Grass Meadows Drive and Meridian road to the east of the site.

2. DRAINAGE BASINS AND SUB-BASINS

A. MAJOR BASIN DESCRIPTION

The subject site is located within the Falcon Drainage Basin Planning Study, Please refer to the Appendix F for excerpts from the Falcon Drainage Basin Planning Study. The historic 100-year runoff for the subject site is 12.67 cfs of

on-site flow. Additionally, there is 72.5 cfs and 1.6 cfs of off-site flows from the north and the west respectively that flow through the site. The runoff from the site will be discharged to the north side of the intersection of Meridian and Bent Grass Meadows into roadside drainage swale on the west side of Meridian.

The drainage basin has been divided into sub-basins and analyzed for individual sub-basin characteristics such as runoff coefficients and peak runoff flows. For existing conditions, the on-site area has been divided into 3 onsite sub-basins EX1, EX2, and EX3. For post-development conditions, the basin has been divided into 7 onsite sub-basins: A1, A2, A3, A4, A5, A6, and A7. The runoff from these sub-basins is captured by proposed storm drain systems and conveyed to the detention pond located in the southeast corner of the site.

Drainage will generally be conveyed via sheet flow, grass swales, and curb and gutters to strategically placed inlets and will be routed southeast to the onsite detention pond in Basin A3. The discharge rates from the detention pond will not be allowed to exceed historical flow rate of 12.67 cfs as shown in the MHFD Detention Spreadsheet in Appendix E.

Hydrologic and hydraulic calculations have been provided with this drainage report. See Appendix D and E for calculation spreadsheets.

EXISTING SUB-BASIN DESCRIPTION

Basin EX1

Basin EX1 consists of the western half of the site area. This basin consists of 4.96 acres of native grasses and weeds and has been analyzed with an impervious of 20%. Runoff surface flows to the southern portion of the basin where it collects in an existing sediment pond. Overflow from the sediment pond overtops a riprap overflow and then continues south.

Basin EX2

Basin EX2 consists of the Northeast portion of the site. This basin consists of 2.05 acres of native grasses and weeds and has been analyzed with an impervious of 20%. Runoff surface flows to the southern portion of the basin where it collects in an existing depression. When flows overtop the depression, they flow to the southeast.

Basin EX3

Basin EX3 consists of the southeastern portion of the site. This basin consists of 1.97 acres of native grasses and weeds and has been analyzed with an impervious of 20%. Runoff surface flows to the south and east where it flows offsite into existing ROW.

PROPOSED SUB-BASIN DESCRIPTION

Basin A1

Basin A1 (1.03 acres) is located to the northwest of the building including a portion of the building roof. It consists of proposed drive aisles, landscaping, sidewalk, and roof and has an impervious percentage of 52.7%. Runoff will generally overland flow southeast via landscape and gutters into Type R inlet S1 and through a Storm pipe also known as Design Point 2 ultimately discharging to the detention pond. The 10-yr and 100-yr flow produced from this basin are 1.56 cfs and 2.96 cfs respectively.

Basin A2

Basin A2 (2.19 acres) is located to the northeast of the building including a portion of the building roof. It consists of proposed drive aisles, landscaping, sidewalk, and roof and has an impervious percentage of 46.0%. Runoff will generally flow southeast via landscape swales and gutters into Type R inlet S2 and through a Storm pipe also known as Design Point 2 ultimately discharging to the detention pond. The 10-yr and 100-yr flow produced from this basin are 2.60 cfs and 5.23 cfs respectively.

Basin A3

Basin A3 (2.07 acres) is located to the southeast of the building including a portion of the building roof. It consists of proposed drive aisles, landscaping, sidewalk, detention pond, playground area, and roof and has an impervious percentage of 30.5%. Runoff will generally flow southeast via a landscape swale from the north and via curb and gutter from the east, into the detention pond and through the outlet structure (S3) via a storm pipe also known as Design Point 3. Flow will then ultimately discharge to the off-site storm system flowing east along Bent Grass Meadows drive. The 10-yr and 100-yr flow produced from this basin are 1.78 cfs and 4.41 cfs respectively.

Basin A4

Basin A4 (1.52 acres) is located to the southwest of the building, including a portion of the building roof and the western side of the proposed parking lot. It consists of proposed drive aisles, parking, landscaping, sidewalk, trash enclosure, and roof and has an impervious percentage of 65.3%. Runoff will generally flow southwest into Type R curb inlets (S4 and S7) and discharge to the east via a storm pipe also known as Design Point 4 ultimately discharging to the detention pond. The 10-yr and 100-yr flow produced from this basin are 3.94 cfs and 6.79 cfs respectively.

Basin A5

Basin A5 (0.62 acres) is the eastern portion of the proposed parking lot and includes a portion of the building roof. It consists of proposed drive aisles, parking, landscaping, sidewalk, and roof and has an impervious percent of 85.3%. Runoff will generally flow southeast into Type R curb inlets (S5 and S8) and

discharge to the east via a storm pipe also known as Design Point 5 ultimately discharging to the detention pond. The 10-yr and 100-yr flow produced from this basin are 2.64 cfs and 4.10 cfs respectively.

Basin A6

Basin A6 (1.28 acres) is located along the north and eastern property lines of the site. It consists of native vegetation and has an impervious percent of 20%. Runoff will generally be conveyed via Grass channel to the east and then to the south, where it is collected and conveyed via the off-site Storm Pipe also known as Design Point 6 ultimately discharging to the into the regional channel along west side of Meridian Road. The 10-yr and 100-yr flow produced from this basin are 0.61 cfs and 1.93 cfs respectively.

Basin A7

Basin A7 (0.26 acres) is located along the south property line of the site. It consists of proposed drive entrances, parking, landscaping, and sidewalk and has an impervious percent of 45.6%. Runoff will generally sheetflow to the south, where it is collected in the curb and gutter along the north side of Bent Grass Meadows Drive. The 10-yr and 100-yr flow produced from this basin are 0.51 cfs and 1.03 cfs respectively.

While runoff from Basins A6 and A7 are not able to be captured/conveyed to the detention pond, the detention pond is still sized to store the necessary runoff for those basins.

Refer to Appendix D for and E for calculations.

3. DRAINAGE DESIGN CRITERIA

A. REGULATIONS

This report has been prepared in general accordance with the Mile High Flood District/Urban Storm Drainage Criteria Manual (USDCM), City of Colorado Springs/El Paso County Drainage Criteria Manual, as revised in November 1991 and October 1994 with County adopted Chapter 6 and Section 3.2.1 of Chapter 13 of the City of Colorado Springs/El Paso County Drainage Criteria Manual as revised in May 2014.

B. HYDROLOGIC CRITERIA

The subject site consists of approximately 8.98 acres. The site is currently undeveloped and the proposed project will consist of a proposed school building, parking lots, drive lanes, landscape areas, and detention pond.

The subject site is located within the Falcon Drainage Basin Planning Study, as shown in the Bent Grass Development MDDP and DBPS Amendment, January 2021, prepared by Galloway. All onsite and offsite flow is directed east via curb and gutter and 30 inch off-site storm drain pipe to the roadside drainage swale

along the west side of Meridian road, which is in compliance with the Bent Grass Development MDDP.

Runoff from impervious and pervious surfaces as a result of the proposed development will be routed through the proposed onsite detention pond. The controlled discharge from the detention pond will be released from the southeast corner of the subject site to a proposed 30 inch pipe to carry it to the roadside drainage swale along the west side of Meridian road.

C. HYDRAULIC CRITERIA

This report has been prepared in general accordance with the Mile High Flood District/Urban Storm Drainage Criteria Manual (USDCM), City of Colorado Springs/El Paso County Drainage Criteria Manual, as revised in November 1991 and October 1994 with County adopted Chapter 6 and Section 3.2.1 of Chapter 13 of the City of Colorado Springs/El Paso County Drainage Criteria Manual as revised in May 2014.

The design storms for this project are the 10-year and the 100-year recurrence intervals. Runoff is calculated using the Rational Method since the total project and all basins are smaller than 160 acres. The Rational calculations are estimates based on site areas and assumed uses within the proposed basins. Refer to Appendix E for Hydraulic computations.

4. DRAINAGE FACILITY DESIGN

A. GENERAL CONCEPT AND DESIGN

On-site Conveyance and Storage

The overall development has been analyzed for water quality treatment and the impacts of the 10-year minor storm event and the 100-year major storm event as well as adherence to the Bent Grass Development MDDP and DBPS Amendment. The contributing areas to be controlled by the detention pond outlet structure is 7.44 acres but the detention is sized to detain the entire site area of 8.98 acres. The contributing area will be conveyed to the proposed detention pond via underground storm drain system and overland flow for detention and treatment. The water quality treatment volume and storage for the 100-year event will be provided by the full spectrum extended detention which includes forebays within the pond and a micro pond at the outlet structure for sediment removal. An outlet at the southeast corner of the detention pond will allow discharge at a 100-year peak flow rate of 6.8 cfs into the proposed 30 inch offsite drainage system being developed with this project.

Off-site Run-on Conveyance

For conveying the 100-year off-site runoff through the site, the full 72.5 cfs from the north will be captured in a drainage channel along the north and flow to the northeast corner and then south to the proposed off-site pipe system. For the 100-year condition, approximately 33.2 cfs will overtop the curb and be conveyed via the Bent Grass Meadows roadway following existing conditions. The remainder

of the 72.5 cfs that is being bypassed will be captured and conveyed in the proposed 30 inch storm pipe that will run along the north side of Bent Grass Meadows drive. The 1.6 cfs from basin 5-1 (See sections of the MDDP) to the west will be captured via vegetated swales and conveyed through the on-site storm infrastructure to be conveyed through the pond. The proposed off-site storm drain will flow approximately 2000 ft to the east and outlet to the north of the intersection of Bent Grass Meadows Drive and Meridian Road to the Roadside Drainage Swale.

The drainage improvements designed for this proposed development will provide detention and water quality treatment for the project site 100-year event for on-site flows and conveyance of the 100-year storm event for off-site flows.

B. DETENTION

The proposed drainage patterns will follow existing drainage patterns, with all of the site ultimately discharging to the southeast through proposed storm drain system, including an off-site 30 inch pipe which runs approximately 2000 ft to the east and outlet to the north of the intersection of Bent Grass Meadows Drive and Meridian Road to the Roadside Drainage Swale.

The onsite detention pond shall be a full spectrum pond, which includes water quality (WQ), excess urban runoff volume (EURV) and 100-year volume. Stage 1 will be WQ; Stage 2 will be EURV and Stage 3 will be the 100-year volume.

The required WQ volume is 0.122 ac-ft and the provided volume is 0.122 ac-ft with a release rate of 0.1 cfs. The WQ surface elevation is 6955.08 ft. The required EURV volume is 0.194 ac-ft (including WQ) and the provided volume is 0317 ac-ft at a release rate of 0.2 cfs. The EURV water surface elevation is 6955.66 ft. The required 100-year volume is 0.564 ac-ft and the provided volume is 0.580 ac-ft at a release rate of 4.6 cfs. The 100-year water surface elevation is 6956.33 ft.

The pond will have an emergency overflow spillway for a plugged outlet condition or for a storm event greater than the 100-year event. The emergency overflow spillway has been designed to be 20’ long and have a water depth of +/- 5.6 inches. The runoff through the spillway was calculated by assuming a plugged outlet and summing post development peak flows across the site for the most extreme case. The spillway crest elevation is 6956.83 and the top of the proposed detention pond will be 6957.33 feet.

The detention pond will release via an 18 inch RCP into a proposed 96 inch storm manhole as part of the off-site system within Bent Grass Meadows. Runoff is then conveyed in the proposed 30 inch RCP along Bent Grass Meadows ultimately discharging on the north side of Bent Grass Meadows into the roadside drainage swale along the west side of Meridian Road.

The 100-year overflow spillway for the off-site flows to overtop the channel into Bent Grass Meadows drive and spills over the proposed sidewalk. The sidewalk is graded to provide a depth of 0.34 feet of flow to convey the 33.2 cfs to the roadway following existing drainage patterns per the MDDP.

C. STORMWATER QUALITY

Water quality for the subject development will be provided with the proposed extended detention pond. The outlet structure for the pond contains an orifice plate to limit the release and provide water quality for the development site.

The required water quality capture volume is 0.12 ac-ft and the water quality capture volume provided is 0.12 ac-ft at an elevation of 6955.08 ft. The water quality volume drains within 42 hours. The 100-year event volume drains within 60 hours.

The detention pond and outlet structure shall be regularly inspected and maintained by the property owner (at least 1 time every six months and 2 times per year). The inspections should include a log for the date, items inspected, maintenance actions and any updates to the drainage system. Maintenance access is an all-weather path on the south side of the structure. Maintenance shall follow Chapter 6: BMP Maintenance of the MHFD, Volume III.

Stormwater quality and erosion control measures will be addressed by applying Best Management Practices in general accordance with Urban Drainage Volume 3. A SWMP will be prepared for the site and will provide more detail on BMPs during construction and post-construction BMPs.

5. Four Step Process
    A. Runoff Reduction Proposed: Storm runoff sheet flows over pervious areas wherever possible to slow runoff and increase time of concentration to storm water system. Runoff is collected in a pervious detention basin to allow infiltration and slow water impact on County stormwater infrastructure.

    B. Stabilization of drainage ways: All drainage ways are stabilized with pervious landscaping where possible.

    C. Proposed Stormwater Quality Capture Volume (WQCV) proposed: Proposed on-site runoff is collected and diverted to the proposed extended detention pond, which releases at a pre-determined rate to ensure WQCV standards are met.

    D. Identify Best Management Practices (BMP's) to be used to control industrial and commercial pollutants: Refer to prepared SWMP and GEC plans for proposed BMP's as well as maintenance and care thereof.

6. SEDIMENT/EROSION CONTROL

The following practices/methods shall be implemented as a part of the overall sediment/erosion control for the proposed site:

- Silt Fence
- Inlet Protection
- Materials Handling and Spill Prevention (Concrete Washout Area)
- Stabilized Staging Area for Material/Equipment Storage
- Vehicle Tracking Control Pad
- Sanitary Facilities
- Curb Socks
- Seeding & Mulching
- Riprap

7. CONCLUSION

A. COMPLIANCE WITH STANDARDS

This project is in general compliance with the City of Colorado Springs/El Paso County Drainage Criteria Manual and the Mile High Flood District for storm water design. *Urban Storm Drainage Criteria Manuals Volume I and III* have been utilized in the placement of best management practices and design of the stormwater system regarding imperviousness and runoff coefficients. Adequate storm water treatment has been provided, and the peak flows have been reduced to below pre-development conditions for 10-year and 100-year rates.

B. DRAINAGE COMPLIANCE

The purpose of this report is to define and analyze existing and developed runoff quantities and conveyance methods for the Honor Charter School development. The design of the site was based on the 10-year and 100-year storm events. The streets and drainage conveyance facilities were designed to meet these events. The design of the release points from the site shows reduction in peak flows. No foreseeable negative impacts on the surrounding properties and drainage infrastructure are anticipated. The drainage is in accordance with requirements and criteria established by El Paso County and the Bent Grass Development MDDP and DBPS Amendment.

8. REFERENCES

Drainage Criteria Manual, Volumes 1-3. Urban Storm Drainage Criteria Manual. Updated March 2024.

City of Colorado Springs/El Paso County Drainage Criteria Manual

Bent Grass Development MDDP and DBPS Amendment

9. APPENDICES

A. VICINITY MAP
B. EXISTING AND PROPOSED DEVELOPMENT EXHIBITS
C. FEMA FIRM MAP
D. HYDROLOGIC COMPUTATIONS
E. HYDRAULIC COMPUTATIONS
F. SECTIONS FROM BENT GRASS MDDP/DBPS AMENDMENT & FALCON DRAINAGE BASIN STUDY
G. SOILS REPORT
H. GRADING AND STORM DRAINAGE PLANS

APPENDIX A

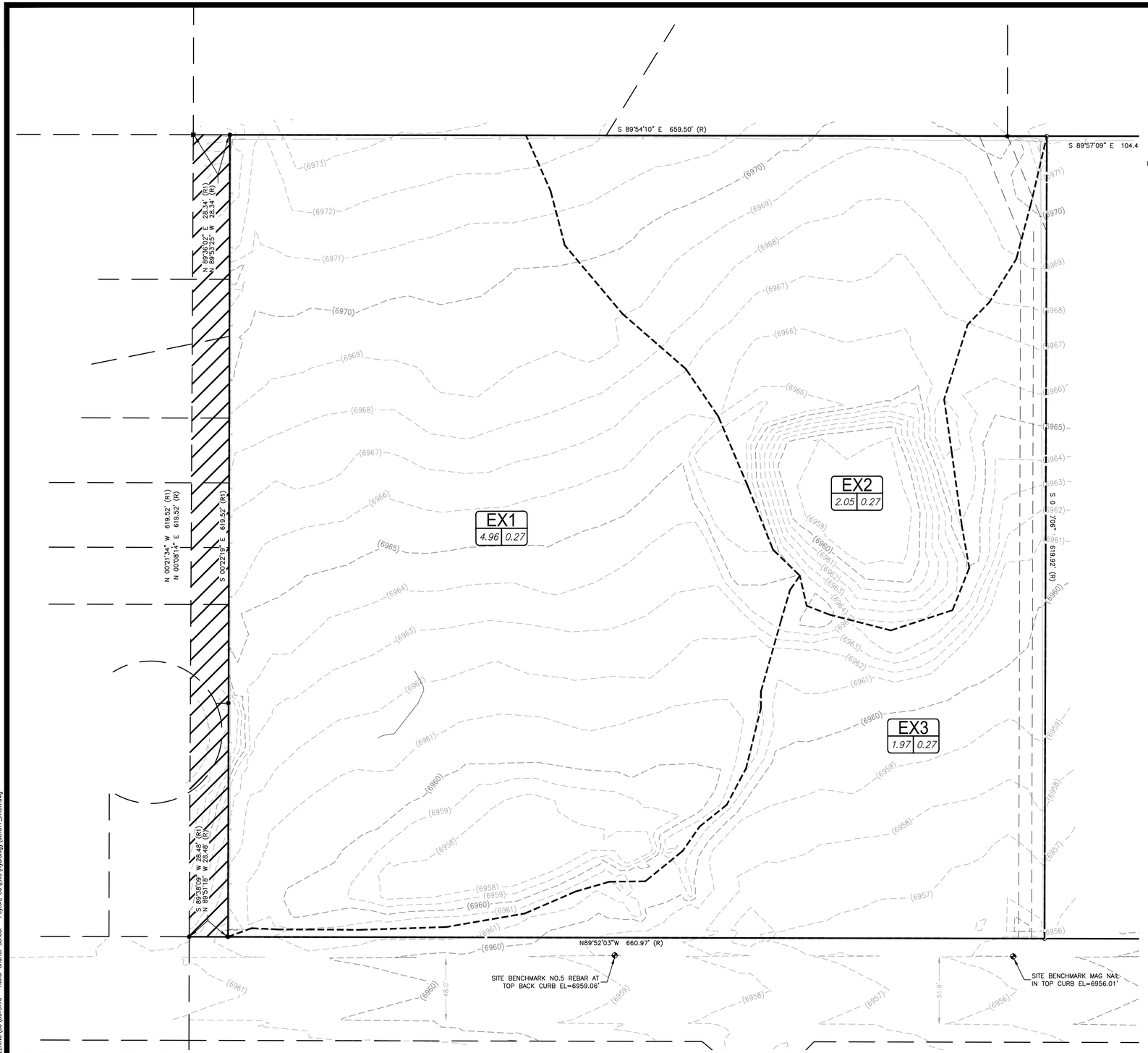
VICINITY MAP

VICINITY MAP

(NOT TO SCALE)

APPENDIX B

EXISTING AND PROPOSED DEVELOPMENT EXHIBITS



GRADING PLAN

SYMBOLS LEGEND

- PROPERTY LINE
- ADJACENT PROPERTY/ ROW LINE
- BUILDING SETBACK LINE
- PROPOSED EASEMENT
- LIMIT OF DISTURBANCE
- EXISTING WATER LINE
- EXISTING SEWER LINE
- PROPOSED TELEPHONE SERVICE LINE
- PROPOSED ELECTRIC SERVICE LINE
- PROPOSED WATER SERVICE LINE
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- PROPOSED GRADE BREAK
- PROPOSED TOP OF POND
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- PROPOSED SS CLEANOUT
- PROPOSED BACKFLOW PREVENTOR
- EXISTING FIRE HYDRANT
- PROPOSED FIRE HYDRANT
- PROPOSED STREET LIGHT
- (40.00)ES EXISTING ELEVATION
- 40.00FS PROPOSED ELEVATION
- (2940) EXISTING CONTOUR
- 2940 PROPOSED CONTOUR
- (5.2%) EXISTING SLOPE
- 5.4% PROPOSED SLOPE
- EXISTING INLET
- PROPOSED INLET
- PROPOSED STORM INFRASTRUCTURE
- PROPOSED STORM MANHOLE
- PROPOSED TEE / THRUST BLOCK
- PROPOSED FLARED-END SECTION
- EXISTING SANITARY SEWER MANHOLE

DRAINAGE LEGEND:

- PROPOSED SLOPE 2.0%
- EXISTING SLOPE (1.0%)
- BASIN LIMITS
- IMPERVIOUS AREA

A
B | C

A = BASIN DESIGNATION
B = AREA IN ACRES
C = 100-YR RUNOFF COEFFICIENT

NOTE:

ELEVATIONS ARE TRUNCATED BY 6900.00'.

UNAUTHORIZED CHANGES & USES

THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE FOR, OR LIABLE FOR, UNAUTHORIZED CHANGES TO OR USES OF THESE PLANS. ALL CHANGES OF THESE PLANS MUST BE IN WRITING AND MUST BE APPROVED BY THE PREPARER OF THESE PLANS PRIOR TO CONSTRUCTION. CONSTRUCTION CONTRACTOR AGREES THAT IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, CONSTRUCTION CONTRACTOR WILL BE REQUIRED TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THE PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY, THAT THIS REQUIREMENT SHALL BE MADE TO APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS, AND CONSTRUCTION CONTRACTOR FURTHER AGREES TO DEFEND, INDEMNIFY AND HOLD DESIGN PROFESSIONAL HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF DESIGN PROFESSIONAL.

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BASIS OF BEARINGS:
BEARINGS ARE BASED ON THE WESTERLY BOUNDARY OF THE SUBJECT PARCEL COINCIDENT WITH THE EASTERLY BOUNDARY OF THE BENT GRASS RESIDENTIAL FILING NO.2, MONUMENTED ON THE NORTH END WITH A NO.5 REBAR & 1-3/8" RED PLASTIC CAP MARKED "ALC PLS 38087", FOUND FLUSH WITH GRADE, AND ON THE SOUTH END WITH A NO. 4 REBAR & 1" ORANGE PLASTIC CAP MARKED "PLS 38141", RECOVERED 0.6' BELOW GRADE, AND IS ASSUMED TO BEAR N 00°08'14" E A MEASURED DISTANCE OF 619.52 FEET.

BENCHMARK:
ELEVATIONS ARE BASED ON THE PROJECT BENCHMARK IDENTIFIED AS JK0239 ELEVATION=6902.3'(NAVD88). PER DATA PUBLISHED BY THE NATIONAL GEODETIC SURVEY.

PREPARED UNDER THE SUPERVISION OF TAIT & ASSOCIATES, INC.

BRIAN CAMPBELL
COLORADO P.E. #40191

NO.	DESCRIPTION	REVISIONS	BY	DATE

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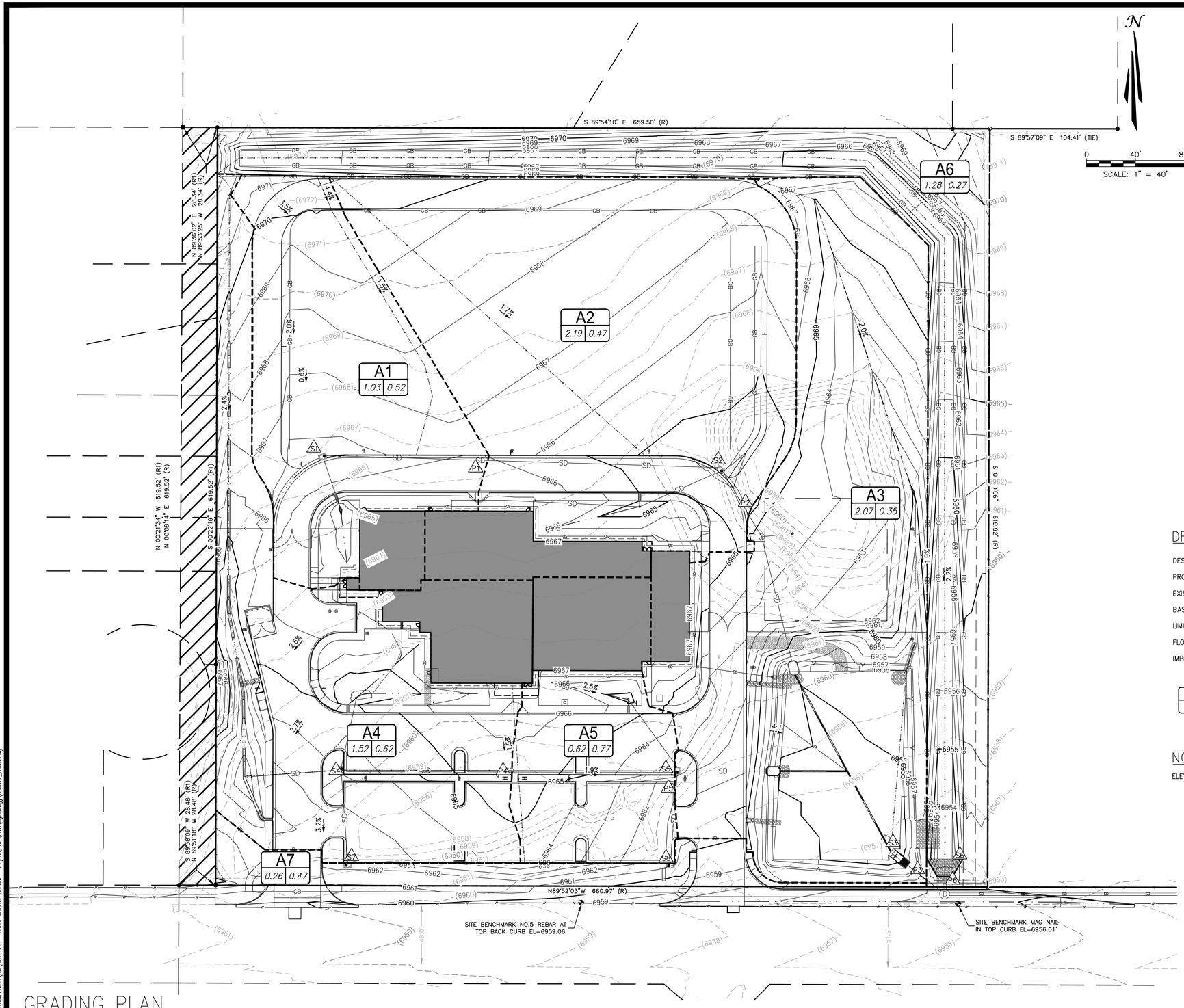
GRADING PLAN

HONOR CHARTER SCHOOL
HIGHMARK SCHOOL DEVELOPMENT
8250 BENT GRASS MEADOWS DR.

DRAWN: CW
DATE: 11/11/2024
CHECKED:
DATE:
REVISION #:
DATE:
JOB NO. C01517

2/6/2024 Internal Review #1

Apr 29, 2026 - 3:29pm by tschneider X:\ENGINEERING\CO\C01517O - Honor Charter School - Peyton, CO\ENG\Hydrology\C01517_JN09.dwg



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NO.	DESCRIPTION	REVISIONS	BY	DATE

TAIT & ASSOCIATES
ENGINEERING ENVIRONMENTAL BUILDING LAND
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PREPARED UNDER THE SUPERVISION OF TAIT & ASSOCIATES, INC.

BRIAN CAMPBELL
COLORADO P.E. #40196

DRAWN: CW
DATE: 11/11/2024
CHECKED:
DATE:
REVISION #:
DATE:
JOB NO: CO1517

8 OF 48

FOR REVIEW ONLY - NOT FOR CONSTRUCTION

2/6/2024 Internal Review #1

Apr 30, 2026 - 3:10pm by tschneider X:\ENGINEERING\CO\CO1517D - Honor Charter School - Peyton, CO\ENG\Hydrology\CO1517_HYDR.dwg

APPENDIX C

FEMA FIRM MAP

National Flood Hazard Layer FIRMette

FEMA

104°37'14"W 38°57'20"N

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

1:6,000

104°36'37"W 38°56'52"N

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 12/12/2025 at 4:34 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

APPENDIX D

HYDROLOGIC COMPUTATIONS

Calculation of Peak Runoff using Rational Method

Designer: NR
Company: TAIT & Associates, Inc.
Date: 4/29/2026
Project: Honor Charter School
Location: El Paso County

Version 2.00 released May 2017

Cells of this color are for required user-input
Cells of this color are for optional override values
Cells of this color are for calculated results based on overrides

$t_i = \frac{0.395(1.1 - C_5)\sqrt{L_i}}{S^{0.33}}$

$t_t = \frac{L_t}{60K\sqrt{S_t}} = \frac{L_t}{60V_t}$

Computed $t_c = t_i + t_t$

Regional $t_c = (26 - 17i) + \frac{L_t}{60(14i + 9)\sqrt{S_t}}$

$t_{minimum} = 5$ (urban)
$t_{minimum} = 10$ (non-urban)

Selected $t_c = \max\{t_{minimum}, \min(\text{Computed } t_c, \text{Regional } t_c)\}$

Select UDFCD location for NOAA Atlas 14 Rainfall Depths from the pulldown list OR enter your own depths obtained from the NOAA website (click this link)

	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr
1-hour rainfall depth, P1 (in) =	1.19	1.50	1.75	2.00	2.25	2.52	3.68
Rainfall Intensity Equation Coefficients =	a: 28.50	b: 10.00	c: 0.786	$I(in/hr) = \frac{a * P_1}{(b + t_c)^c}$			

$Q(cfs) = CIA$

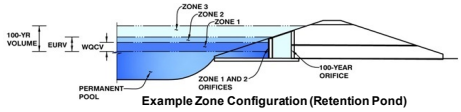
Subcatchment Name	Area (ac)	NRCS Hydrologic Soil Group	Percent Imperviousness	Runoff Coefficient, C							Overland (Initial) Flow Time					Channelized (Travel) Flow Time							Time of Concentration			Rainfall Intensity, I (in/hr)							Peak Flow, Q (cfs)						
				2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr	Overland Flow Length L_i (ft)	U/S Elevation (ft) (Optional)	D/S Elevation (ft) (Optional)	Overland Flow Slope S_i (ft/ft)	Overland Flow Time t_i (min)	Channelized Flow Length L_t (ft)	U/S Elevation (ft) (Optional)	D/S Elevation (ft) (Optional)	Channelized Flow Slope S_t (ft/ft)	NRCS Conveyance Factor K	Channelized Flow Velocity V_t (ft/sec)	Channelized Flow Time t_t (min)	Computed t_c (min)	Regional t_c (min)	Selected t_c (min)	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr
A1	1.03	A	52.7	0.36	0.38	0.40	0.43	0.48	0.52	0.59	251.00			0.030	14.33	207.00			0.015	15	1.84	1.88	16.21	18.76	16.21	2.60	3.28	3.83	4.38	4.92	5.51	8.05	0.98	1.29	1.56	1.94	2.41	2.96	4.92
A2	2.19	A	46.0	0.31	0.32	0.34	0.37	0.42	0.47	0.55	344.00			0.020	20.79	103.00			0.020	20	2.83	0.61	21.40	18.97	18.97	2.41	3.03	3.54	4.04	4.55	5.10	7.44	1.61	2.12	2.60	3.27	4.16	5.23	8.97
A3	2.07	A	30.5	0.18	0.19	0.20	0.23	0.29	0.35	0.45	52.00			0.020	9.43	585.00			0.020	20	2.83	3.45	12.88	26.01	12.88	2.90	3.65	4.26	4.87	5.48	6.13	8.96	1.07	1.43	1.78	2.34	3.24	4.41	8.36
A4	1.52	A	65.3	0.48	0.50	0.52	0.55	0.58	0.62	0.68	20.00			0.020	3.86	695.00			0.015	20	2.45	4.73	8.58	20.11	8.58	3.41	4.30	5.02	5.73	6.45	7.22	10.55	2.50	3.27	3.94	4.77	5.71	6.79	10.82
A5	0.62	A	85.3	0.68	0.70	0.72	0.74	0.75	0.77	0.80	18.00			0.010	3.04	133.00			0.020	20	2.83	0.78	3.83	12.25	5.00	4.04	5.09	5.94	6.78	7.63	8.55	12.48	1.71	2.22	2.64	3.11	3.57	4.10	6.22
A6	1.28	A	20.3	0.11	0.11	0.12	0.15	0.20	0.27	0.38	30.00			0.020	7.77	1139.00			0.015	20	2.45	7.75	15.52	35.64	15.52	2.66	3.35	3.91	4.47	5.03	5.63	8.22	0.36	0.48	0.61	0.84	1.28	1.93	4.05
A7	0.26	A	45.9	0.30	0.32	0.33	0.37	0.42	0.47	0.55	20.00			0.020	5.02	5.00			0.015	20	2.45	0.03	5.05	18.24	5.05	4.03	5.07	5.92	6.77	7.61	8.52	12.45	0.32	0.42	0.51	0.65	0.83	1.04	1.78
Existing Conditions																																							
EX1	4.96	A	20.0	0.10	0.11	0.12	0.14	0.20	0.27	0.38	130.00			0.020	16.21	445.00			0.030	15	2.60	2.85	19.06	26.23	19.06	2.40	3.03	3.53	4.03	4.54	5.08	7.42	1.23	1.66	2.10	2.90	4.41	6.70	14.10
EX2	2.05	A	20.0	0.10	0.11	0.12	0.14	0.20	0.27	0.38	191.00			0.020	19.64	1.00			0.020	15	2.12	0.01	19.65	22.61	19.65	2.36	2.98	3.47	3.97	4.47	5.00	7.31	0.50	0.67	0.86	1.18	1.79	2.73	5.74
EX3	1.97	A	20.0	0.10	0.11	0.12	0.14	0.20	0.27	0.38	300.00			0.200	11.51	146.00			0.020	15	2.12	1.15	12.66	24.06	12.66	2.92	3.68	4.29	4.90	5.52	6.18	9.02	0.59	0.80	1.02	1.40	2.13	3.24	6.81

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.07 (June 2025)

Project: Honor Charter Academy

Basin ID: School Pond



Example Zone Configuration (Retention Pond)

Watershed Information

Selected SCM Type =	**EDB**	
Watershed Area =	8.98	acres
Watershed Length =	884	ft
Watershed Length to Centroid =	442	ft
Watershed Slope =	0.020	ft/ft
Watershed Imperviousness =	33.98%	percent
Percentage Hydrologic Soil Group A =	100.0%	percent
Percentage Hydrologic Soil Group B =	0.0%	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) =	0.122	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	0.316	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	0.225	acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	0.307	acre-feet	1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	0.373	acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	0.524	acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	0.665	acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	0.853	acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 3.68 in.) =	1.643	acre-feet	3.68	inches
Approximate 2-yr Detention Volume =	0.200	acre-feet		
Approximate 5-yr Detention Volume =	0.265	acre-feet		
Approximate 10-yr Detention Volume =	0.330	acre-feet		
Approximate 25-yr Detention Volume =	0.413	acre-feet		
Approximate 50-yr Detention Volume =	0.473	acre-feet		
Approximate 100-yr Detention Volume =	0.564	acre-feet		

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	0.122	acre-feet
Zone 2 Volume (EURV - Zone 1) =	0.194	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	0.248	acre-feet
Total Detention Basin Volume =	0.564	acre-feet
Initial Surcharge Volume (ISV) =	user	ft^3
Initial Surcharge Depth (ISD) =	user	ft
Total Available Detention Depth (H_{total}) =	user	ft
Depth of Trickle Channel (H_{TC}) =	user	ft
Slope of Trickle Channel (S_{TC}) =	user	ft/ft
Slopes of Main Basin Sides (S_{main}) =	user	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	user	

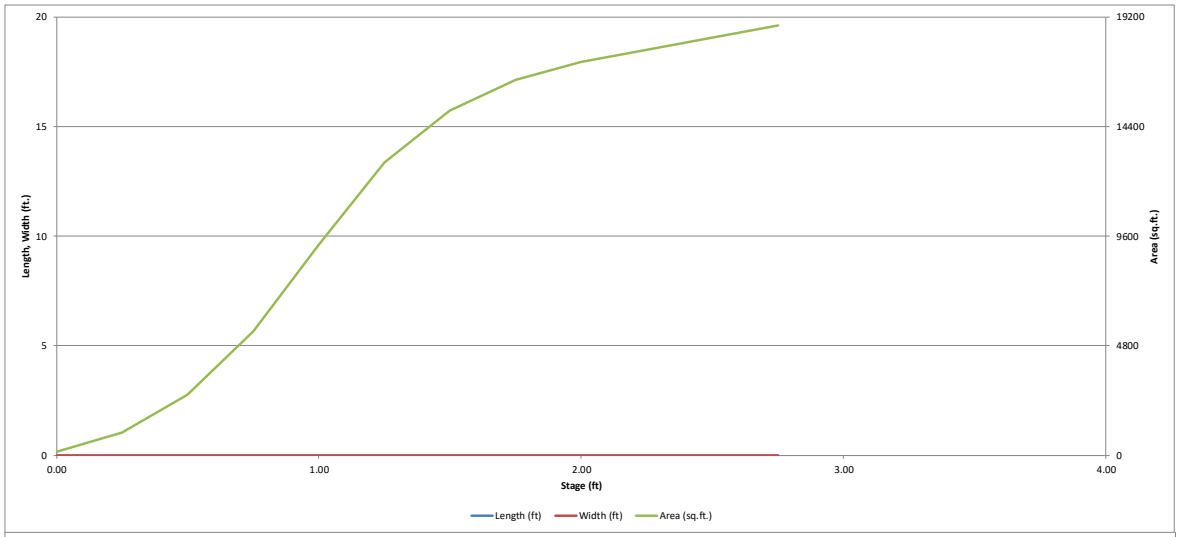
Initial Surcharge Area (A_{ISV}) =	user	ft^2
Surcharge Volume Length (L_{ISV}) =	user	ft
Surcharge Volume Width (W_{ISV}) =	user	ft
Depth of Basin Floor (H_{FLOOR}) =	user	ft
Length of Basin Floor (L_{FLOOR}) =	user	ft
Width of Basin Floor (W_{FLOOR}) =	user	ft
Area of Basin Floor (A_{FLOOR}) =	user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

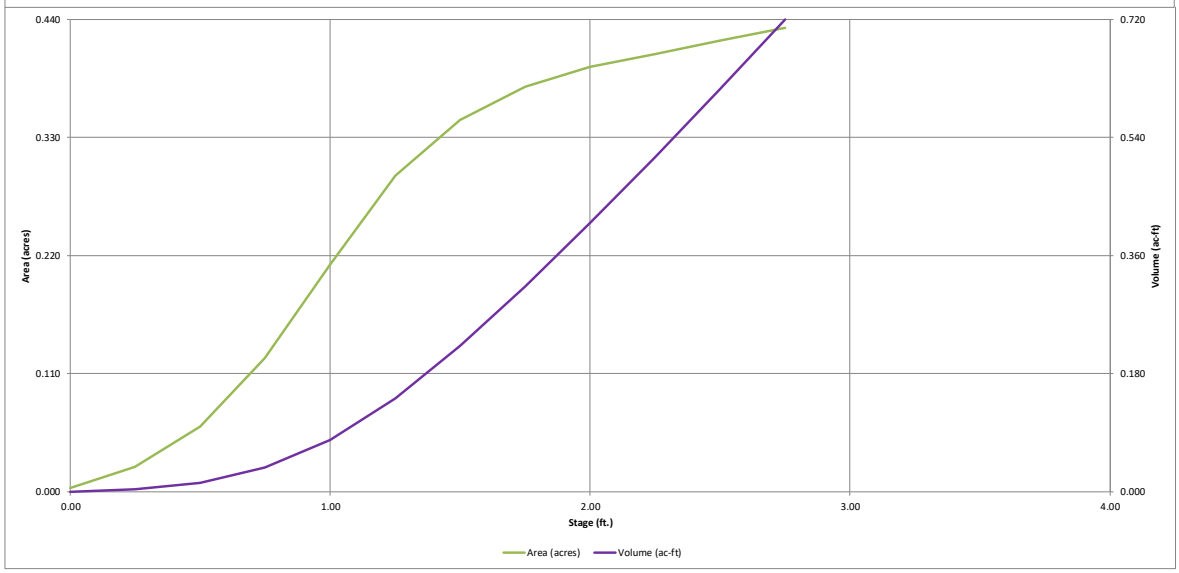
Depth Increment = 0.25 ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	--	0.00	--	--	--	159	0.004		
6954.25	--	0.25	--	--	--	1,003	0.023	145	0.003
6954.5	--	0.50	--	--	--	2,645	0.061	601	0.014
6954.75	--	0.75	--	--	--	5,426	0.125	1,610	0.037
6955	--	1.00	--	--	--	9,205	0.211	3,439	0.079
6955.25	--	1.25	--	--	--	12,820	0.294	6,192	0.142
6955.5	--	1.50	--	--	--	15,095	0.347	9,681	0.222
6955.75	--	1.75	--	--	--	16,446	0.378	13,624	0.313
6956	--	2.00	--	--	--	17,235	0.396	17,834	0.409
6956.25	--	2.25	--	--	--	17,767	0.408	22,209	0.510
6956.5	--	2.50	--	--	--	18,300	0.420	26,718	0.613
6956.75	--	2.75	--	--	--	18,839	0.432	31,360	0.720
6957	--	3.00	--	--	--	19,536	0.448		

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.07 (June 2025)



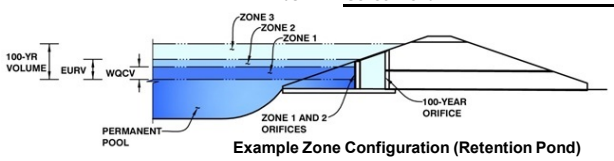


DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.07 (June 2025)

Project: **Honor Charter Academy**

Basin ID: **School Pond**



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	1.18	0.122	Orifice Plate
Zone 2 (EURV)	1.76	0.194	Orifice Plate
Zone 3 (100-year)	2.39	0.248	Weir&Pipe (Circular)
Total (all zones)		0.564	

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

			Calculated Parameters for Underdrain		
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

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

			Calculated Parameters for Plate		
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 =	1.76	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

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	0.59	1.17					
Orifice Area (sq. inches)	0.75	1.25	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		Calculated Parameters for Vertical Orifice	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				

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		Calculated Parameters for Overflow Weir	Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	2.20	N/A	ft (relative to basin bottom at Stage = 0 ft)	Height of Grate Upper Edge, H_t =	2.20	N/A	feet
Overflow Weir Front Edge Length =	6.00	N/A	feet	Overflow Weir Slope Length =	6.00	N/A	feet
Overflow Weir Grate Slope =	0.00	N/A	H:V	Grate Open Area / 100-yr Orifice Area =	16.11	N/A	
Horiz. Length of Weir Sides =	6.00	N/A	feet	Overflow Grate Open Area w/o Debris =	28.48	N/A	ft²
Overflow Grate Type =	Close Mesh Grate	N/A		Overflow Grate Open Area w/ Debris =	14.24	N/A	ft²
Debris Clogging % =	50%	N/A	%				

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

	Zone 3 Circular	Not Selected		Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate	Zone 3 Circular	Not Selected	
Depth to Invert of Outlet Pipe =	0.00	N/A	ft (distance below basin bottom at Stage = 0 ft)	Outlet Orifice Area =	1.77	N/A	ft²
Circular Orifice Diameter =	18.00	N/A	inches	Outlet Orifice Centroid =	0.75	N/A	feet
				Half-Central Angle of Restrictor Plate on Pipe =	N/A	N/A	radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

			Calculated Parameters for Spillway	
Spillway Invert Stage=		ft (relative to basin bottom at Stage = 0 ft)	Spillway Design Flow Depth=	feet
Spillway Crest Length =		feet	Stage at Top of Freeboard =	feet
Spillway End Slopes =		H:V	Basin Area at Top of Freeboard =	acres
Freeboard above Max Water Surface =		feet	Basin Volume at Top of Freeboard =	acre-ft

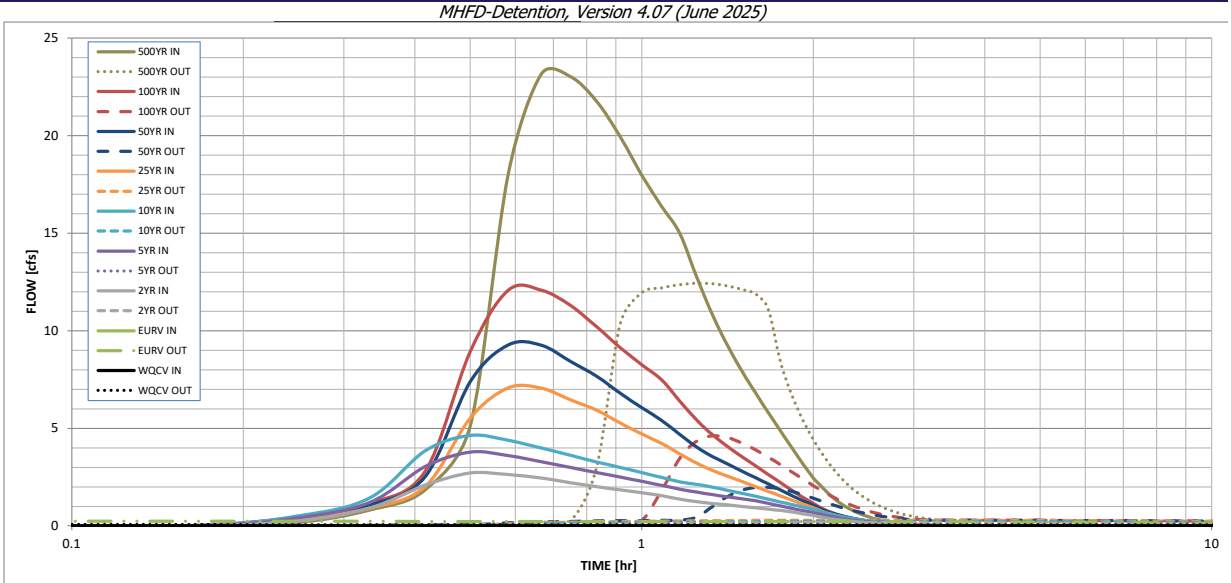
Routed Hydrograph Results

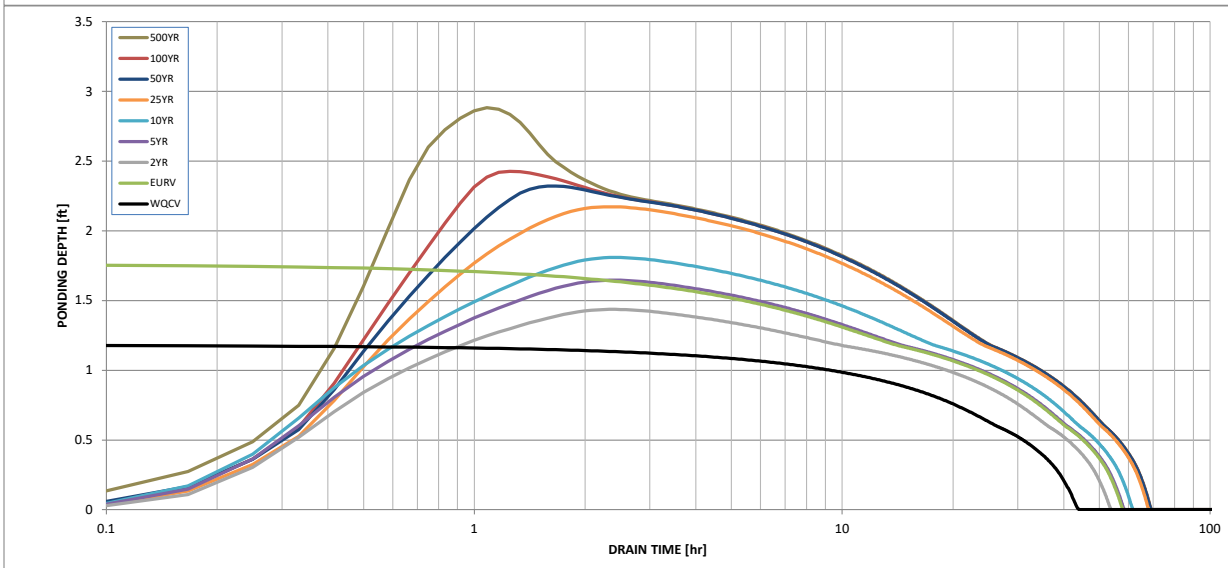
The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

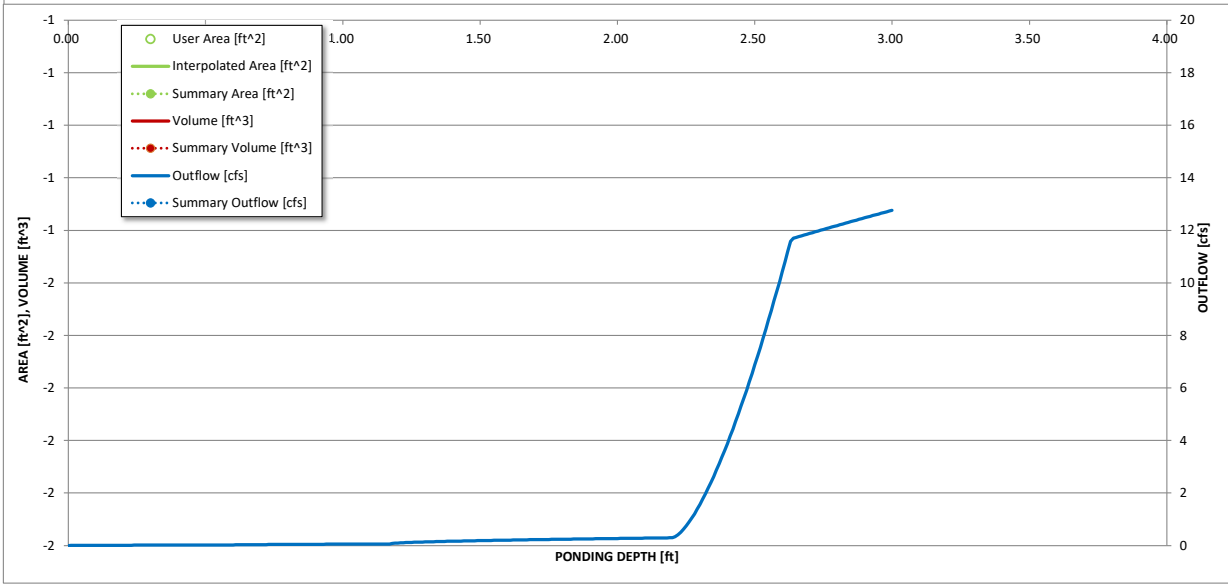
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	N/A	N/A	1.19	1.50	1.75	2.00	2.25	2.52	3.68
CUHP Runoff Volume (acre-ft) =	0.122	0.316	0.225	0.307	0.373	0.524	0.665	0.853	1.643
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	0.225	0.307	0.373	0.524	0.665	0.853	1.643
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	0.2	0.3	0.5	2.0	3.7	5.9	14.4
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A						12.7	
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.02	0.04	0.05	0.23	0.42	1.41	1.60
Peak Inflow Q (cfs) =	N/A	N/A	2.7	3.8	4.6	7.1	9.3	12.1	23.1
Peak Outflow Q (cfs) =	0.1	0.2	0.2	0.2	0.2	0.3	2.0	4.6	12.4
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.6	0.5	0.1	0.5	0.4	0.9
Structure Controlling Flow =	Plate	Plate	Plate	Plate	Plate	Plate	Overflow Weir 1	Overflow Weir 1	Outlet Plate 1
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	0.1	0.2	0.4
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) =	39	48	46	49	51	54	52	50	42
Time to Drain 99% of Inflow Volume (hours) =	**42**	54	50	54	57	62	62	60	55
Maximum Ponding Depth (ft) =	1.18	1.76	1.44	1.65	1.81	2.17	2.32	2.43	2.88
Area at Maximum Ponding Depth (acres) =	0.27	0.38	0.33	0.36	0.38	0.40	0.41	0.42	0.00
Maximum Volume Stored (acre-ft) =	0.122	0.317	0.199	0.272	0.332	0.477	0.539	0.580	#VALUE!

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.07 (June 2025)







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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:05:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:10:00	0	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.18
	0:15:00	0	0.00	0.25	0.41	0.51	0.35	0.44	0.43	0.81
	0:20:00	0	0.00	0.91	1.20	1.43	0.91	1.07	1.15	1.85
	0:25:00	0	0.00	2.08	3.04	3.84	2.01	2.51	2.79	5.13
	0:30:00	0	0.00	2.71	3.78	4.64	5.53	7.38	8.94	18.05
	0:35:00	0	0.00	2.63	3.60	4.38	7.07	9.27	12.08	23.15
	0:40:00	0	0.00	2.45	3.29	3.98	7.05	9.26	12.08	23.02
	0:45:00	0	0.00	2.21	2.99	3.61	6.46	8.42	11.29	21.76
	0:50:00	0	0.00	2.01	2.73	3.27	5.93	7.67	10.20	19.94
	0:55:00	0	0.00	1.84	2.50	3.00	5.27	6.79	9.13	17.97
	1:00:00	0	0.00	1.69	2.28	2.73	4.71	6.05	8.26	16.38
	1:05:00	0	0.00	1.54	2.07	2.48	4.22	5.41	7.48	14.97
	1:10:00	0	0.00	1.37	1.88	2.25	3.69	4.68	6.39	12.71
	1:15:00	0	0.00	1.24	1.72	2.12	3.20	4.02	5.41	10.75
	1:20:00	0	0.00	1.15	1.60	1.98	2.83	3.54	4.64	9.19
	1:25:00	0	0.00	1.07	1.49	1.82	2.54	3.16	4.05	7.91
	1:30:00	0	0.00	1.00	1.38	1.66	2.26	2.80	3.54	6.81
	1:35:00	0	0.00	0.93	1.29	1.51	2.01	2.47	3.08	5.81
	1:40:00	0	0.00	0.86	1.15	1.37	1.77	2.15	2.64	4.88
	1:45:00	0	0.00	0.79	1.02	1.23	1.54	1.85	2.22	4.00
	1:50:00	0	0.00	0.72	0.90	1.10	1.32	1.56	1.82	3.19
	1:55:00	0	0.00	0.61	0.78	0.97	1.11	1.29	1.46	2.46
	2:00:00	0	0.00	0.53	0.69	0.85	0.93	1.05	1.15	1.91
	2:05:00	0	0.00	0.43	0.56	0.70	0.72	0.81	0.86	1.44
	2:10:00	0	0.00	0.35	0.46	0.57	0.56	0.63	0.66	1.08
	2:15:00	0	0.00	0.29	0.38	0.47	0.45	0.50	0.51	0.82
	2:20:00	0	0.00	0.23	0.31	0.38	0.36	0.40	0.40	0.62
	2:25:00	0	0.00	0.19	0.25	0.31	0.29	0.32	0.31	0.46
	2:30:00	0	0.00	0.15	0.20	0.25	0.23	0.25	0.24	0.34
	2:35:00	0	0.00	0.12	0.16	0.20	0.18	0.20	0.18	0.26
	2:40:00	0	0.00	0.10	0.13	0.15	0.14	0.15	0.14	0.20
	2:45:00	0	0.00	0.08	0.10	0.12	0.11	0.12	0.11	0.15
	2:50:00	0	0.00	0.06	0.08	0.10	0.09	0.09	0.09	0.12
	2:55:00	0	0.00	0.05	0.06	0.07	0.07	0.07	0.07	0.09
	3:00:00	0	0.00	0.04	0.05	0.06	0.05	0.05	0.05	0.07
	3:05:00	0	0.00	0.03	0.03	0.04	0.04	0.04	0.04	0.05
	3:10:00	0	0.00	0.02	0.02	0.03	0.02	0.03	0.02	0.03
	3:15:00	0	0.00	0.01	0.01	0.02	0.02	0.02	0.01	0.02
	3:20:00	0	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	3:25:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:30:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:35:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:40:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:45:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:50:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:55:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:00:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:05:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:10:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:15:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:20:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:25:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:30:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:35:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:40:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:45:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:50:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:55:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:00:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:05:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:10:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:15:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:20:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:25:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:30:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:35:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:40:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:45:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:50:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:55:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:00:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.07 (June 2025)

Summary Stage-Area-Volume-Discharge Relationships

The user can create a summary S-A-V-D by entering the desired stage increments and the remainder of the table will populate automatically.

The user should graphically compare the summary S-A-V-D table to the full S-A-V-D table in the chart to confirm it captures all key transition points.

Stage - Storage Description	Stage [ft]	Elevation [ft]	Area [ft^2]	Area [acres]	Volume [ft^3]	Volume [ac-ft]	Total Outflow [cfs]

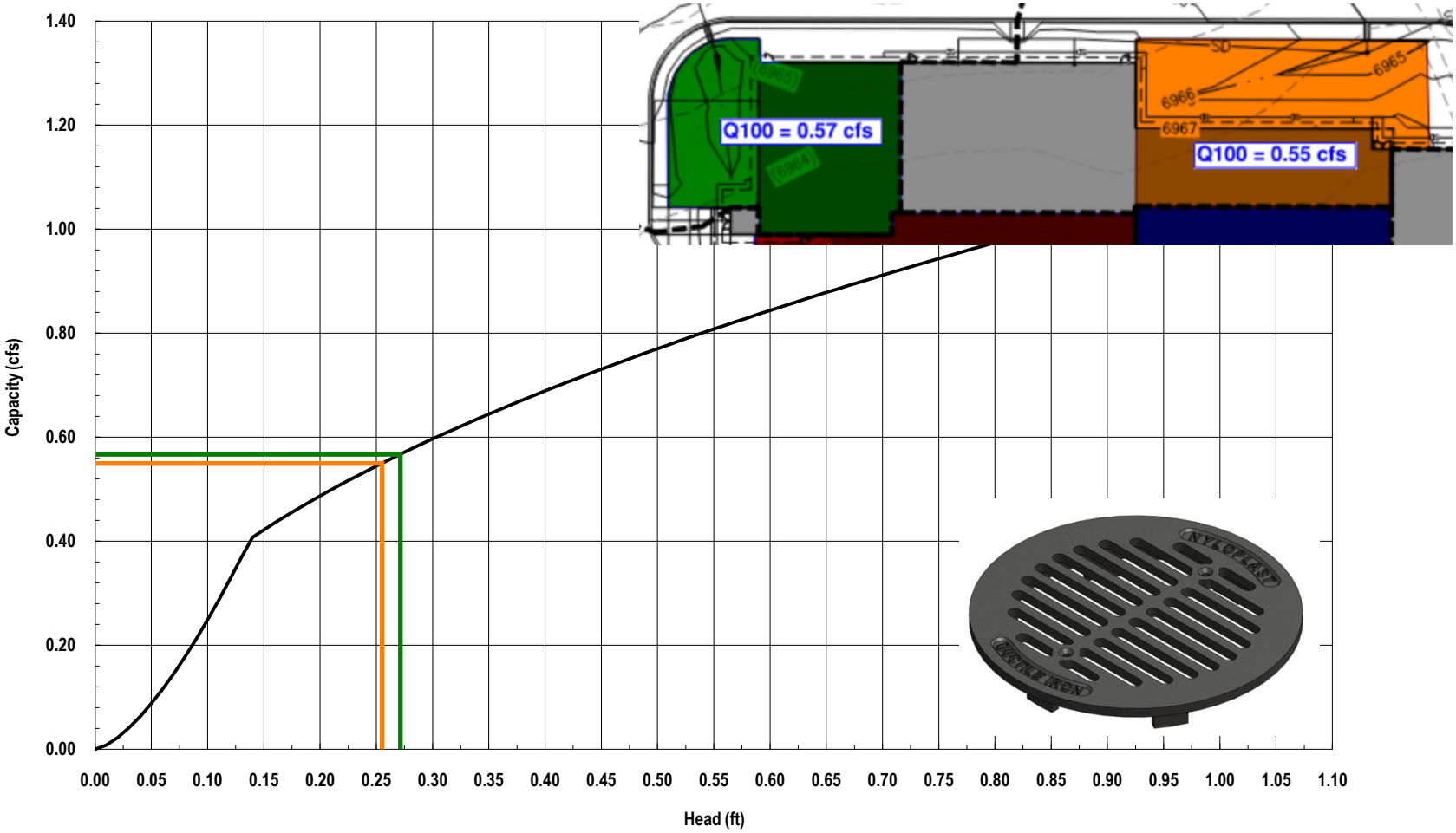
For best results, include the stages of all grade slope changes (e.g. ISV and Floor) from the S-A-V table on Sheet 'Basin'.

Also include the inverts of all outlets (e.g. vertical orifice, overflow grate, and spillway, where applicable).

APPENDIX E

HYDRAULIC COMPUTATIONS

Nyloplast 10" Drop In Grate Inlet Capacity Chart



NW INLET
Qreq = 0.57 CFS --> 0.275 FT
NE INLET
Qreq = 0.55 CFS --> 0.26 FT

Nyloplast®
3130 Verona Avenue • Buford, GA 30518
(866) 888-8479 / (770) 932-2443 • Fax: (770) 932-2490

Nyloplast 15" Drop In Grate Inlet Capacity Chart

SW INLET
Qreq = 1.36 CFS --> 0.44 FT
SE INLET
Qreq = 1.20 CFS --> 0.34 FT

Nyloplast®
3130 Verona Avenue • Buford, GA 30518
(866) 888-8479 / (770) 932-2443 • Fax: (770) 932-2490

MHFD-Inlet, Version 6.00 (August 2025)

INLET MANAGEMENT

Project: Honor Charter School
Minor: 10-year
Major: 100-year

Worksheet Protected

INLET NAME	Inlet S1	Inlet S2	Inlet S4	Inlet S5	Inlet S7	Inlet S8
Inlet Application (Street or Area)	STREET	STREET	STREET	STREET	STREET	STREET
Hydraulic Condition	In Sump	In Sump	In Sump	In Sump	In Sump	In Sump
Inlet Type	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening
Number of Inlet Units	1	1	1	1	1	1

USER-DEFINED INPUT

User-Defined Peak Flows

Minor Peak Flow, Q (cfs)	1.28	2.16	0.99	2.02	1.01	0.99
Major Peak Flow, Q (cfs)	2.39	4.45	1.46	3.07	1.54	1.50

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:						
Bypass Flow Description (Optional):						
Minor Bypass Flow Received, Q_b (cfs)						
Major Bypass Flow Received, Q_b (cfs)						

CALCULATED OUTPUT

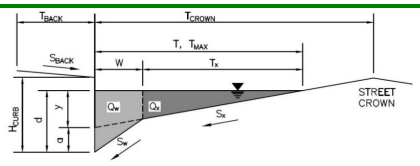
Minor Total Design Peak Flow, Q (cfs)	1.28	2.16	0.99	2.02	1.01	0.99
Major Total Design Peak Flow, Q (cfs)	2.39	4.45	1.46	3.07	1.54	1.50
Minor Inlet Interception Capacity, Q_a (cfs)	5.38	5.38	5.38	5.38	5.38	5.38
Major Inlet Interception Capacity, Q_a (cfs)	5.38	5.38	5.38	5.38	5.38	5.38
Minor Flow Bypassed Downstream, Qb (cfs)	N/A	N/A	N/A	N/A	N/A	N/A
Major Flow Bypassed Downstream, Qb (cfs)	N/A	N/A	N/A	N/A	N/A	N/A
Minor Flow Capture Percentage, C%	100%	100%	100%	100%	100%	100%
Major Flow Capture Percentage, C%	100%	100%	100%	100%	100%	100%

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

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

Project: **Honor Charter School**

Inlet ID: **Inlet S1**



Gutter Geometry:

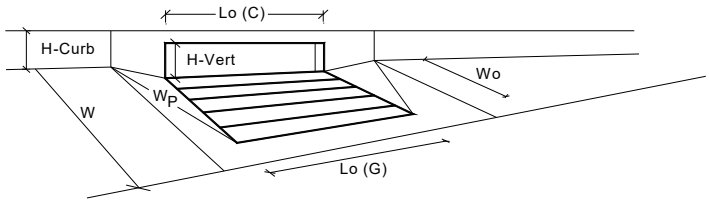
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	5.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.016	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	30.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.046	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	30.0	30.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	6.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 6.00 (August 2025)



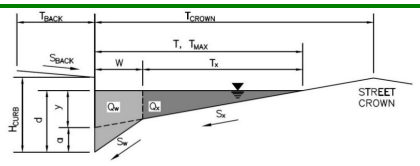
Design Information (Input)		MINOR	MAJOR	
Type of Inlet (CDOT Type R Curb Opening)	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	6.0	6.0	inches
Grate Information		MINOR	MAJOR	Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.33	0.33	ft
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**5.4**	**5.4**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)	$Q_{PEAK\ REQUIRED}$ =	1.3	2.4	cfs

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

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

Project: **Honor Charter School**

Inlet ID: **Inlet S2**



Gutter Geometry:

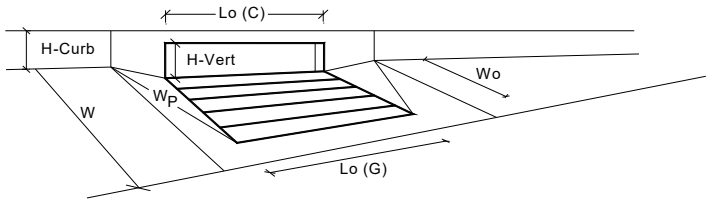
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	5.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.012	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	30.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.041	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	30.0	30.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	6.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 6.00 (August 2025)



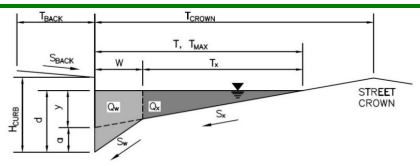
Design Information (Input)		MINOR	MAJOR	
Type of Inlet (CDOT Type R Curb Opening)	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	6.0	6.0	inches
Grate Information		MINOR	MAJOR	☐ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.33	0.33	ft
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**5.4**	**5.4**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)	$Q_{PEAK\ REQUIRED}$ =	2.2	4.5	cfs

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

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

Project: **Honor Charter School**

Inlet ID: **Inlet S4**



Gutter Geometry:

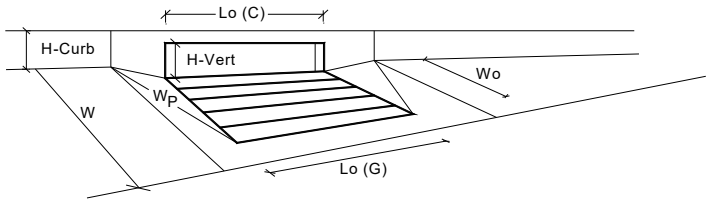
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	5.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.012	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	30.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	30.0	30.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	6.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 6.00 (August 2025)



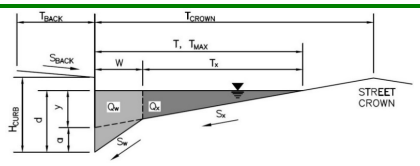
Design Information (Input)		MINOR	MAJOR	
Type of Inlet (CDOT Type R Curb Opening)	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	6.0	6.0	inches
Grate Information		MINOR	MAJOR	☐ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.33	0.33	ft
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**5.4**	**5.4**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)	$Q_{PEAK\ REQUIRED}$ =	1.0	1.5	cfs

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

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

Project: **Honor Charter School**

Inlet ID: **Inlet S5**



Gutter Geometry:

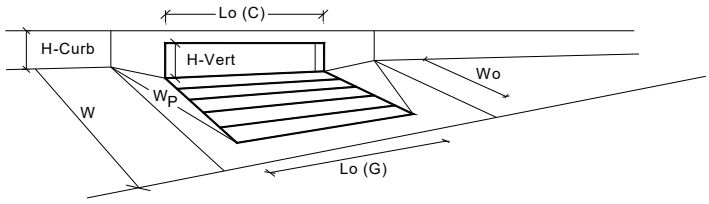
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	5.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.012	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	30.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.036	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	30.0	30.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	6.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 6.00 (August 2025)



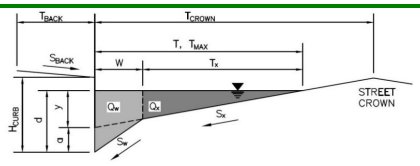
Design Information (Input)		MINOR	MAJOR	
Type of Inlet (CDOT Type R Curb Opening)	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	6.0	6.0	inches
Grate Information		MINOR	MAJOR	☐ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.33	0.33	ft
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**5.4**	**5.4**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)	$Q_{PEAK\ REQUIRED}$ =	2.0	3.1	cfs

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

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

Project: **Honor Charter School**

Inlet ID: **Inlet S7**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	5.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.012	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	30.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	30.0	30.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	6.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

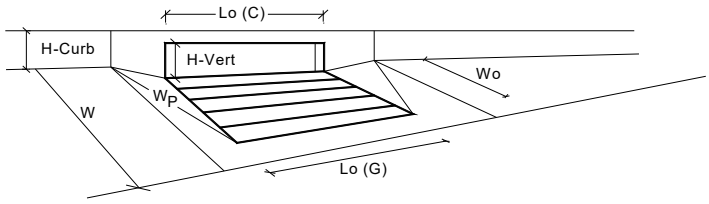
MINOR STORM Allowable Capacity is not applicable to Sump Condition

MAJOR STORM Allowable Capacity is not applicable to Sump Condition

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

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 6.00 (August 2025)



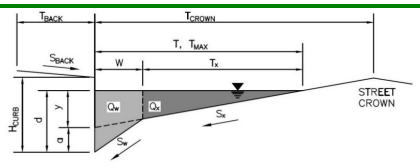
Design Information (Input)		MINOR	MAJOR	
Type of Inlet (CDOT Type R Curb Opening)	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	6.0	6.0	inches
Grate Information		MINOR	MAJOR	☐ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.33	0.33	ft
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**5.4**	**5.4**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)	$Q_{PEAK\ REQUIRED}$ =	1.0	1.5	cfs

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

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

Project: **Honor Charter School**

Inlet ID: **Inlet S8**



Gutter Geometry:

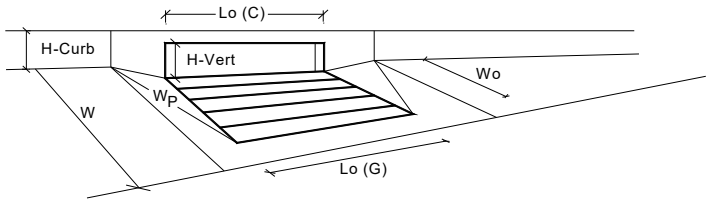
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	5.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.012	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	30.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.030	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	30.0	30.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	6.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 6.00 (August 2025)



Design Information (Input)		MINOR	MAJOR	
Type of Inlet (CDOT Type R Curb Opening)	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	6.0	6.0	inches
Grate Information		MINOR	MAJOR	☐ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.33	0.33	ft
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**5.4**	**5.4**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)	$Q_{PEAK\ REQUIRED}$ =	1.0	1.5	cfs

Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Apr 29 2026

A1-01

Circular

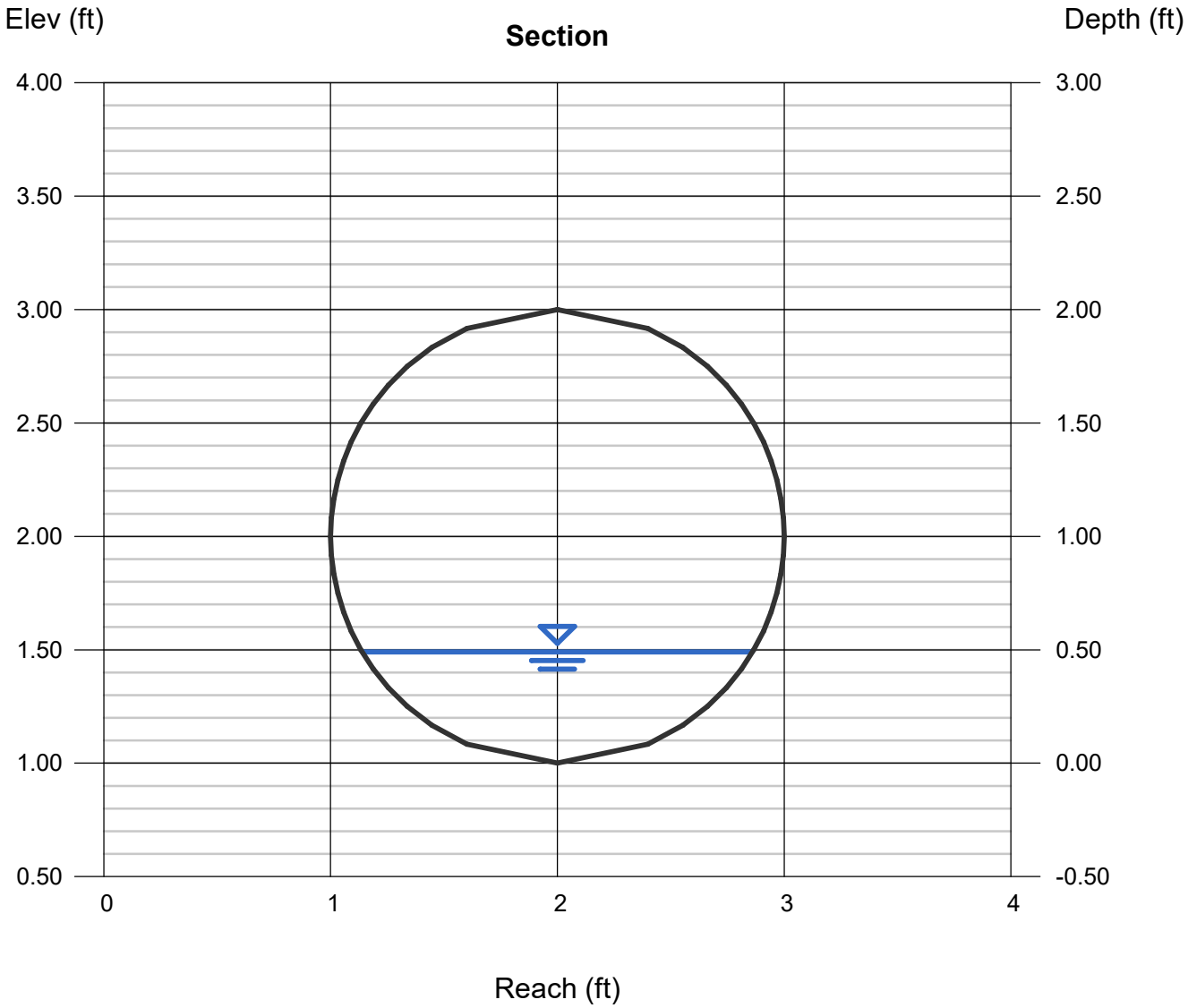
Diameter (ft)	= 2.00
Invert Elev (ft)	= 1.00
Slope (%)	= 1.00
N-Value	= 0.013

Calculations

Compute by:	Known Q
Known Q (cfs)	= 2.96

Highlighted

Depth (ft)	= 0.49
Q (cfs)	= 2.960
Area (sqft)	= 0.60
Velocity (ft/s)	= 4.91
Wetted Perim (ft)	= 2.08
Crit Depth, Yc (ft)	= 0.60
Top Width (ft)	= 1.72
EGL (ft)	= 0.86



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Apr 29 2026

A2-01

Circular

Diameter (ft)	= 2.00
Invert Elev (ft)	= 1.00
Slope (%)	= 1.00
N-Value	= 0.013

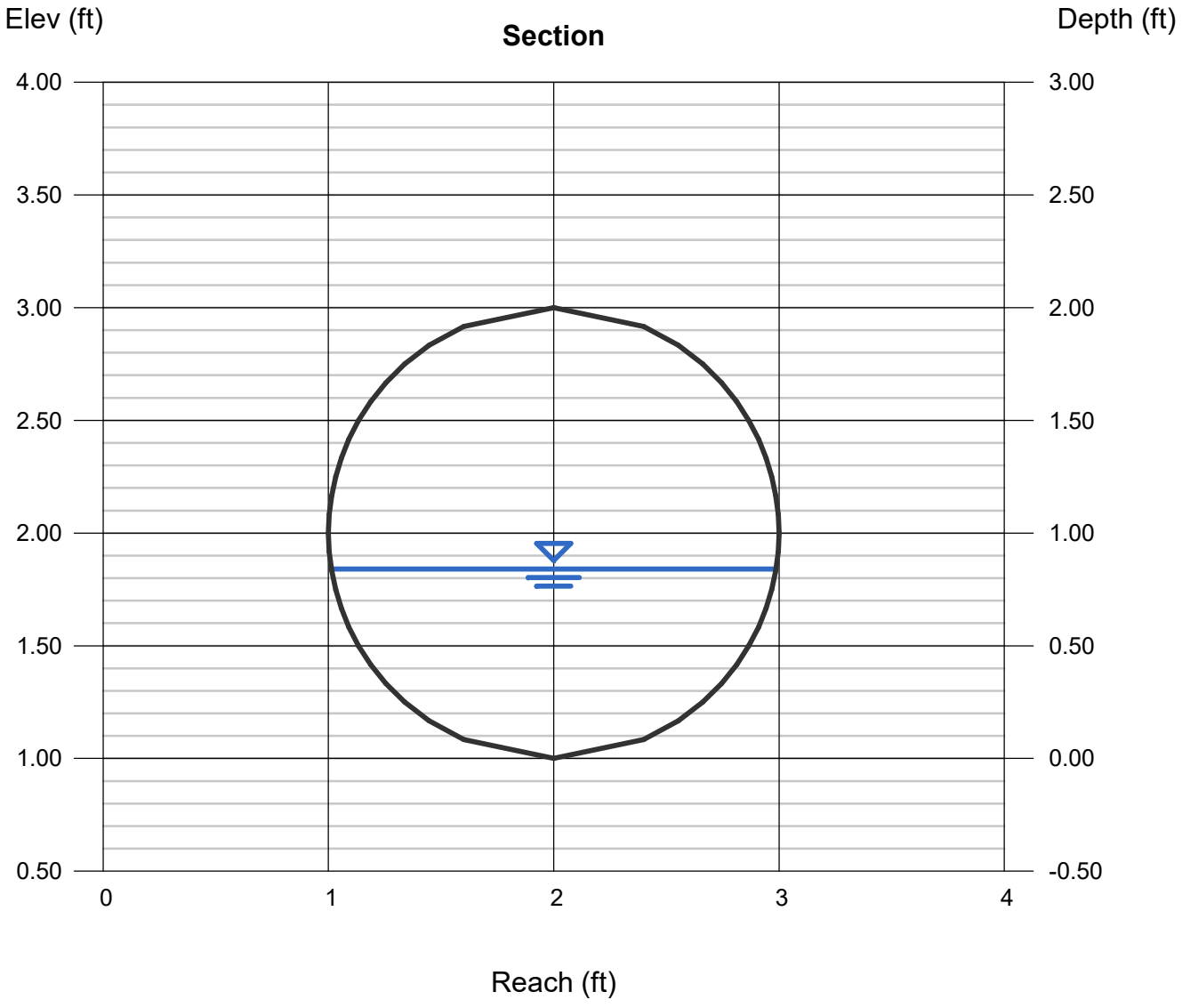
Calculations

Compute by:	Known Q
Known Q (cfs)	= 8.19

Basin A1 (2.96) +
Basin A2 (5.23)

Highlighted

Depth (ft)	= 0.84
Q (cfs)	= 8.190
Area (sqft)	= 1.26
Velocity (ft/s)	= 6.49
Wetted Perim (ft)	= 2.83
Crit Depth, Yc (ft)	= 1.02
Top Width (ft)	= 1.98
EGL (ft)	= 1.50



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Apr 29 2026

A4-01

Circular

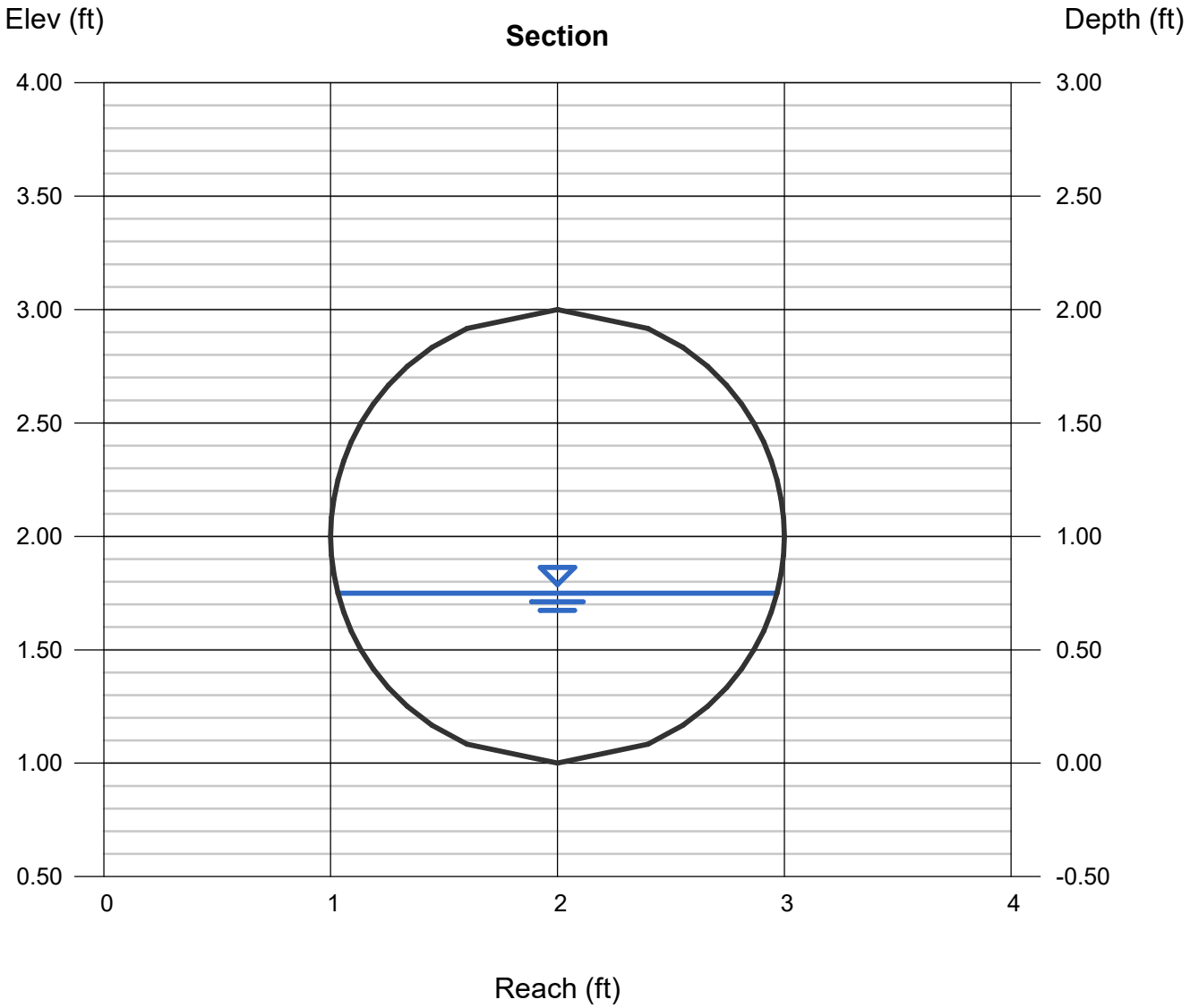
Diameter (ft)	= 2.00
Invert Elev (ft)	= 1.00
Slope (%)	= 1.00
N-Value	= 0.013

Calculations

Compute by:	Known Q
Known Q (cfs)	= 6.79

Highlighted

Depth (ft)	= 0.75
Q (cfs)	= 6.790
Area (sqft)	= 1.08
Velocity (ft/s)	= 6.29
Wetted Perim (ft)	= 2.64
Crit Depth, Yc (ft)	= 0.92
Top Width (ft)	= 1.94
EGL (ft)	= 1.37



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Apr 29 2026

A5-01

Circular

Diameter (ft)	= 2.00
Invert Elev (ft)	= 1.00
Slope (%)	= 1.00
N-Value	= 0.013

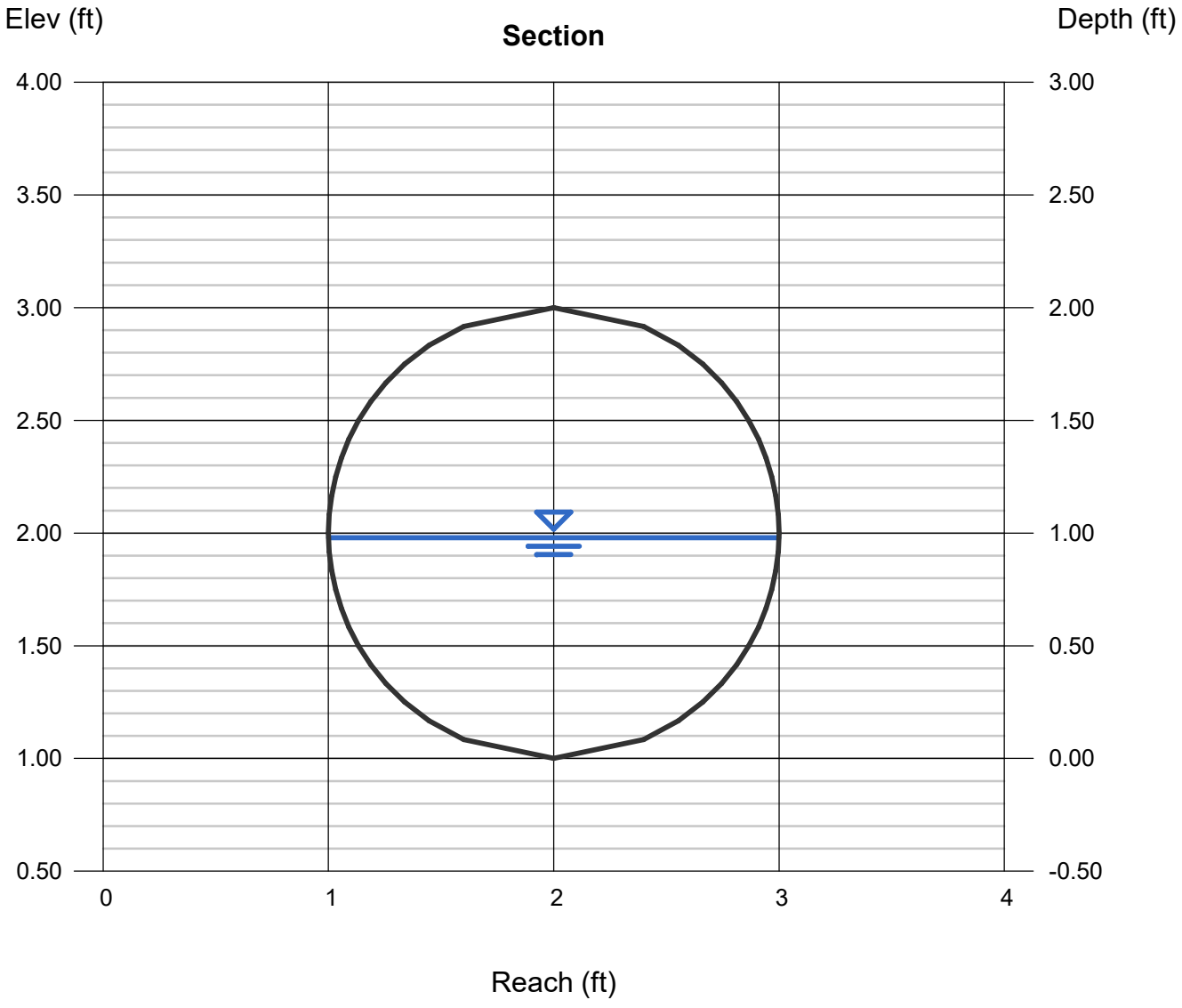
Calculations

Compute by:	Known Q
Known Q (cfs)	= 10.89

Highlighted

Depth (ft)	= 0.98
Q (cfs)	= 10.89
Area (sqft)	= 1.54
Velocity (ft/s)	= 7.08
Wetted Perim (ft)	= 3.11
Crit Depth, Yc (ft)	= 1.19
Top Width (ft)	= 2.00
EGL (ft)	= 1.76

Basin A4 (6.79) +
Basin A5 (4.10)



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Apr 29 2026

A6-01

Circular

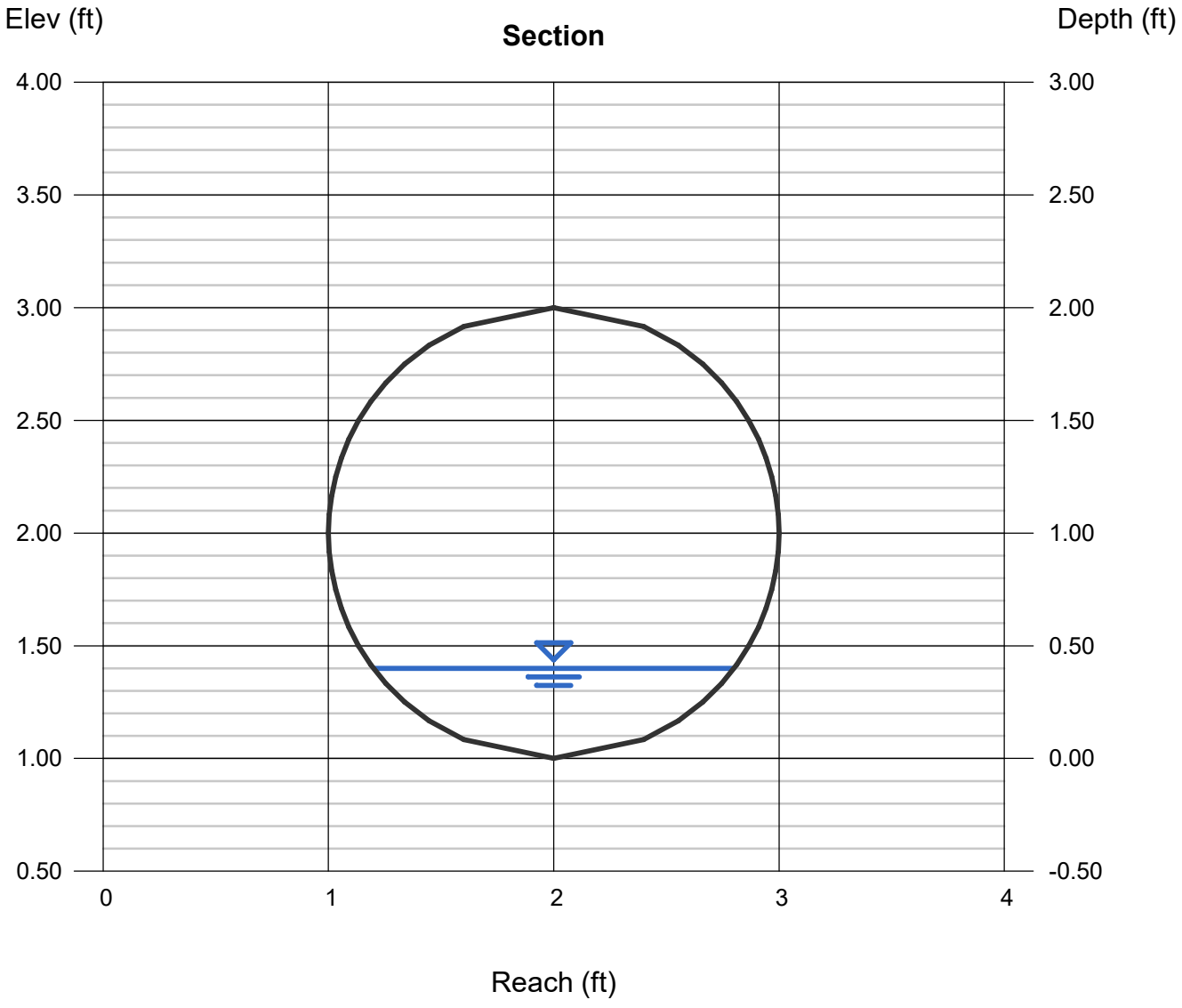
Diameter (ft)	= 2.00
Invert Elev (ft)	= 1.00
Slope (%)	= 1.00
N-Value	= 0.013

Calculations

Compute by:	Known Q
Known Q (cfs)	= 1.93

Highlighted

Depth (ft)	= 0.40
Q (cfs)	= 1.930
Area (sqft)	= 0.45
Velocity (ft/s)	= 4.28
Wetted Perim (ft)	= 1.86
Crit Depth, Yc (ft)	= 0.49
Top Width (ft)	= 1.60
EGL (ft)	= 0.69



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Apr 29 2026

Outflow Pipe 100 Year Flow

Circular

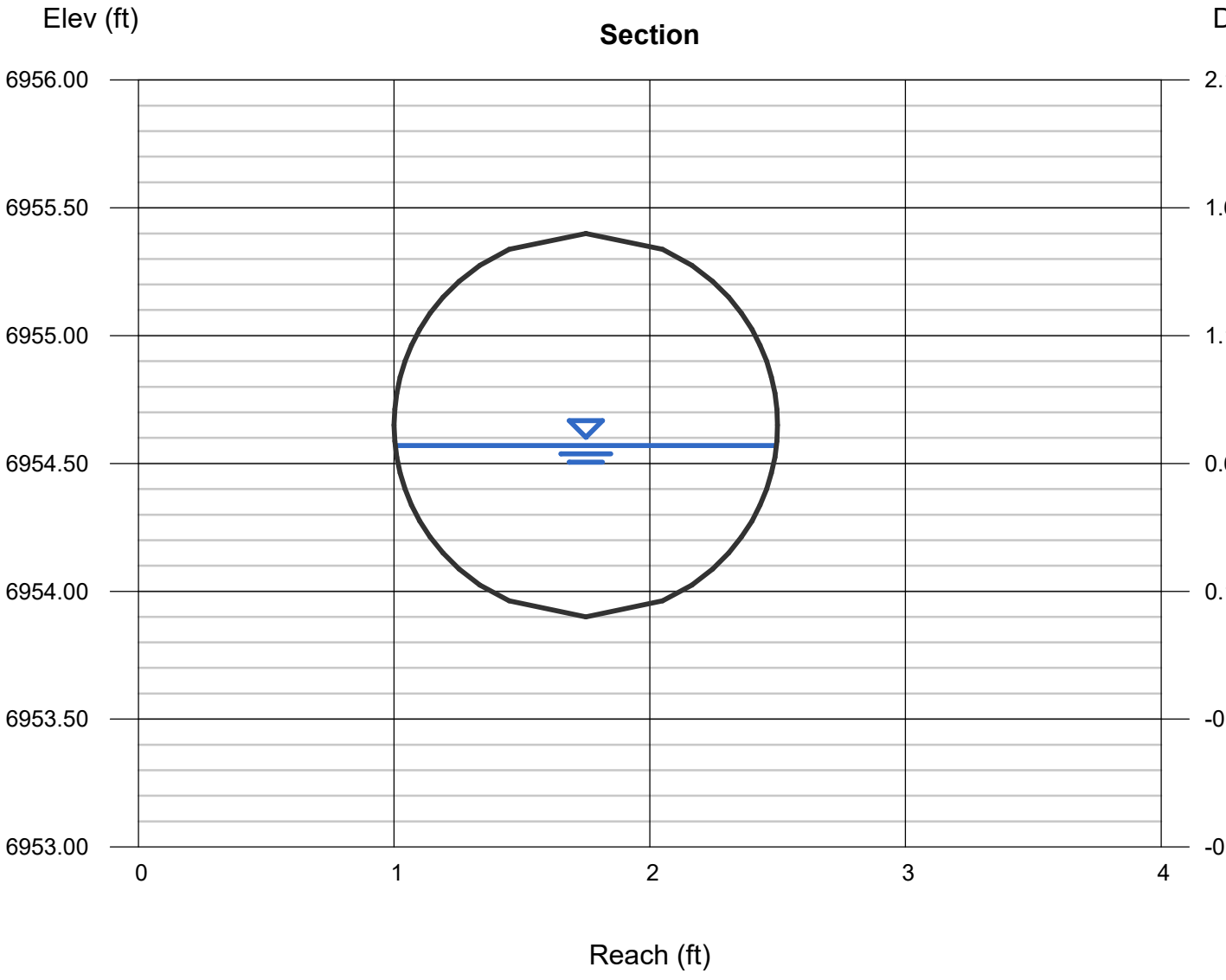
Diameter (ft)	= 1.50
Invert Elev (ft)	= 6953.90
Slope (%)	= 1.00
N-Value	= 0.012

Calculations

Compute by:	Known Q
Known Q (cfs)	= 4.60

Highlighted

Depth (ft)	= 0.67
Q (cfs)	= 4.600
Area (sqft)	= 0.76
Velocity (ft/s)	= 6.01
Wetted Perim (ft)	= 2.20
Crit Depth, Yc (ft)	= 0.83
Top Width (ft)	= 1.49
EGL (ft)	= 1.23



Weir Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Apr 29 2026

100-year Emergency Overflow Detention Pond

Trapezoidal Weir

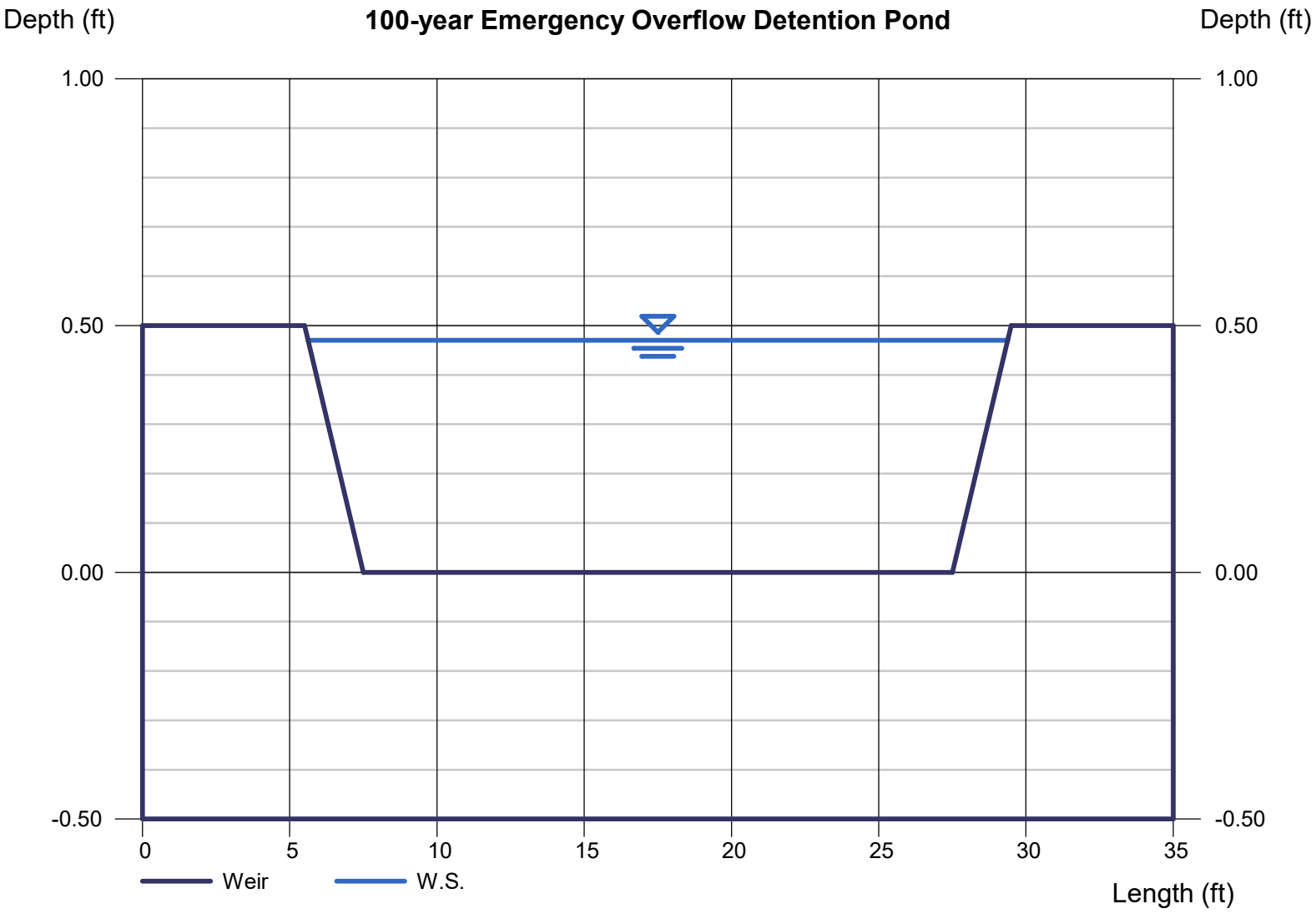
Crest	= Sharp
Bottom Length (ft)	= 20.00
Total Depth (ft)	= 0.50
Side Slope (z:1)	= 4.00

Calculations

Weir Coeff. Cw	= 3.10
Compute by:	Known Q
Known Q (cfs)	= 21.11

Highlighted

Depth (ft)	= 0.47
Q (cfs)	= 21.11
Area (sqft)	= 10.28
Velocity (ft/s)	= 2.05
Top Width (ft)	= 23.76



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, Apr 28 2026

Channel 100 Year Flow

Trapezoidal

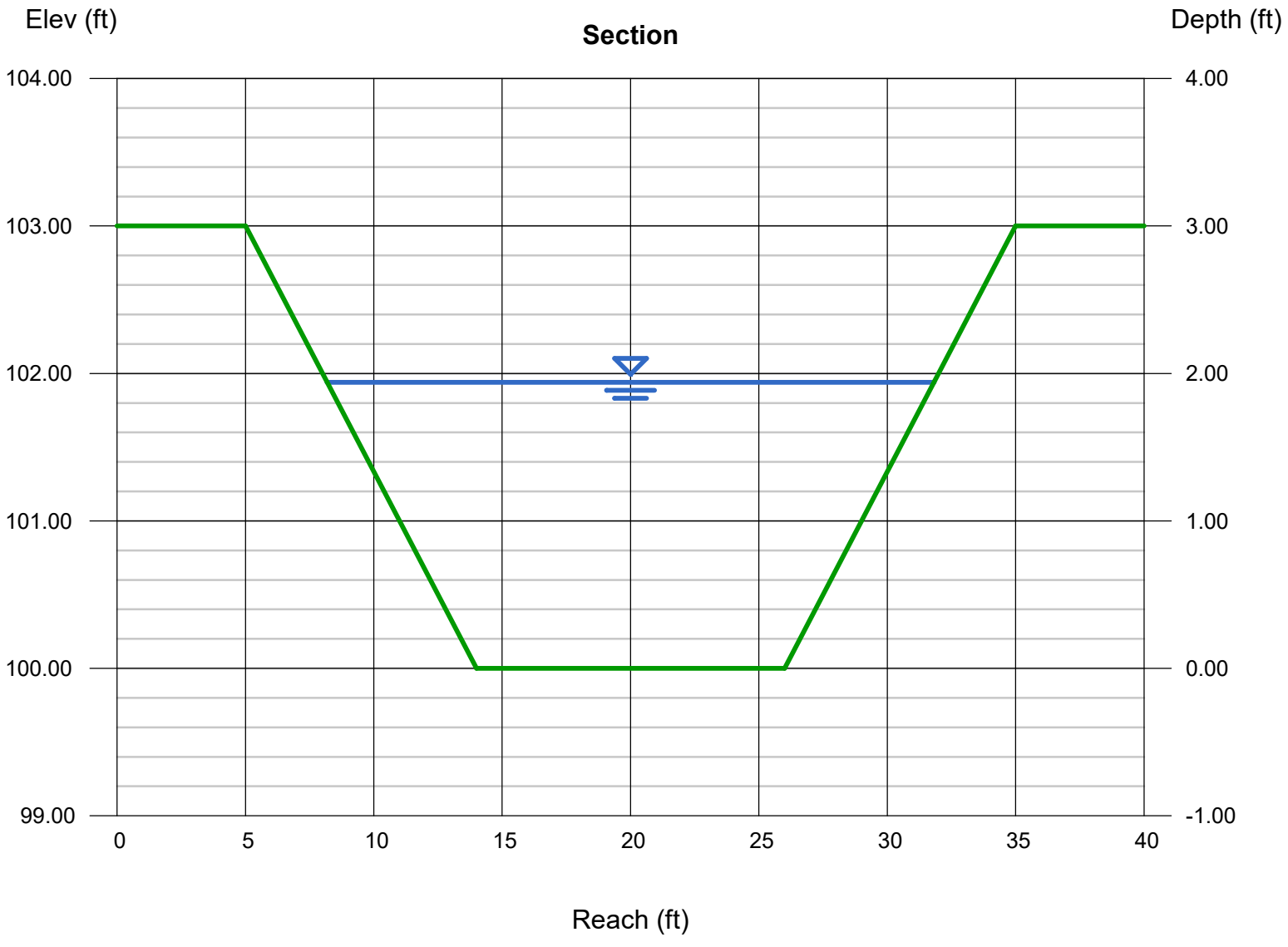
Bottom Width (ft)	= 12.00
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 3.00
Invert Elev (ft)	= 100.00
Slope (%)	= 0.80
N-Value	= 0.080

Calculations

Compute by:	Known Q
Known Q (cfs)	= 72.50

Highlighted

Depth (ft)	= 1.94
Q (cfs)	= 72.50
Area (sqft)	= 34.57
Velocity (ft/s)	= 2.10
Wetted Perim (ft)	= 24.27
Crit Depth, Yc (ft)	= 0.96
Top Width (ft)	= 23.64
EGL (ft)	= 2.01



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Apr 29 2026

100 Year Offsite Emergency Overflow

User-defined

Invert Elev (ft)	= 55.62
Slope (%)	= 1.50
N-Value	= 0.012

Calculations

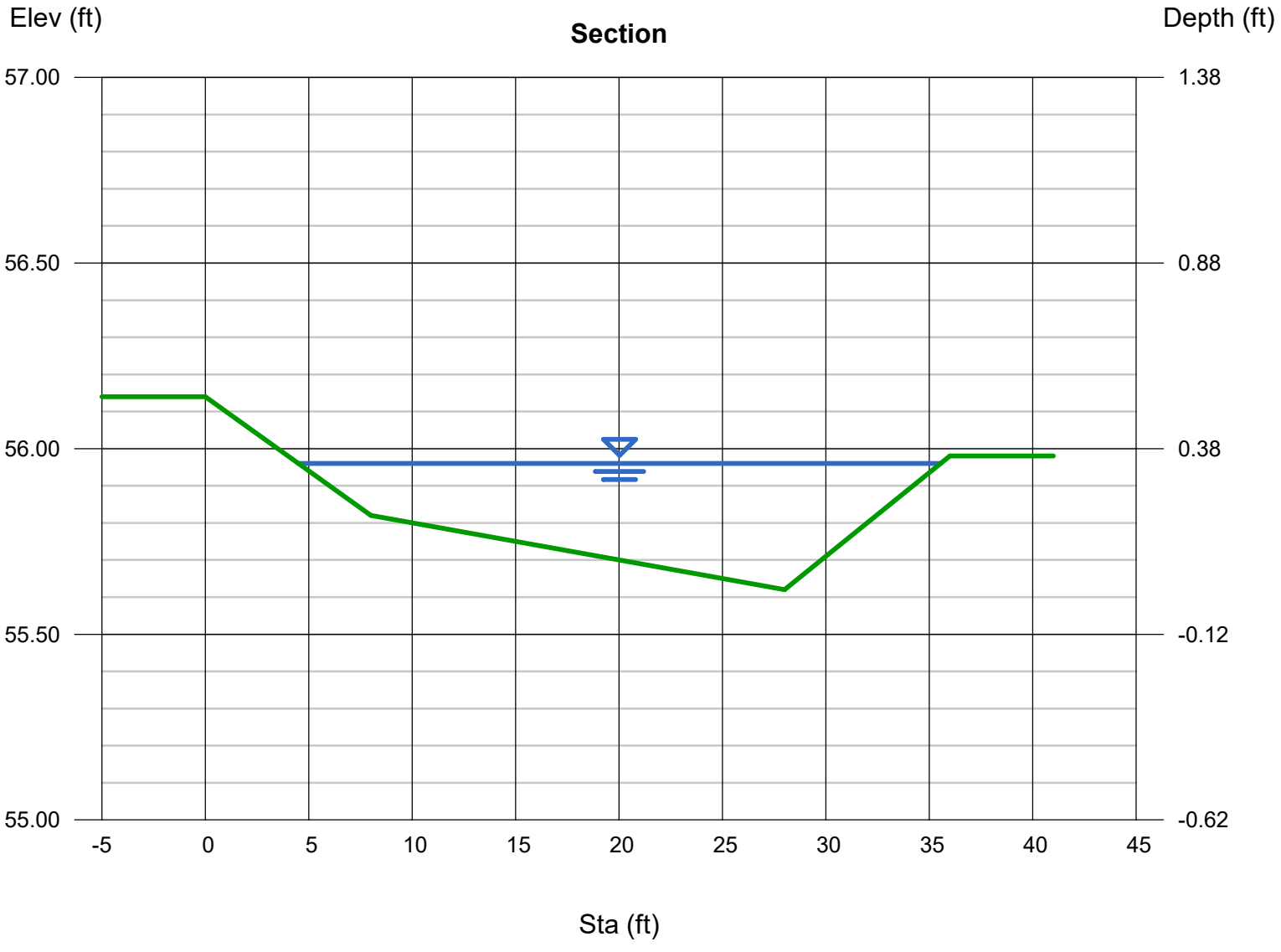
Compute by:	Known Q
Known Q (cfs)	= 33.20

Highlighted

Depth (ft)	= 0.34
Q (cfs)	= 33.20
Area (sqft)	= 6.33
Velocity (ft/s)	= 5.25
Wetted Perim (ft)	= 31.07
Crit Depth, Yc (ft)	= 0.47
Top Width (ft)	= 31.06
EGL (ft)	= 0.77

(Sta, El, n)-(Sta, El, n)...

(0.00, 56.14)-(8.00, 55.82, 0.012)-(28.00, 55.62, 0.012)-(36.00, 55.98, 0.012)



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Apr 29 2026

Off-site 30 inch Pipes 100-year at 1 percent

Circular

Diameter (ft)	= 2.50
Invert Elev (ft)	= 100.00
Slope (%)	= 1.00
N-Value	= 0.012

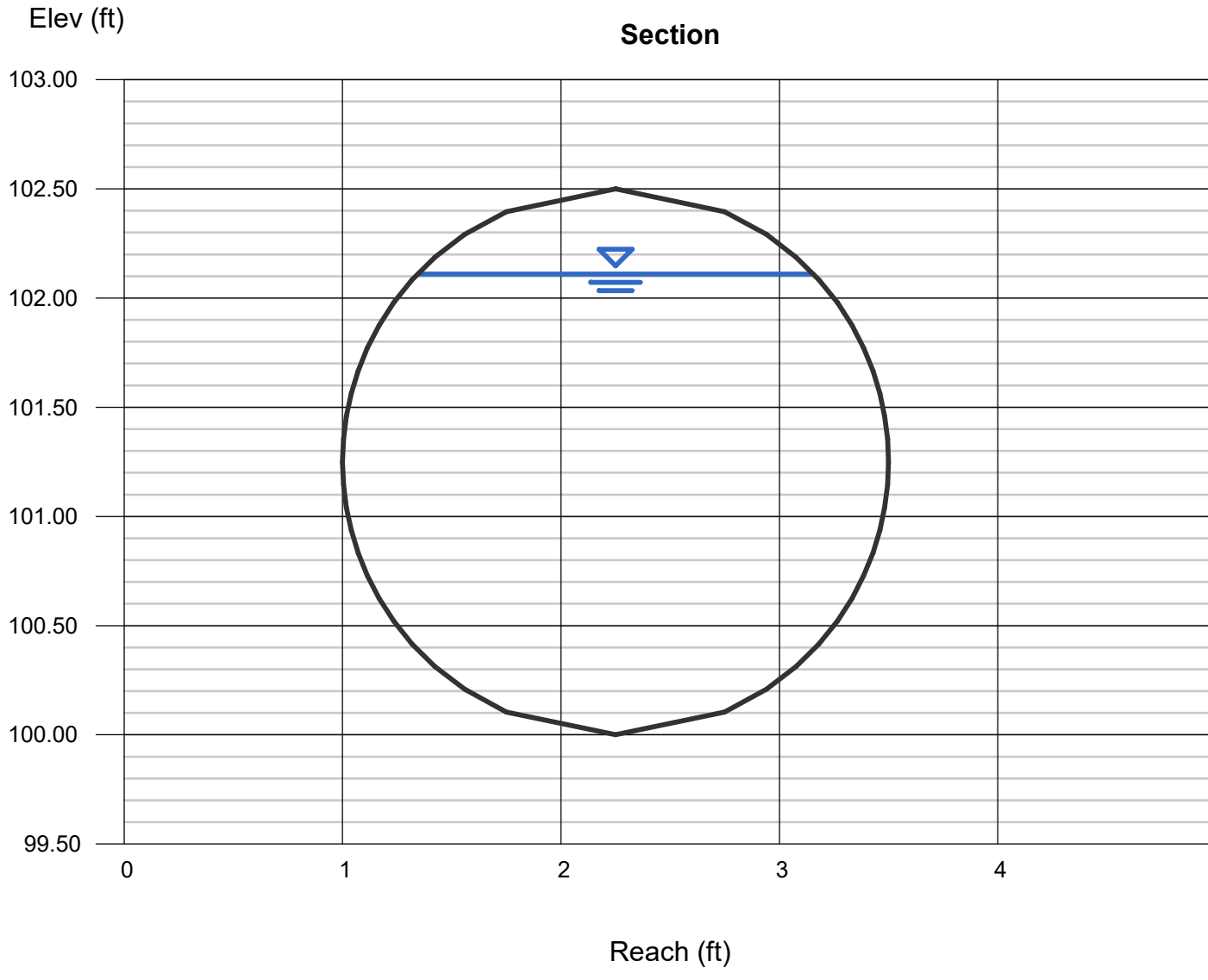
Calculations

Compute by:	Known Q
Known Q (cfs)	= 45.50

Highlighted

Depth (ft)	= 2.11
Q (cfs)	= 45.50
Area (sqft)	= 4.42
Velocity (ft/s)	= 10.29
Wetted Perim (ft)	= 5.83
Crit Depth, Yc (ft)	= 2.24
Top Width (ft)	= 1.81
EGL (ft)	= 3.76

+72.5 cfs (Off-site North)
+1.6 cfs (Off-site West)
+4.6 cfs (On-site Discharge)
-33.2 cfs (Off-site Discharge to Bent Grass Meadows Roadway)
= 45.5 cfs (Discharge through Proposed Storm Pipe.



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Apr 29 2026

Off-site Pipes 100-year at 0.5 percent

Circular

Diameter (ft)	= 3.00
Invert Elev (ft)	= 100.00
Slope (%)	= 0.50
N-Value	= 0.012

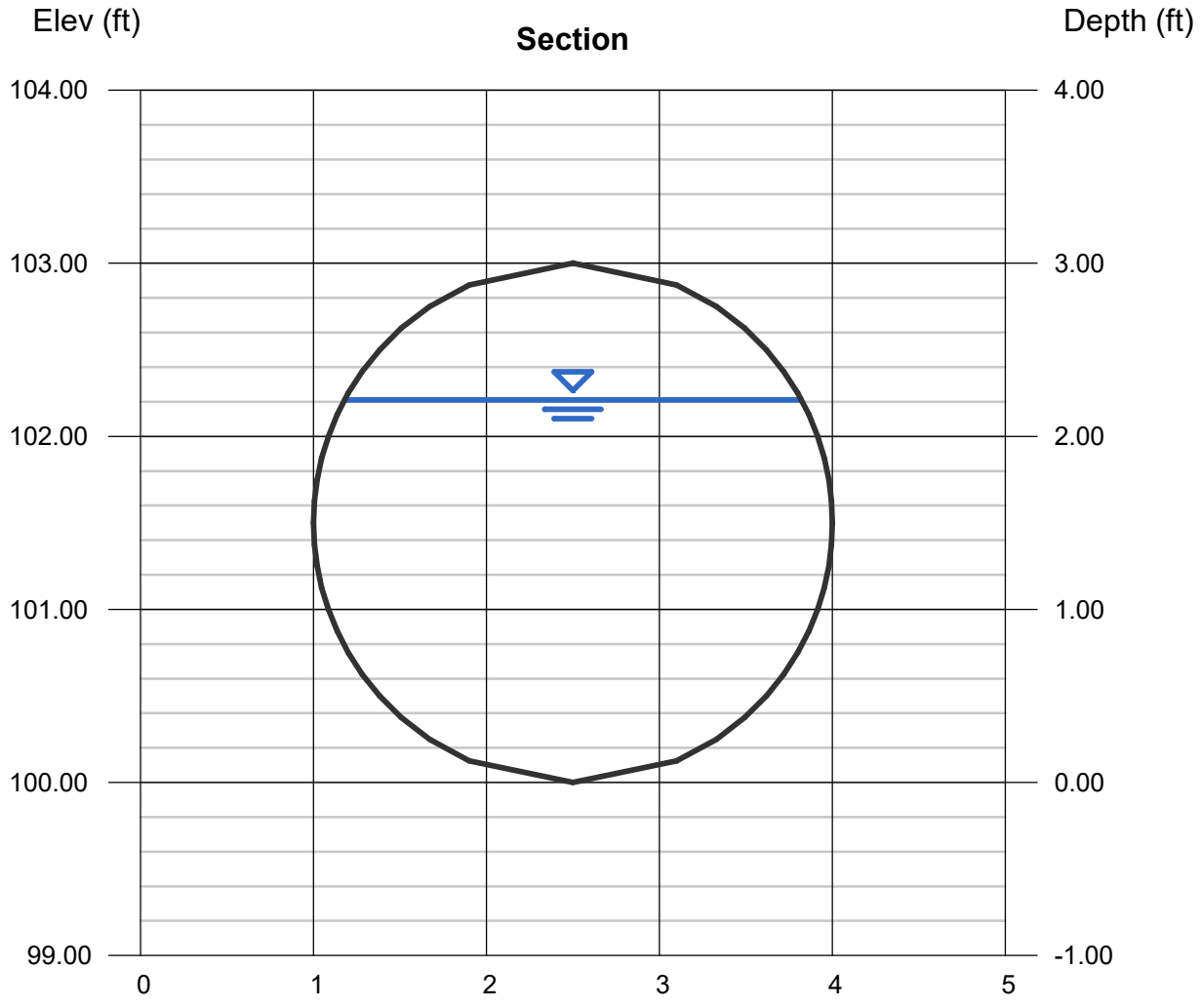
Calculations

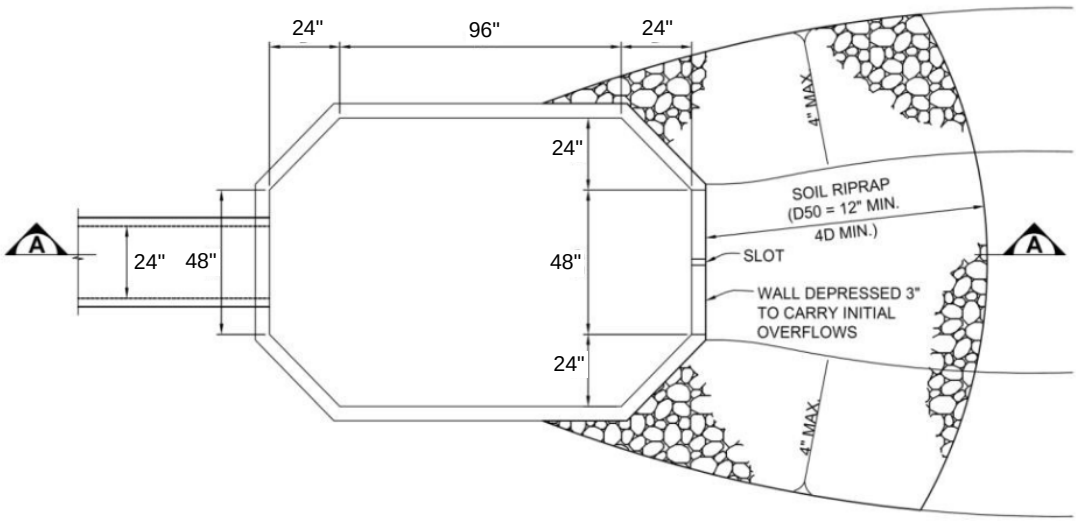
Compute by:	Known Q
Known Q (cfs)	= 45.50

Highlighted

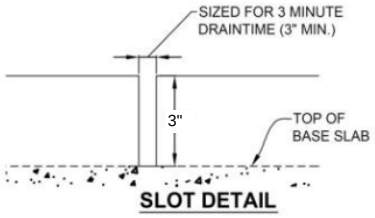
Depth (ft)	= 2.21
Q (cfs)	= 45.50
Area (sqft)	= 5.59
Velocity (ft/s)	= 8.15
Wetted Perim (ft)	= 6.20
Crit Depth, Yc (ft)	= 2.20
Top Width (ft)	= 2.64
EGL (ft)	= 3.24

+72.5 cfs (Off-site North)
+1.6 cfs (Off-site West)
+4.6 cfs (On-site Discharge)
-33.2 cfs (Off-site Discharge to Bent Grass Meadows Roadway)
= 45.5 cfs (Discharge through Proposed Storm Pipe.





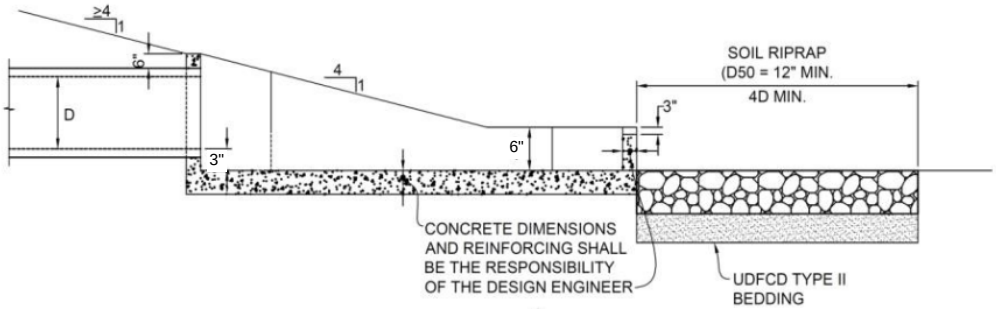
PLAN



SLOT DETAIL

NOTES:

1. DIMENSIONS SHOWN ARE MINIMUMS AND APPLY TO FOREBAYS WITHIN MODIFIED EXTENDED DETENTION BASINS. FOREBAYS IN STANDARD EXTENDED DETENTION BASINS SHALL BE SIZED BASED ON UDFCD CRITERIA.
2. FOR DEPTH ≥ 2.5-FEET, FOREBAY REQUIRES RAMP INTO BOTTOM AND ACCESS ROAD LEADING TO STREET.



SECTION A

Basin A1 and A2 Forebay sizing

5. Forebay

A) Minimum Forebay Volume
(V_{FMIN} = 1% of the WQCV)

V_{FMIN} = 0.00 ac-ft

B) Actual Forebay Volume

V_F = 0.0010 ac-ft

C) Forebay Depth
(D_F = 12 inch maximum)

D_F = 6.0 in

D) Forebay Discharge

i) Undetained 100-year Peak Discharge

Q_{100} = 6.62 cfs

ii) Forebay Discharge Design Flow
($Q_F = 0.02 * Q_{100}$)

Q_F = 0.13 cfs

E) Forebay Discharge Design

Choose One
- ○ Berm With Pipe
- ◉ Wall with Rect. Notch
- ○ Wall with V-Notch Weir

Flow too small for berm w/ pipe

F) Discharge Pipe Size (minimum 8-inches)

Calculated D_P = in

G) Rectangular Notch Width

Calculated W_N = 2.5 in

Basin A4 and A5 Forebay sizing

5. Forebay

A) Minimum Forebay Volume
(V_{FMIN} = 1% of the WQCV)

V_{FMIN} = 0.00 ac-ft

B) Actual Forebay Volume

V_F = 0.0010 ac-ft

C) Forebay Depth
(D_F = 12 inch maximum)

D_F = 6.0 in

D) Forebay Discharge

i) Undetained 100-year Peak Discharge

Q_{100} = 8.23 cfs

ii) Forebay Discharge Design Flow
($Q_F = 0.02 * Q_{100}$)

Q_F = 0.16 cfs

E) Forebay Discharge Design

Choose One
- ○ Berm With Pipe
- ◉ Wall with Rect. Notch
- ○ Wall with V-Notch Weir

Flow too small for berm w/ pipe

F) Discharge Pipe Size (minimum 8-inches)

Calculated D_P = in

G) Rectangular Notch Width

Calculated W_N = 2.9 in

APPENDIX F

SECTIONS FROM BENT GRASS MDDP/DBPS AMENDMENT & THE FALCON DRAINAGE BASIN STUDY

FOLLOWING PAGES FROM MDDP/DBPS AMENDMENT

Galloway

MDDP & DBPS AMENDMENT

BENT GRASS DEVELOPMENT

El Paso County, Colorado

PREPARED FOR:
Challenger Communities, LLC
8605 Explorer Dr., Suite 250
Colorado Springs, CO 80920

PREPARED BY:
Galloway & Company, Inc.
1155 Kelly Johnson Blvd., Suite 305
Colorado Springs, CO 80920

DATE:
January 2021
Revised: March 2021
Revised: April 2021
Revised: June 2021
Revised: August 2021
Revised: September 2021

PUDSP-20-005

A Current Conditions drainage basin map has also been provided. This scenario includes the development of Bent Grass residential Filing No. 2. Hydrology Calculations for this scenario have been provided in Appendix B. This was also provided as the existing conditions map and calculations in the Bent Grass West PDR.

Individual basin descriptions have not been included here, as they have been addressed in previously stated reports. General overall descriptions of the drainage patterns have been provided.

The Bent Grass development will impact the West Tributary and the Middle Tributary of the Falcon Basin. All development from the west of side of Bent Grass Residential Filing No. 1 and west will be contained within the West Tributary. Everything east of that property line, including the Bent Grass Meadows/Meridian Road intersection, will impact the Middle Tributary.

MIDDLE TRIBUTARY

The Middle Tributary drainage begins at Design Point 30.

Design Point 30 (225.0 AC, Q_5 = 2.1 cfs, Q_{100} = 63.5 cfs): is the release rate of the existing Meadows Pond #3, located in Meadows Filing No. 3, just north of Woodmen Hills Drive. The flows are based on the revised HEC-HMS (Current and Future Models), which is located in Appendix B. Flows will cross under Woodmen Hills Drive via an existing culvert, then sheet flow to the southeast, passing through Basin OS-25 to DP 31. The DBPS by Matrix had 160 cfs at this location under the "Do Nothing Analysis" and 99 cfs under the "Regional" and "Sub-Regional" design alternatives. Minor flows were not provided in the report. The flows are lower in the current HEC-HMS report, as more accurate design data and as-built information for the existing Meadows Pond 2 was utilized in the pond stage/storage and storage/discharge tables.

Design Point 30 will combine with offsite basins OS-25 & OS-26, until they reach an existing sedimentation pond at DP-32, located north of Bent Grass Meadows Drive, on what's referred to as the "school" site. The current configuration of the pond has release rates of 2.1 and 63.5 cfs for the 5 and 100-year storm events, under the Current HEC HMS model. These flows will continue south to Bent Grass Meadows Drive. Curb and gutter in the roadway is able to handle 7.4 and 33.2 cfs in the minor and major storms. It is assumed that the max gutter flow will continue to the east and any remaining flow, of 30.3 cfs, will be directed to the south through the Bent Grass Filing No. 1 development. Flow will travel through curb and gutter and existing storm systems within Bent Grass Filing No. 1, ultimately out falling to Bent Grass Pond 1. Based on the local street section and slopes, flows were routed through the development based on overtopping and flows splitting at intersections. The routing of the storm flow can be found in Appendix B, under Surface Routing.

The existing detention pond, Pond 1 Bent Grass Filing No. 1, was analyzed with the additional flow and contributing area. From the FDR for Bent Grass Residential, Pond 1 had a 5-year release rate of 0.4 cfs and a 100-year release rate of 6.8 cfs. The 100-year water surface elevation was 6937.61. With the additional flow being re-routed to Pond 1, the current release rates for Pond 1 are 0.5 cfs for the 5-year event and 22.0 cfs for the 100-year event. The pond will have a 100-year water surface elevation of 6938.08. The spillway elevation for the pond is 6939.61.

Flows in Bent Grass Meadows will continue east, on the north side of the roadway, where they will combine with offsite flows from BG 50 (5-year flow is 280 cfs, 100-year flow=850 cfs), which is the flow obtained from the Falcon DBPS. There are 3 existing 45" x 29" elliptical rcp's. For the current condition, the approved FDR for Meridian Road is allowing 2 additional elliptical rcp's, which will handle the flow

from Bent Grass Meadows at Design Point 15n (5-year flow = 13.4 cfs, 100-year flow=62.2 cfs). Design Point 20 (5-year flow=304.8, 100-year flow=961.8 cfs) combines the roadside flow from offsite with the flow from Bent Grass Meadows Drive. Flows will then continue south in a roadside ditch along Meridian Road, on the west side. The Meridian Road ditch also captures flows from the Bent Grass East Commercial developments. Existing water quality facilities intercept the runoff and treat it, prior to being released into the ditch. Flows will eventually be intercepted by a set of existing twin 36" cmp's at Owl Place, at Design Point BG 25 (Q100=837.4, Q5=256.3 cfs). From the Meridian Road/Bent Grass Meadows FDR, it is shown that the existing culverts at Bent Grass Meadows Drive and Owl Place and the channel connecting the culverts are undersized and will need to be improved in the future to properly convey the flows outlined in the DBPS. Flow will continue through an existing channel and release into Pond SR-4.

The "school site" and areas north of it (Rational Basins OS-25 & OS-26), are now referred to as Basin MT060a in the HEC HMS model. MT060a is 19.8 acres and generates 8.3 cfs for the 5-year event and 28.3 cfs for the 100-year event. These flows are directed to an existing "sediment pond" which is refer ed to as the "School Pond". This area is a localized low area which holds flows and releases them through an existing spillway. This "pond" has been included in the "Current HEC_HMS model". Basin MT060-N is the area east of MT060a and north of Bent Grass Meadows Drive. MT060-N is 28.2 acres and flows towards the east to Meridian Road. MT060-N generates 17.6 cfs for the 5-year storm and 59.6 cfs for the 100-year storm.MT060-S is 70.9 acres and is south of Bent Grass Meadows Drive, It encompasses the remainder of the original DBPS MT060 basin and flows through an existing channel to the south. MT060-S generates 37.8 cfs for the 5-year storm and 125.7 cfs for the 100-year storm. These flows are released directly into Pond SR-4.

WEST TRIBUTARY

For the West Tributary of Falcon Basin, the hydrology analysis has the Bent Grass Residential Filing No. 2 as being constructed, as it is currently under construction. The basins for this development are part of the hydrology calculations which are provided in Appendix B, but a complete description of each of these basins has not been provided, as they can be referenced in the approved FDR for Bent Grass Residential Filing No. 2. With this development, there were 2 water quality ponds built, which release into the West Tributary channel. The offsite basins have also been discussed in the Bent Grass Filing No. 2 FDR.

The currently undeveloped portion of the Bent Grass site, referred to as Bent Grass West, is comprised of 8 undeveloped basins. Below is a brief description of them.

Basin EX-1 (1.19 AC, Q_5 = 0.4 cfs, Q_{100} = 2.5 cfs): is associated with the northeastern portion of the Bent Grass West site east of the existing channel. The basin is currently undeveloped. Runoff from the basin generally flows to the southwest, into Basin EX-2 at **DP 10.**

Basin EX-2 (1.56 AC, Q_5 = 0.5 cfs, Q_{100} = 3.7 cfs): is along the eastern boundary portion of the proposed site and is south of Basin EX-1, east of the existing channel. The basin is currently undeveloped and receives flows from Basins OS-4 & OS-5. Runoff from the basin generally flows to the southeast into Basin EX-3 at **DP 14** combined with flows from **DP 11 & 12**.

Basin EX-3 (0.62 AC, Q_5 = 0.2 cfs, Q_{100} = 1.5 cfs): is along the eastern boundary of the proposed site south of Basin EX-2 and east of the existing channel. The basin currently contains an existing WQCV pond created as part of Bent Grass Residential Filing No. 2. This basin receives flows from **DP 14** and **DP 8**.

Sub Regional Detention Alternative[1]						
Pond		Q_2 In (cfs)	Q_2 Out (cfs)	Q_{100} In (cfs)	Q_{100} Out (cfs)	Required Volume (AF)[2]
Paint Brush Hills Pond #4	PBH 4	38	29	200	150	1.34
Paint Brush Hills Pond A	PBH A	35	7	170	140	2.62
Paint Brush Hills Pond B1	PBH B1	80	51	420	270	9.17
Paint Brush Hills Pond B2	PBH B2	51	10	270	180	12.09
Paint Brush Hills Pond C	PBH C	56	3	300	140	6.77
Regional Pond MN	R MN	65	32	850	820	7.53
Regional Pond R1	R R1	110	77	1,600	1,500	25.00
Regional Pond R2	R R2	140	140	2,100	2,100	7.90
Regional Pond WU South	R WU	47	22	1,070	930	39.54
Sub Regional Pond SR1	SR 1	54	42	610	510	11.03
Sub Regional Pond SR2	SR 2	65	65	840	840	2.05
Sub Regional Pond SR3	SR 3	72	72	910	910	1.03
Sub Regional Pond SR4	SR 4	130	27	1,000	730	19.37
Sub Regional Pond SR6	SR 6	74	9	390	200	11.82
The Meadows Pond #1	M 1	11	0	75	2	3.25
The Meadows Pond #2	M 2	28	5	210	99	7.94
Woodmen Hills Pond #1 North	WH 1N	65	61	390	260	7.13
Woodmen Hills Pond #1 South	WH 1S	61	10	260	260	8.78
Woodmen Hills Pond #2	WH 2	37	10	270	250	9.18
Woodmen Hills Pond #3	WH 3	105	13	530	360	8.35
Woodmen Hills Pond #4	WH 4	110	15	790	260	40.45
Woodmen Hills Pond #5	WH 5	40	1	130	19	4.10
Woodmen Hills Pond H	WH H	140	110	750	750	2.66

Notes
1: Represents future hydrology with retrofit existing detention ponds and 5 new subregional detention ponds
2: Required volume to highest WSE

Reach Alternative	Total (ft)
Protect In Place	30,066
Natural Channel Design	32,359
Small Drop Structures w/ Toe Protection	76,812
Large Drop Structures w/ Toe Protection	0

BURGESS RD
GOODSON RD
STAPLETON DR
EASTONVILLE RD
JUDGE ORR RD
WOODMEN RD
TAMLIN RD
FALCON HWY
GARRETT RD
MERIDIAN RD
DIVERSION
CHANGE DUE TO BENT GRASS R2 (RWT200)
DELETE POND WITH WQCV REPLACEMENTS & CHANNEL IMPROVEMENTS
CHANGE DUE TO BENT GRASS R1 (RMT063)

LEGEND

Detention Pond
- Existing
- Proposed
- Existing Watershed Boundary
- Historical and Future Watershed Boundary
- Tributary Basin Boundary
- Subbasin Boundary
- Major Tributary
- Immediate Action Required to Preserve Existing Condition

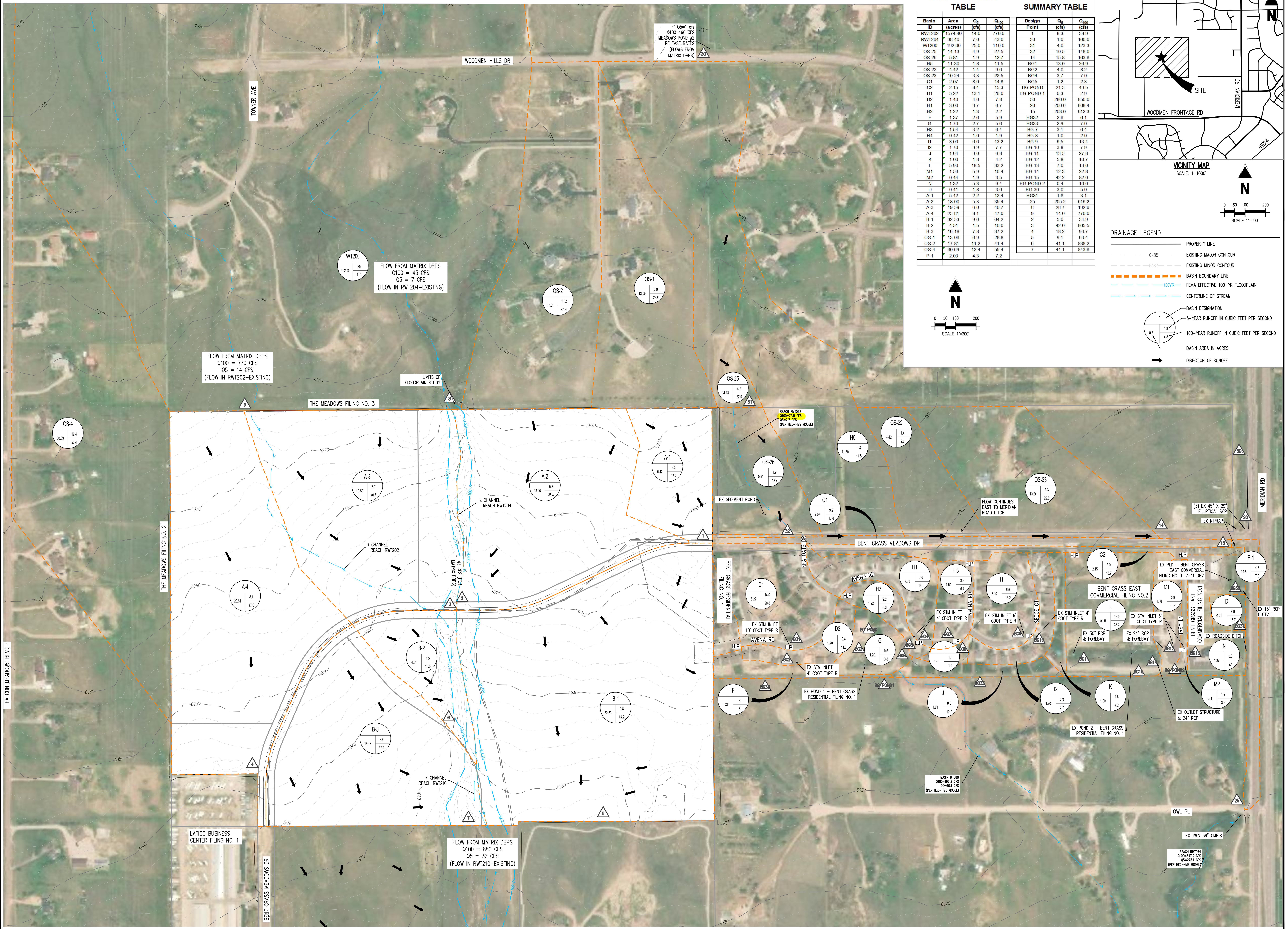
Reach Alternative
- Protect In Place
- Natural Channel Design
- Small Drop Structures w/ Toe Protection

Figure 5-3
Sub-Regional Detention Alternative
Falcon DBPS
El Paso County, CO

0 0.5 1
Miles

NOTE: FIGURE MUST BE VIEWED IN COLOR

FILE: G:\gis_projects\Falcon_Creek_DBPS\active\apps\20111215_alternatives\subregional_detention_alt.mxd, 12/19/2011, ron_ramold



RUNOFF SUMMARY TABLE

Basin ID	Area (acres)	Q_5 (cfs)	Q_{100} (cfs)
RWT202	1574.40	14.0	770.0
RWT204	38.40	7.0	43.0
WT200	192.00	25.0	110.0
OS-25	14.13	4.9	27.5
OS-26	5.81	1.9	12.7
H5	11.30	1.8	11.5
OS-22	4.42	1.4	9.6
OS-23	10.24	3.3	22.5
C1	2.07	8.0	14.6
C2	2.15	8.4	15.3
D1	5.22	13.1	26.0
D2	1.40	4.0	7.8
H1	3.00	3.7	6.7
H2	1.22	1.3	2.2
F	1.37	2.6	5.9
G	1.70	2.7	5.6
H3	1.54	3.2	6.4
H4	0.42	1.0	1.9
I1	3.00	6.6	13.2
I2	1.70	3.9	7.7
J	1.64	3.0	6.8
K	1.00	1.8	4.2
L	5.90	18.5	33.2
M1	1.56	5.9	10.4
M2	0.44	1.9	3.5
N	1.32	5.3	9.4
D	0.41	1.8	3.0
A-1	5.42	2.2	12.4
A-2	18.00	5.3	35.4
A-3	19.59	6.0	40.7
A-4	23.81	8.1	47.0
B-1	32.53	9.6	64.2
B-2	4.51	1.5	10.0
B-3	16.18	7.8	37.2
OS-1	13.06	6.9	28.8
OS-2	17.81	11.2	41.4
OS-4	30.69	12.4	55.4
P-1	2.03	4.3	7.2

DESIGN POINT SUMMARY TABLE

Design Point	Q_5 (cfs)	Q_{100} (cfs)
1	8.3	38.9
30	1.0	160.0
31	4.0	123.3
32	10.5	148.0
14	15.8	163.6
BG1	13.0	26.9
BG2	4.0	8.2
BG4	3.7	7.0
BG5	1.2	2.3
BG POND	21.3	43.5
BG POND 1	0.3	2.9
50	280.0	850.0
20	200.6	608.4
15	203.0	612.3
BG32	2.6	6.1
BG33	2.9	7.0
BG 7	3.1	6.4
BG 8	1.0	2.0
BG 9	6.5	13.4
BG 10	3.8	7.9
BG 11	13.5	27.8
BG 12	5.8	10.7
BG 13	7.0	13.0
BG 14	12.3	22.8
BG 15	42.2	82.0
BG POND 2	0.4	10.0
BG 30	3.0	5.0
BG31	1.8	3.1
25	205.2	616.2
8	28.7	132.6
9	14.0	770.0
2	5.0	34.9
3	42.0	865.5
4	18.2	93.7
5	9.1	63.4
6	41.1	838.2
7	44.1	843.6

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CHALLENGER HOMES

DRAINAGE PLAN
BENT GRASS RESIDENTIAL
FOR
CHALLENGER COMMUNITIES, LLC

BENT GRASS MEADOWS DRIVE & MERIDIAN ROAD
FALCON, CO - EL PASO COUNTY

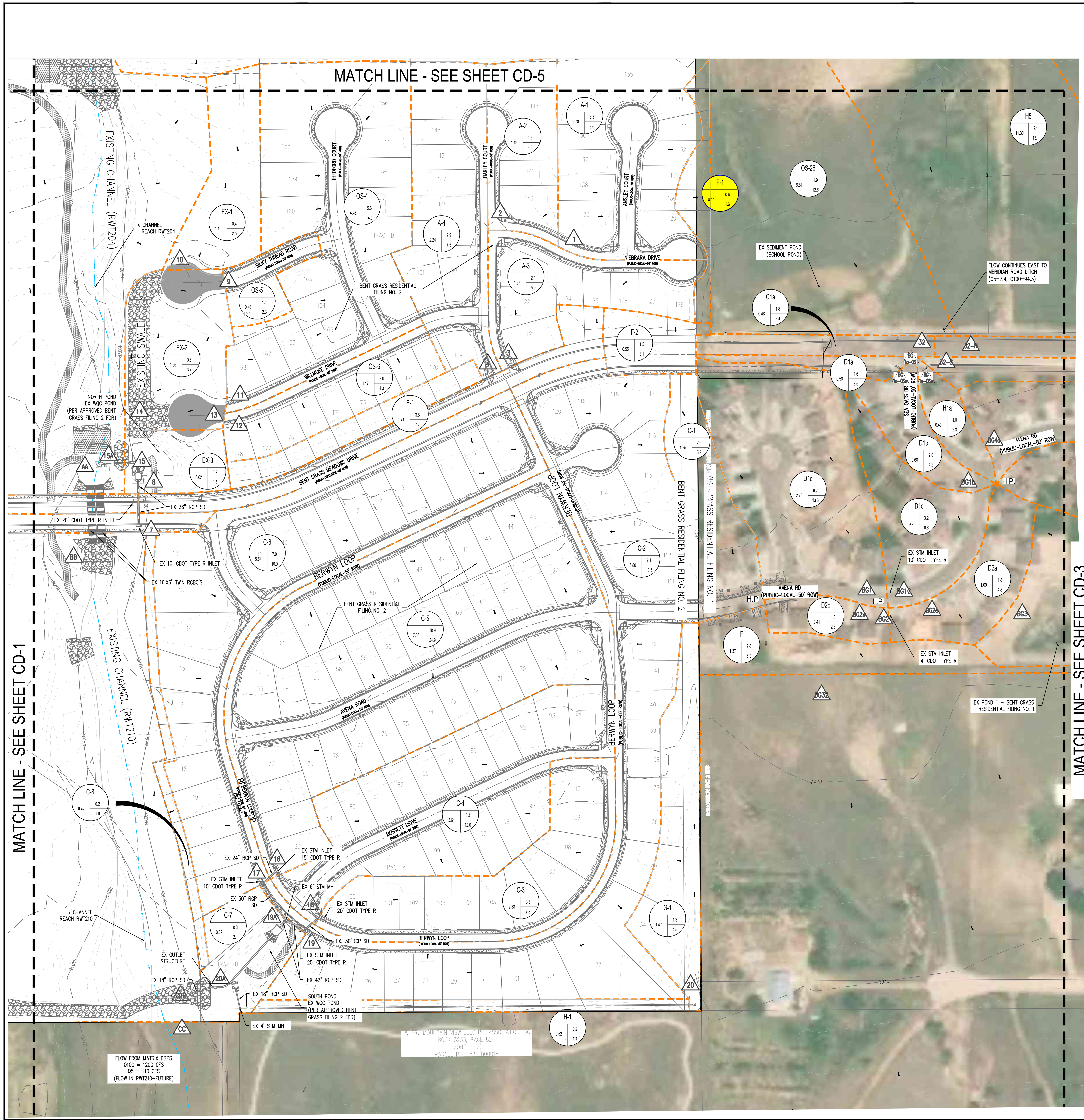
#	Date	Issue / Description	Init.

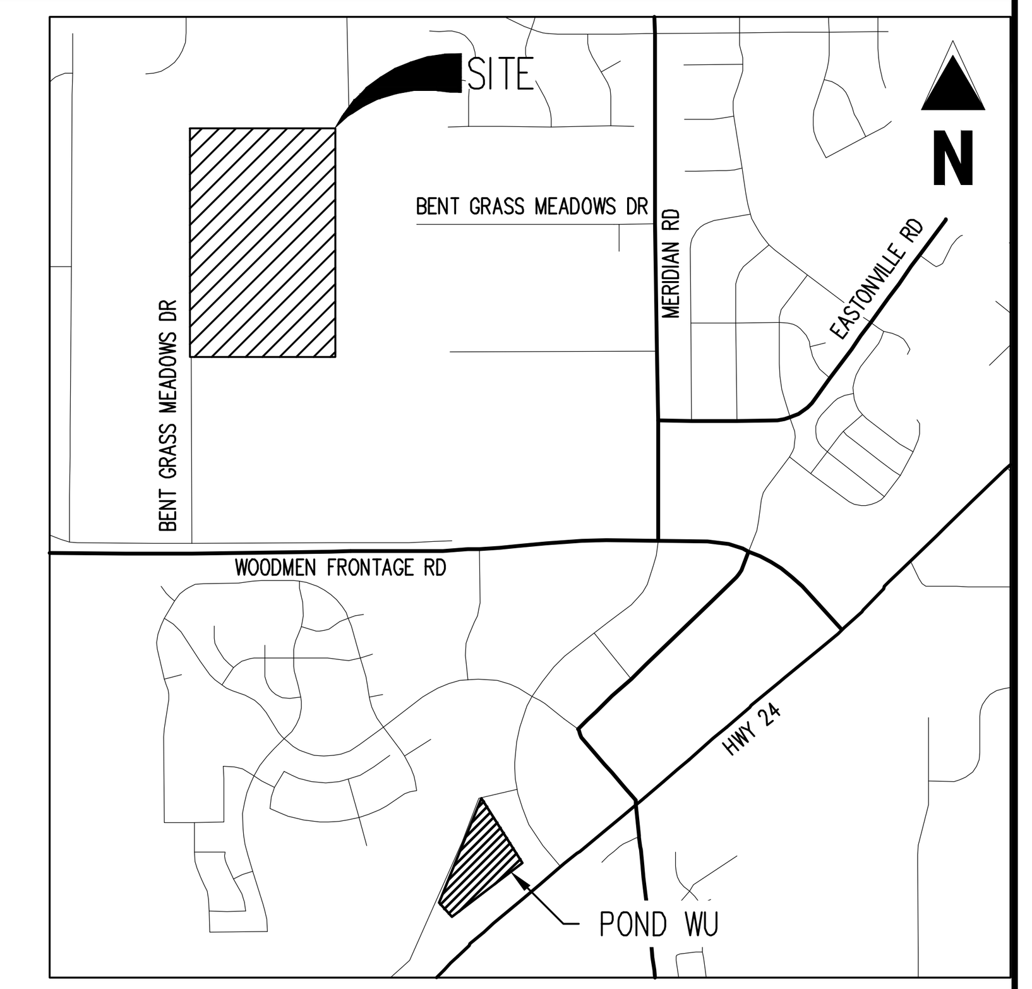
Project No:	CLH000014.20
Drawn By:	CMWJ
Checked By:	SMB
Date:	OCTOBER 2019

EXISTING CONDITIONS DRAINAGE MAP

ED-1

Sheet 1 of 1





VICINITY MAP
1"=2,000'

DRAINAGE LEGEND

- PROPERTY LINE
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- BASIN BOUNDARY LINE
- FEMA EFFECTIVE 100-YR FLOODPLAIN
- CENTERLINE OF STREAM
- BASIN DESIGNATION
- 5-YEAR RUNOFF IN CUBIC FEET PER SECOND
- 100-YEAR RUNOFF IN CUBIC FEET PER SECOND
- BASIN AREA IN ACRES
- DIRECTION OF RUNOFF

RUNOFF SUMMARY TABLE

Basin ID	Area (acres)	Q_5 (cfs)	Q_{100} (cfs)
RWT202	1574.40	220.0	1000.0
RWT204	38.40	7.0	43.0
WT200	192.00	52.0	190.0
OS-2	20.08	9.0	43.4
OS-3	10.62	4.7	22.7
OS-25	14.13	5.1	29.0
OS-26	5.81	1.9	12.6
H5	11.30	2.1	13.1
OS-22	4.42	1.5	9.7
OS-23	10.24	3.3	22.5
C1a	0.48	1.8	3.4
C1b	0.88	3.3	6.2
C1c	1.09	4.1	7.8
D1a	0.56	1.6	3.5
D1b	0.68	2.0	4.2
D1c	1.20	3.2	6.6
D1d	2.79	6.7	13.6
C2a	1.26	2.9	6.0
C2b	0.99	3.3	6.0
D2a	1.00	1.8	4.8
D2b	0.41	1.0	2.3
H1a	0.40	1.0	2.3
H1b	2.52	4.3	9.9
H1c	0.16	0.4	0.9
H2a	1.09	1.7	4.2
H2b	0.15	0.3	0.7
F	1.37	2.6	5.9
G	1.70	2.7	5.6
H3	1.54	3.2	6.4
H4	0.42	1.0	1.9
I1	3.00	6.6	13.2
I2	1.70	3.9	7.7
J	1.64	3.0	6.8
K	1.00	1.8	4.2
L	5.90	18.5	33.2
M1	1.56	5.9	10.4
M2	0.44	1.9	3.5
N	1.32	5.3	9.4
D	0.41	1.8	3.0
OS-1	32.28	15.1	65.1
OS-4	4.46	5.6	14.0
OS-5	0.46	1.1	2.3
OS-6	1.17	2.0	4.3
A-1	2.70	3.3	8.6
A-2	1.19	1.5	4.2
A-3	1.57	2.1	5.0
A-4	2.24	2.9	7.5
C-1	1.35	2.6	5.9
C-2	6.80	7.1	18.5
C-3	2.38	3.3	7.8
C-4	3.61	5.3	12.0
C-5	7.86	10.9	24.9
C-6	5.54	7.0	16.9
C-7	0.89	0.3	2.1
C-8	0.42	0.2	1.0
E-1	1.71	3.6	7.7
E-2	0.68	2.4	4.6
E-3	0.78	2.9	5.3
E-4	0.91	3.0	5.7
E-5	0.89	3.3	6.1
F-1	0.44	0.6	1.6
F-2	0.55	1.5	3.1
G-1	1.47	1.3	4.5
H-1	0.52	0.2	1.4
I-1	0.31	1.0	2.1
EX-1	1.19	0.4	2.5
EX-2	1.56	0.5	3.7
EX-3	0.62	0.2	1.5
EX-4	12.49	3.7	25.1
EX-5	5.15	1.6	10.6
EX-6	9.53	2.7	17.8
EX-7	9.16	2.8	18.9
EX-8	21.30	6.6	43.9
P-1	2.03	4.2	8.7

DESIGN POINT SUMMARY TABLE

Design Point	Q_5 (cfs)	Q_{100} (cfs)	REV HMS FLOWS Q_5 (cfs)	REV HMS FLOWS Q_{100} (cfs)
40	277.8	1226.8	67.6	1014.5
1	3.1	8.6		
2	4.3	11.9		
3	5.9	15.9		
4	8.3	22.3		
5	1.5	10.5		
6	3.5	34.4		
7	2.9	5.5		
8	11.2	32.7		
9	0.7	1.5		
10	1.0	3.9		
11	5.3	13.9		
12	1.9	4.4		
13	7.1	17.9		
14	8.1	23.8		
15	18.3	54.1		
15A	12.2	37.0		
AA	268.8	1181.4		
BB	268.3	1176.5		
16	16.6	39.4		
17	10.6	26.8		
18	13.5	39.2		
19	9.5	29.7		
20	1.3	4.6		
20A	18.4	57.1		
20B	21.3	66.0		
28	8.6	42.8		
29	12.2	60.9		
21	2.7	18.7		
22	2.5	29.6		
23	11.5	57.6		
24	3.2	18.0		
25	3.3	10.7		
26	15.1	73.2		
27A	6.3	43.7		
27B	0.2	1.3		
CC	278.3	1224.7	186.2	1044.6
30	2.7	63.4		
31	5.1	60.9		
32	6.5	65.0		
32-N	6.5	33.2		
32-S	0.6	33.2		
BG 1a-Os	0.0	0.0		
BG 1a-Ose	0.0	0.0		
BG 1a-Osw	0.0	0.0		
BG 4a	0.4	0.9		
BG .1b	0.8	1.7		
BG 1c	2.1	4.4		
BG 1	5.2	11.0		
BG 2e	1.8	5.0		
BG 2w	1.0	2.4		
BG 2	2.8	7.3		
BG 4e	0.4	0.9		
BG 4w	2.4	5.7		
BG 4	2.6	6.1		
BG 5e	0.3	0.7		
BG 5w	1.7	4.2		
BG 5	1.9	4.7		
BG 3	7.6	16.6		
BG 6	3.5	8.4		
BG POND1	0.5	22.0		
BG 14n	13.0	63.8		
BG 15n	12.6	62.2		
BG 50	280.0	850.0		
BG 20	303.7	961.8		
BG 14s	1.5	36.4		
BG 15s	3.0	38.5		
BG 21	306.3	1007.0		
BG 32	2.6	6.1		
BG 33	2.9	7.0		
BG 7	3.1	6.4		
BG 8	1.0	2.0		
BG 9	6.5	13.4		
BG 10	3.8	7.9		
BG 11	13.5	27.8		
BG 12	5.8	10.7		
BG 13	7.0	13.0		
BG 14	12.3	22.8		
BG 15	42.2	82.0		
BG POND2	0.4	10.0		
BG 30	3.0	5.0		
BG 31	1.8	3.1		
BG 25	255.5	837.4		

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CHALLENGER HOMES

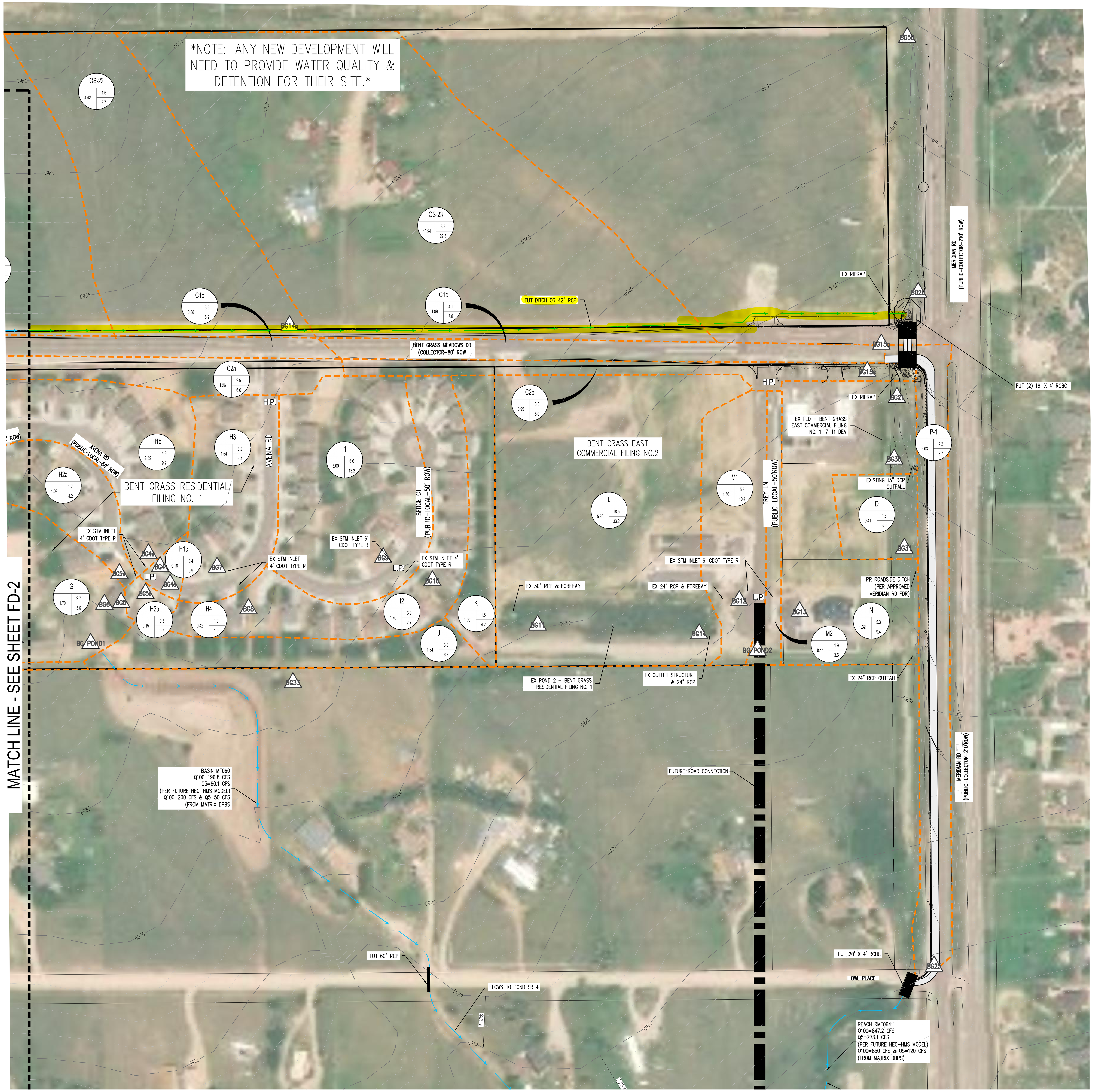
MASTER DRAINAGE DEVELOPMENT PLAN
FALCON MEADOWS AT BENT GRASS
FOR
CHALLENGER COMMUNTIES, LLC

BENT GRASS MEADOWS DRIVE & MERDIAN ROAD
FALCON, CO 80831 - EL PASO COUNTY

#	Date	Issue / Description	Init.

Project No: CLH000014.20
Drawn By: CMWJ
Checked By: SMB
Date: OCTOBER 2019

CURRENT CONDITIONS DRAINAGE MAP



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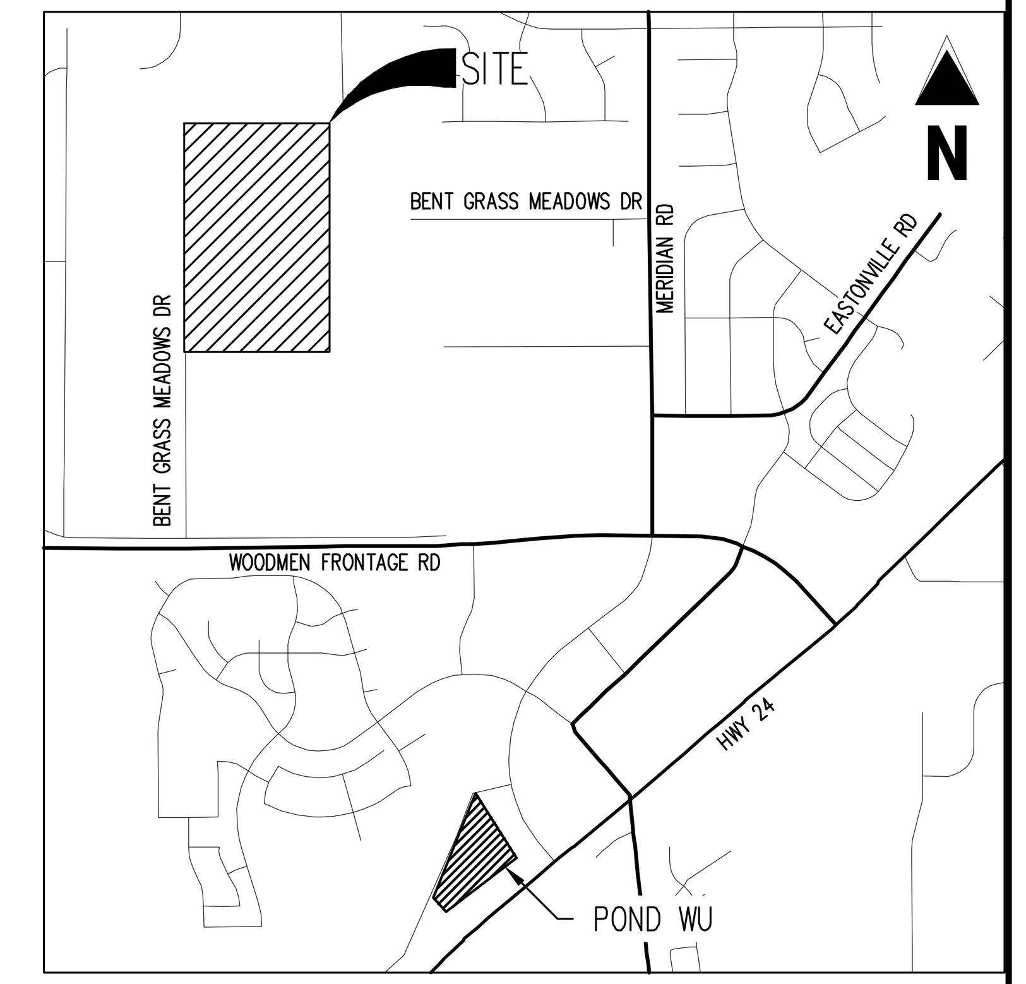

VICINITY MAP
1"=2,000'

DRAINAGE LEGEND

PROPERTY LINE
EXISTING MAJOR CONTOUR
EXISTING MINOR CONTOUR
PROPOSED/FUTURE MAJOR CONTOUR
PROPOSED/FUTURE MINOR CONTOUR
BASIN BOUNDARY LINE
FEMA EFFECTIVE 100-YR FLOODPLAIN
CENTERLINE OF STREAM
BASIN DESIGNATION
5-YEAR RUNOFF IN CUBIC FEET PER SECOND
100-YEAR RUNOFF IN CUBIC FEET PER SECOND
BASIN AREA IN ACRES
DIRECTION OF RUNOFF

RUNOFF SUMMARY TABLE

Basin ID	Area (acres)	Q_5 (cfs)	Q_{100} (cfs)
RWT202	1574.40	220.0	1000.0
RWT204	38.40	7.0	43.0
WT200	192.00	52.0	190.0
OS-2	20.08	9.0	43.4
OS-3	10.62	4.7	22.7
OS-25	18.74	6.3	35.8
OS-26	5.81	1.9	12.6
H5	6.37	3.2	15.1
OS-22	4.42	1.5	9.7
OS-23	10.24	3.3	22.5
C1a	0.48	1.8	3.4
C1b	0.88	3.3	6.2
C1c	1.09	4.1	7.8
D1a	0.56	1.6	3.5
D1b	0.68	2.0	4.2
D1c	1.20	3.2	6.6
D1d	2.79	6.7	13.6
C2a	1.26	2.9	6.0
C2b	0.99	3.3	6.0
D2a	1.00	1.8	4.8
D2b	0.41	1.0	2.3
H1a	0.40	1.0	2.3
H1b	2.52	4.3	9.9
H1c	0.16	0.4	0.9
H2a	1.09	1.7	4.2
H2b	0.15	0.3	0.7
F	1.37	2.6	5.9
G	1.70	2.7	5.6
H3	1.54	3.2	6.4
H4	0.42	1.0	1.9
I1	3.00	6.6	13.2
I2	1.70	3.9	7.7
J	1.64	3.0	6.8
K	1.00	1.8	4.2
L	5.90	18.5	33.2
M1	1.56	5.9	10.4
M2	0.44	1.9	3.5
N	1.32	5.3	9.4
D	0.41	1.8	3.0
OS-1	33.07	15.5	66.7
OS-4	4.46	5.6	14.0
OS-5	0.46	1.1	2.3
OS-6	1.17	2.0	4.3
A-1	2.70	3.3	8.6
A-2	1.19	1.5	4.2
A-3	1.57	2.1	5.0
A-4	2.24	2.9	7.5
C-1	1.35	2.6	5.9
C-2	6.80	7.1	18.5
C-3	2.38	3.3	7.8
C-4	3.61	5.3	12.0
C-5	7.86	10.9	24.9
C-6	5.54	7.0	16.9
C-7	0.89	0.3	2.1
E-1	1.71	3.6	7.7
E-2	0.68	2.4	4.6
E-3	0.78	2.9	5.3
E-4	0.91	3.0	5.7
E-5	0.89	3.3	6.1
F-1	0.44	0.6	1.6
F-2	0.55	1.5	3.1
G-1	1.47	1.3	4.5
H-1	0.52	0.2	1.4
I-1	0.31	1.0	2.1
AA-1	2.57	4.2	9.9
AA-2	2.28	4.2	9.3
B-1	5.25	2.3	10.7
B-2	4.16	1.4	9.1
CC-1	9.07	16.9	36.0
CC-2	1.53	4.6	9.8
CC-3	1.88	6.4	12.1
CC-4	3.64	6.2	16.0
CC-5	0.45	0.2	1.4
D-1	9.07	11.2	26.6
D-2	7.42	15.5	32.2
D-3	2.03	0.8	2.3
D-4	4.38	7.8	16.6
D-5	1.08	2.2	4.6
D-6	4.01	8.2	17.2
D-7	6.39	3.2	14.8
D-8	1.69	1.3	4.5
P-1	2.03	4.2	8.7

DESIGN POINT SUMMARY TABLE

Design Point	Q_5 (cfs)	Q_{100} (cfs)	REV HMS FLOWS Q_5 (cfs)	REV HMS FLOWS Q_{100} (cfs)
40	278.1	1227.8	181.4	1029.1
1	3.1	8.6		
2	4.3	11.9		
3	5.9	15.9		
4	8.3	22.3		
9	1.1	2.4		
11	6.0	15.5		
13	7.6	19.0		
5	10.9	27.1		
6	4.1	9.4		
7	2.9	5.5		
8	20.0	50.5		
12	4.6	10.2		
15	20.9	45.4		
10	23.9	52.7		
10A	6.0	21.9		
14	33.0	81.1		
14A	12.2	37.0		
AA	270.3	1188.7		
BB	269.5	1186.4		
16	16.6	39.4		
17	10.6	26.8		
18	13.5	39.2		
19	9.5	29.7		
20	1.3	4.6		
20A	18.4	57.1		
20B	21.3	66.0		
28	8.6	42.8		
29	12.2	60.9		
21	15.0	32.5		
22	10.5	26.0		
23	12.2	59.7		
24	2.1	15.9		
25	3.3	10.7		
26	8.0	41.7		
42	7.5	16.5		
43	10.0	21.8		
44	1.2	4.5		
45	53.8	173.9		
45A	1.1	45.8		
CC	268.2	1183.4	191.9	1075.3
30	2.1	63.5		
31	5.8	67.4		
32	6.5	64.8		
32A	4.9	34.5		
32A-N	4.9	33.2		
32A-S	12.5	3.6		
BG 1a-Os	0.0	0.0		
BG 1a-Ose	0.0	0.0		
BG 1a-Osw	0.0	0.0		
BG 4a	0.6	1.5		
BG 1b	1.3	2.8		
BG 1c	3.3	7.1		
BG 1	8.3	17.6		
BG 2e	1.8	5.0		
BG 2w	1.0	2.4		
BG 2	2.8	7.3		
BG 4e	0.4	0.9		
BG 4w	3.8	9.0		
BG 4	4.0	9.5		
BG 5e	0.3	0.7		
BG 5w	1.7	4.2		
BG 5	1.9	4.7		
BG 3	16.2	58.7		
BG 6	5.4	13.2		
BG POND1	0.3	2.9		
BG 14n	9.2	42.7		
BG 15n	8.8	40.9		
BG 50	280.0	850.0		
BG 20	292.5	909.3		
BG 14s	15.0	7.8		
BG 15s	16.8	12.4		
BG 21	304.6	915.3		
BG 32	2.6	6.1		
BG 33	2.9	7.0		
BG 7	3.1	6.4		
BG 8	1.0	2.0		
BG 9	6.5	13.4		
BG 10	3.8	7.9		
BG 11	13.5	27.8		
BG 12	5.8	10.7		
BG 13	7.0	13.0		
BG 14	12.3	22.8		
BG 15	42.2	82.0		
BG POND2	0.4	10.0		
BG 30	3.0	5.0		
BG 31	1.8	3.1		
BG 25	252.0	751.4		

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CHALLENGER HOMES

MASTER DRAINAGE DEVELOPMENT PLAN
FALCON MEADOWS AT BENT GRASS
FOR
CHALLENGER COMMUNITIES, LLC

BENT GRASS MEADOWS DRIVE & MERDIAN ROAD
FALCON, CO 80831 - EL PASO COUNTY

#	Date	Issue / Description	Init.

Project No: CLH000014.20
Drawn By: CMWJ
Checked By: SMB
Date: OCTOBER 2019

FUTURE CONDITIONS DRAINAGE MAP

FD-3

Sheet 3 OF 5

PAGE FROM FALCON DBPS

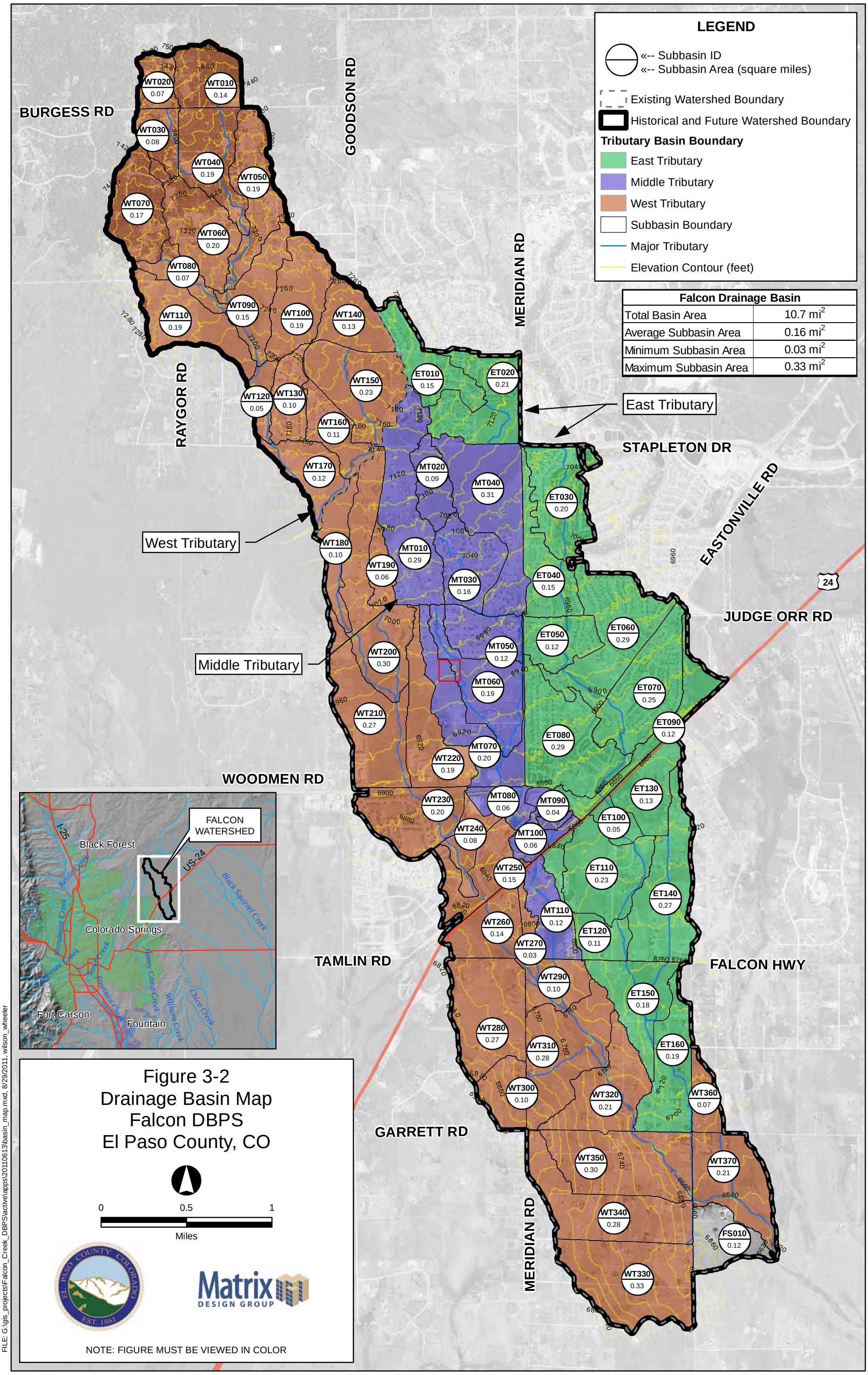
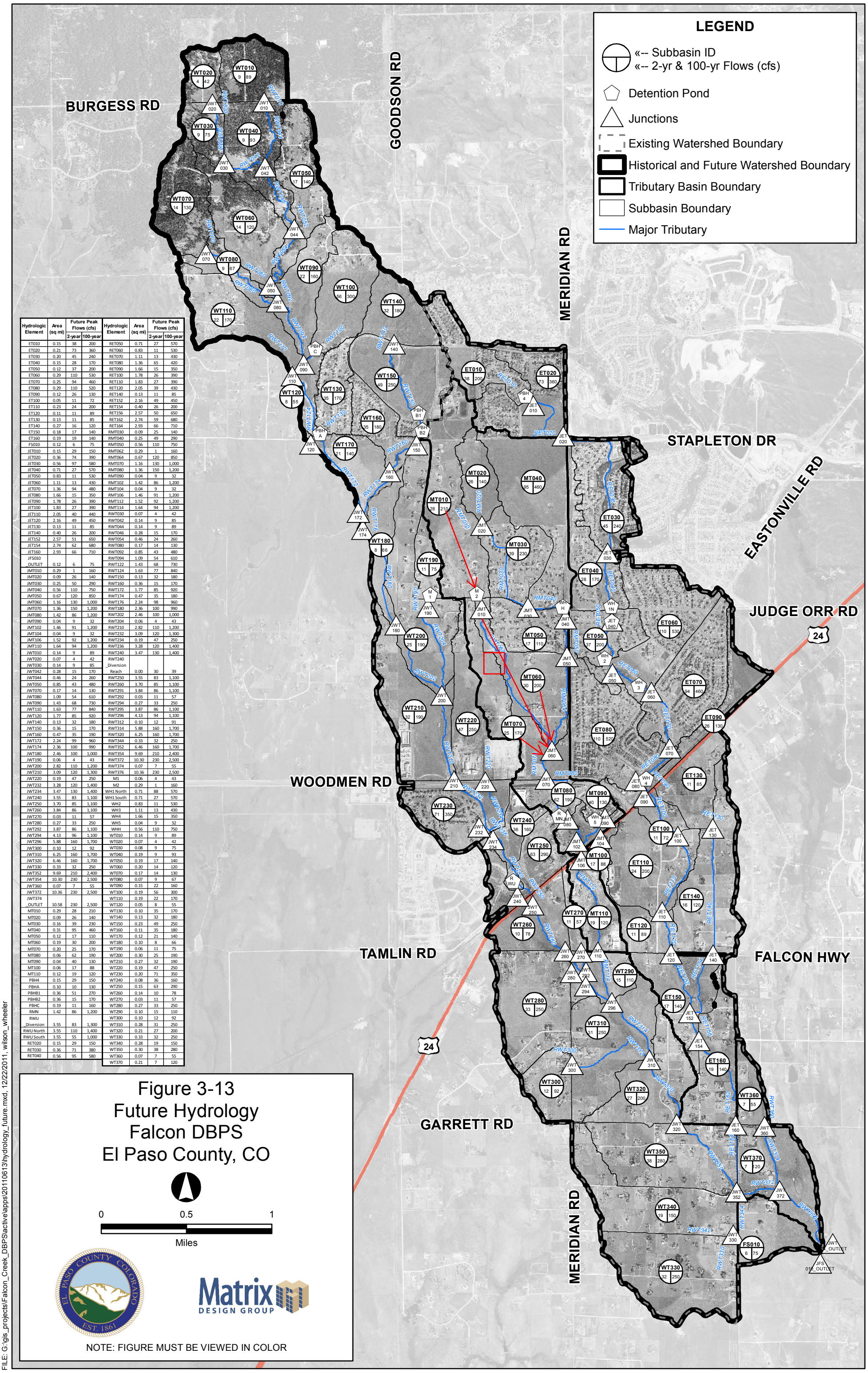


Figure 3-2
Drainage Basin Map
Falcon DBPS
El Paso County, CO

NOTE: FIGURE MUST BE VIEWED IN COLOR

FILE: G:\gis_projects\Falcon_Creek_DBPS\active\apps\20110613\basin_map.mxd, 8/29/2011, wilson_wheeler

PAGE FROM FALCON DBPS



Hydrologic Element	Area (sq mi)	Future Peak Flows (cfs) 2-year	100-year
ET010	0.15	38	200
ET020	0.21	73	360
ET030	0.20	45	240
ET040	0.15	28	170
ET050	0.12	37	200
ET060	0.29	110	530
ET070	0.25	94	460
ET080	0.29	110	520
ET090	0.12	26	130
ET100	0.05	11	72
ET110	0.23	24	200
ET120	0.11	11	89
ET130	0.13	11	85
ET140	0.27	16	120
ET150	0.18	17	140
ET160	0.19	19	140
FS010	0.12	6	75
JET010	0.15	29	150
JET020	0.36	74	390
JET030	0.56	97	580
JET040	0.71	27	570
JET050	0.83	11	530
JET060	1.11	13	430
JET070	1.36	94	480
JET080	1.66	15	350
JET090	1.78	26	390
JET100	1.83	27	390
JET110	2.05	40	440
JET120	2.16	49	450
JET130	0.13	11	85
JET140	0.40	26	200
JET152	2.57	51	650
JET154	2.74	62	680
JET160	2.93	66	710
JFS010 _OUTLET	0.12	6	75
JMT010	0.29	1	160
JMT020	0.09	26	140
JMT030	0.25	50	290
JMT040	0.56	110	750
JMT050	0.67	120	850
JMT060	1.16	130	1,000
JMT070	1.36	150	1,200
JMT080	1.42	86	1,200
JMT090	0.04	9	32
JMT102	1.46	91	1,200
JMT104	0.04	9	32
JMT106	1.52	92	1,200
JMT110	1.64	94	1,200
JWT010	0.14	9	89
JWT020	0.07	4	42
JWT030	0.14	9	85
JWT042	0.28	15	170
JWT044	0.46	24	260
JWT050	0.85	43	480
JWT070	0.17	14	130
JWT080	1.09	54	610
JWT090	1.43	68	730
JWT110	1.63	77	840
JWT120	1.77	85	920
JWT140	0.13	32	180
JWT150	0.36	15	170
JWT160	0.47	35	190
JWT172	2.24	99	960
JWT174	2.36	100	990
JWT180	2.46	100	1,000
JWT190	0.06	4	43
JWT200	2.82	110	1,200
JWT210	3.09	120	1,300
JWT220	0.19	47	250
JWT232	3.28	120	1,400
JWT234	3.47	130	1,400
JWT240	3.55	83	1,100
JWT250	3.70	85	1,100
JWT260	3.84	86	1,100
JWT270	0.03	11	57
JWT280	0.27	33	250
JWT292	3.87	86	1,100
JWT294	4.13	96	1,100
JWT296	5.88	160	1,700
JWT300	0.10	12	92
JWT310	6.25	160	1,700
JWT320	6.46	160	1,700
JWT330	0.33	32	250
JWT352	9.69	210	2,400
JWT354	10.30	230	2,500
JWT360	0.07	7	55
JWT372	10.36	230	2,500
JWT374 _OUTLET	10.58	230	2,500
MT010	0.29	28	210
MT020	0.09	26	140
MT030	0.16	39	230
MT040	0.31	95	460
MT050	0.12	17	110
MT060	0.19	30	200
MT070	0.20	25	170
MT080	0.06	62	190
MT090	0.04	40	130
MT100	0.06	17	88
MT110	0.12	19	120
PBH4	0.15	29	150
PBHA	0.10	10	130
PBHB1	0.36	51	270
PBHB2	0.36	15	170
PBHC	0.19	11	160
RMN	1.42	86	1,200
RWU Diversion	3.55	83	1,300
RWU North	3.55	110	1,400
RWU South	3.55	55	1,000
RET020	0.15	29	150
RET030	0.36	71	380
RET040	0.56	95	580

Hydrologic Element	Area (sq mi)	Future Peak Flows (cfs) 2-year	100-year
RET050	0.71	27	570
RET060	0.83	11	530
RET070	1.11	13	430
RET080	1.36	65	420
RET090	1.66	15	350
RET100	1.78	26	390
RET110	1.83	27	390
RET120	2.05	39	430
RET140	0.13	11	85
RET152	2.16	49	450
RET154	0.40	26	200
RET156	2.57	50	650
RET162	2.74	59	680
RET164	2.93	66	710
RMT030	0.09	25	140
RMT040	0.25	49	290
RMT050	0.56	110	750
RMT062	0.29	1	160
RMT064	0.67	120	850
RMT070	1.16	130	1,000
RMT080	1.36	150	1,200
RMT090	0.04	9	32
RMT102	1.42	86	1,200
RMT104	0.04	9	32
RMT106	1.46	91	1,200
RMT112	1.52	92	1,200
RMT114	1.64	94	1,200
RWT030	0.07	4	42
RWT042	0.14	9	85
RWT044	0.14	9	89
RWT046	0.28	15	170
RWT054	0.46	24	260
RWT080	0.17	14	130
RWT092	0.85	43	480
RWT094	1.09	54	610
RWT122	1.43	68	730
RWT124	1.63	77	840
RWT150	0.13	32	180
RWT160	0.36	15	170
RWT172	1.77	85	920
RWT174	0.47	35	180
RWT176	2.24	98	960
RWT180	2.36	100	990
RWT202	2.46	100	1,000
RWT204	0.06	4	43
RWT210	2.82	110	1,200
RWT232	3.09	120	1,300
RWT234	0.19	47	250
RWT236	3.28	120	1,400
RWT240 _Diversion Reach	0.00	30	39
RWT250	3.55	83	1,100
RWT260	3.70	85	1,100
RWT291	3.84	86	1,100
RWT292	0.03	11	57
RWT294	0.27	33	250
RWT295	3.87	86	1,100
RWT296	4.13	96	1,100
RWT312	0.10	12	91
RWT314	5.88	160	1,700
RWT320	6.25	160	1,700
RWT344	9.69	210	2,400
RWT372	10.30	230	2,500
RWT374	10.36	230	2,500
M1	0.06	4	43
M2	0.29	1	160
WH1 North	0.71	88	570
WH1 South	0.71	27	570
WH2	0.83	11	530
WH3	1.11	13	430
WH4	1.66	15	350
WH5	0.04	9	32
WHH	0.56	110	750
WT010	0.14	9	89
WT020	0.07	4	42
WT030	0.08	9	75
WT040	0.19	9	93
WT050	0.19	17	140
WT060	0.20	14	120
WT070	0.17	14	130
WT080	0.07	9	67
WT090	0.15	22	160
WT100	0.19	56	300
WT110	0.19	22	170
WT120	0.05	8	55
WT130	0.10	35	170
WT140	0.13	32	180
WT150	0.23	49	250
WT160	0.11	35	180
WT170	0.12	21	140
WT180	0.10	8	66
WT190	0.06	11	75
WT200	0.30	25	190
WT210	0.27	32	190
WT220	0.19	47	250
WT230	0.20	71	350
WT240	0.08	36	160
WT250	0.15	63	290
WT260	0.14	10	78
WT270	0.03	11	57
WT280	0.27	33	250
WT290	0.10	15	110
WT300	0.10	12	92
WT310	0.28	31	250
WT320	0.21	27	200
WT330	0.33	32	250
WT340	0.28	19	150
WT350	0.30	38	280
WT360	0.07	7	55
WT370	0.21	7	120

Figure 3-13
Future Hydrology
Falcon DBPS
El Paso County, CO

0 0.5 1
Miles

NOTE: FIGURE MUST BE VIEWED IN COLOR

FILE: G:\gis_projects\Falcon_Creek_DBPS\active\apps\20110613\hydrology_future.mxd, 12/22/2011, wilson_wheeler

PAGE FROM FALCON DBPS

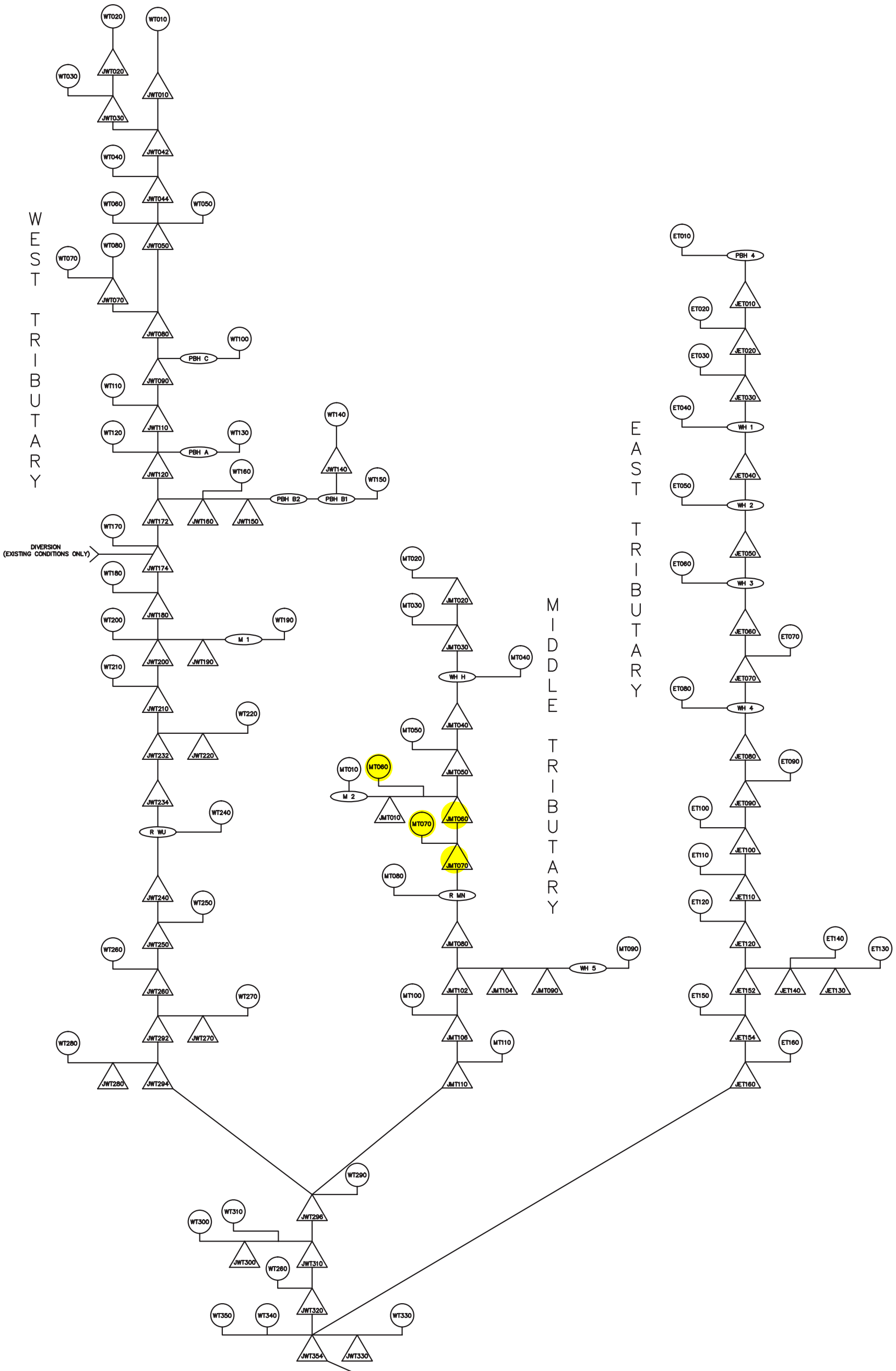


Figure 3-1
Routing Schematic
Falcon DBPS
El Paso County, CO

DRAWING NOT TO SCALE

APPENDIX G

SOILS REPORT

Map Scale: 1:1,470 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 20 40 80 120

Feet: 0 50 100 200 300

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

MAP LEGEND

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

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 23, Aug 29, 2025

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

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

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
8	Blakeland loamy sand, 1 to 9 percent slopes	0.0	0.1%
19	Columbine gravelly sandy loam, 0 to 3 percent slopes	9.1	99.9%
Totals for Area of Interest		**9.1**	**100.0%**

El Paso County Area, Colorado

19—Columbine gravelly sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 367p
Elevation: 6,500 to 7,300 feet
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 46 to 50 degrees F
Frost-free period: 125 to 145 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Columbine

Setting

Landform: Fans, Fan terraces, Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

A - 0 to 14 inches: gravelly sandy loam
C - 14 to 60 inches: very gravelly loamy sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 2.5 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: R049XY214CO - Gravelly Foothill
Hydric soil rating: No

Minor Components

Fluvaquentic haplaquolls

Percent of map unit: 1 percent

Landform: Swales
Hydric soil rating: Yes

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

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

Data Source Information

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 23, Aug 29, 2025

APPENDIX H

GRADING AND STORM DRAINAGE PLANS