FINAL DRAINAGE PLAN
SF 26X

ANTELOPE RIDGE AT
BULL HILL FIL. NO. 1

NOV, 2026

Prepared for:

Eagle Development
212 N. Wahsatch Ave, Suite 301
Colorado Springs, Colorado 80903
(719) 635-3200

Prepared by:

Core Engineering Group, LLC
15004 1ST Avenue South
Burnsville, MN 55306
(719) 570-1100

Project No. 100.302

CORE
ENGINEERING GROUP

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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 El Paso 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.

Richard L. Schindler, P.E. #33997 Date
For and on Behalf of Core Engineering Group, LLC

OWNER'S STATEMENT

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

Eagle Development Date

By
Jeff Mark

Title
Manager

Address
212 N. Wahsatch Avenue, Suite 301, Colorado Springs, CO 80903

EL PASO COUNTY

Filed in accordance with the requirements of the El Paso County Land Development Code, Drainage Criteria Manual, Volume 1 and 2, and Engineering Criteria Manual, As Amended.

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

Conditions: _____

1.0 LOCATION and DESCRIPTION

Antelope Ridge at Bull Hill Filing No. 1 is located east of the East Tributary of Jimmy Camp Creek. The site is located on approximately 164.586 acres of vacant land. This project will develop this site into a single-family residential development with several tracts of land for future development purposes. The land for the project is currently owned by Eagle Development Company and Murray Fountain, LLC.

The site is located in Section 12, Township 15 South and Range 65 West of the 6th Principal Meridian. The site is bounded on the west by the East Tributary of JCC, on the north by Bradley Road, on the east by Meridian Road, and the south by vacant land in Bull Hill. For reference, a vicinity map is included in Appendix A of this report.

Conformance with applicable Drainage Basin Planning Studies

The site is located in the Jimmy Camp Creek Drainage Basin. El Paso County recently adopted a DBPS for Jimmy Camp Creek prepared by Stantec dated February 13, 2025 and is referenced in this report. The only major infrastructure construction recommended by the DBPS is the reconstruction of the East Tributary of Jimmy Camp Creek (Etrib) and a bridge crossing of Bradley Road. Matrix has been working on the Etrib construction plans (CDR234) for several years and has an approved CLOMR from FEMA for the creek construction. The creek construction plans also included abandoning twin 66-inch culverts under Bradley Road that currently drain onto this site. The creek construction, new bridge crossing, and the culvert abandonment will be done prior to and/or in conjunction with the early grading of this project to incorporate the large volume of excess material generated from the creek construction into the early grading. Etrib construction within this site is in conformance with the adopted DBPS.

Antelope Ridge at Bull Hill Filing No. 1 is located within the ***"Jimmy Camp Creek Drainage Basin"***, which is a fee basin in El Paso County. The basin within Bull Hill was recently closed per project DR221 and the basin closure was adopted by the Drainage Board on March 11, 2025. Thus, no drainage fees apply to this project.

Conformance with Bull Hill / Rolling Meadows MDDP (SKP 233) by Core Engineering Group

Core Engineering Group has an approved MDDP for Bull Hill / Rolling Meadows, which covers this study area. This PDR/FDR conforms to the MDDP for Bull Hill and is referenced in this report. The major infrastructure to be constructed in conjunction with this site includes on-site Detention / WQ Pond C.

2.0 DRAINAGE CRITERIA

The supporting drainage design and calculations were performed in accordance with the City of Colorado Springs and El Paso County "Drainage Criteria Manual (DCM)", dated November, 1991, the El Paso County "Engineering Criteria Manual", Chapter 6 and Section 3.2.1 Chapter 13 of the City of Colorado Springs Drainage Criteria Manual dated May 2014, and the UDFCD "Urban Storm Drainage Criteria Manual" Volumes 1, 2 and 3 for inlet sizing and full spectrum ponds. No deviations from these published criteria are requested for this site.

The Rational Method as outlined in Section 6.3.0 of the May 2014 "Drainage Criteria Manual" and in Section 3.2.8.F of the El Paso County "Engineering Criteria Manual" was used for basins less than 130 acres to determine the rainfall and runoff conditions for the proposed development of the site. The runoff rates for the 5-year initial storm and 100-year major design storm were calculated.

Current updates to the Drainage Criteria manual for El Paso County states the if detention is necessary, Full Spectrum Detention will be included in the design, based on this criteria, Full Spectrum Detention will be required for this development.

3.0 EXISTING HYDROLOGICAL CONDITIONS

This site is currently undeveloped with native vegetation (grass with no shrubs) and moderate slopes in a westerly direction the East Tributary of Jimmy Camp Creek.

The Soil Conservation Service (SCS) classifies the soils within the Antelope Ridge at Bull Hill property as Sampson Loam and Tassel Fine Sandy Loam [2]. The loams are considered hydrologic soil group B soils with slow permeability and the Fine Sandy Loam has a moderate permeability. These soils have low to medium susceptible to erosion by wind and water and have low to moderate shrink-swell potential. (see table 3.1 below).

The Soil Conservation Service (SCS) classifies the soils within the study area per Table 3.1.

Table 3.1: SCS Soils Survey for Entire Study Area

Soil No.	Soil	Hydro. Group	Shrink/Swell Potential	Permeability	Surface Runoff Potential	Erosion Hazard
78	Sampson Loam (12.7%)	B	Moderate	Slow	Low	Slight
89	Tassel Fine Sandy Loam (20.9%)	D	Low	Moderately Rapid	Medium	Moderate to High

Excerpts from the SCS "Soil Survey of El Paso County Area, Colorado" are provided in ***Appendix A*** for further reference.

For preparing hydrologic calculations for this report, the soil of each basin are assumed to be wholly comprised of the majority soil hydrologic group.

An existing electrical easement, with existing transmission towers, is located on the east side of this site and will be set aside as open space in the future.

This site is located within the delineated 100-year floodplain of the East Tributary of Jimmy Camp Creek per the Federal Emergency Management Agency (FEMA) Flood Rate Insurance Map (FIRM) number 08041C0790G dated December 7, 2018.

Basin ET-28
This offsite-basin is located east of Meridian Road extended, approximately 1700' south of Bradley Road. The existing electrical easement, within existing transmission towers is located on the west side. This basin contains 69.31 acres; runoff is directed westerly and southerly. The calculated historic flows are 21.2cfs and 125.7cfs for the 5-year and 100-year storm events respectively.

Basin ET-31
This offsite-basin is located east of Meridian Road extended, adjacent and south of Bradley Road, and contains 28.35 acres; runoff is directed westerly to existing basin EX-S4 and is routed to design point S1. The calculated historic flows are 12.2cfs and 68.1cfs for the 5-year and 100-year storm events respectively.

Basin EX-S4
This basin is located in the east-central portion of the site, adjacent and south of Bradley Road and east of Meridian Road extended, contains 84.39 acres; runoff is routed westerly to design point S1 near

Bradley Road. Existing condition flows from this basin are 19.4cfs and 116.6cfs for the 5-year and 100-year storm events respectively. These flows combined with the offsite basin ET-31 flows will be routed to design point S1.

Design Point S1
This existing flow design point is located south of Bradley Road and west of Meridian Road under the electric transmission lines and contains 112.74 acres. The flow is from Basin ET-31 and EX-S4 and is calculated using the Rational Method. The existing flows are 23.8cfs and 140.3cfs for the 5-year and 100-year storm events respectively.

Basin EX-S5
This basin is located in the east-center portion of the site, south of Bradley Road, contains 94.81 acres; runoff is routed westerly and southerly to design point S3 at the East Tributary of Jimmy Camp Creek. Existing condition flows from this basin are 18.0cfs and 112.5cfs for the 5-year and 100-year storm events respectively.

Design Point S3
This existing flow design point is located south of Bradley Road and west of Meridian Road and combines flow from Design Point S1 and Basin Ex-S5 and contains 207.55 acres. The flow is from Basin ET-31, EX-S4, EX-S5 and is calculated using the Rational Method. The existing flows are 39.0cfs and 235.5cfs for the 5-year and 100-year storm events respectively.

Basin EX-S6
This basin is located in the south-central portion of the site, located south of and adjacent to Bradley Road, contains 207.92 acres; runoff is routed southeasterly to the East Tributary of Jimmy Camp Creek. Existing condition flows from this basin flow directly to the East Tributary and are 21.7cfs and 153.6cfs for the 5-year and 100-year storm events respectively.

Design Point E1-T1-5
This existing flow design point is located on the north side of Bradley Road at existing twin 66" RCP culverts. The existing flows from the Stantec DBPS are 15cfs and 172cfs for the 5-year and 100-year storm events respectively. These culverts will be abandoned per the Matrix CLOMR and the flow will be routed west to the East Tributary on the north side of Bradley Road.

Design Point E2-2
This existing flow design point is located at the East Tributary of Jimmy Camp Creek crossing of Bradley Road consisting of twin 8'x12' box culverts. The existing flows from the Stantec DBPS are 33cfs and 568cfs for the 5-year and 100-year storm events respectively. These box culverts do not currently pass the 100year flow and the flow overtops Bradley Road and flow southerly. The two box culverts will be removed and replaced with a CONSPAN structure which increases capacity so the road is not overtopped per the Matrix CLOMR.

4.0 DEVELOPED HYDROLOGICAL CONDITIONS

Hydrology for **Antelope Ridge at Bull Hill** drainage report was based on the City of Colorado Springs/El Paso County Drainage Criteria. Sub-basins that lie within this project were determined and the 5-year and 100-year peak discharges for the developed conditions have been presented in this report. Based on these flows, storm inlets will be added when the street capacity is exceeded.

Soil type B and D has been assumed for the developed hydrologic conditions. See Appendix A for SCS Soils Map.

The time of concentration for each basin and sub-basin was developed using an overland, ditch, street and pipe flow components. The maximum overland flow length for developed conditions was limited to

100 feet. Travel time velocities ranged from 2 to 6 feet per second. The travel time calculations are included in the back of this report.

Runoff coefficients for the various land uses were obtained from Table 6-6 dated May, 2014 from the updated City of Colorado Springs/El Paso County Drainage Criteria Manual. See Appendix B.

Drainage concepts for each of the basins are briefly discussed as follows:

Basin C1.1
This basin consists of runoff from undeveloped land which will eventually be developed as a school site. Runoff will be directed south overland to Echoing Grass Way to Design Point C5 where it will be collected by a flared end section and storm sewer. The undeveloped flow from this basin is 4.5cfs and 27.5cfs for the 5/100-year storm event. Future development of the school site will require an on-site WQ/Detention pond with discharge rates limited to the undeveloped runoff rates at Design Point C5. See the appendix for detailed calculations.

Basin C2.1
This basin consists of runoff from undeveloped land and open space under the electric transmission lines. Runoff will be directed west overland to Design Point C1 where it will be collected by a CDOT Type D inlet in sump condition. The undeveloped flow from this basin is 2.9cfs and 15.7cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin C2.2
This basin consists of runoff from open space under the electric transmission lines, Buffalo Hill Way, residential development, and Hoof Hallow Place. Runoff will be directed west overland to Hoof Hallow Place then in curb/gutter to Design Point C2 where it will be collected by a CDOT Type R inlet in sump condition. The developed flow from this basin is 4.5cfs and 14.1cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin C2.3
This basin consists of runoff from residential development, Hoof Hallow Place and Fox Den Way. Runoff will be directed southwesterly to Fox Den Way via curb/gutter to Design Point C4 where it will be collected by a Type R on-grade inlet. The developed flow from this basin is 7.1cfs and 15.2cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin C2.4
This basin consists of runoff from residential development, Hoof Hallow Place and Fox Den Way. Runoff will be directed southwesterly to Fox Den Way via curb/gutter to Design Point C6where it will be collected by a Type R sump inlet. The developed flow from this basin is 4.1cfs and 9.0cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin C2.5
This basin consists of runoff from residential development, Calf Creek Drive, and Fox Den Way. Runoff will be directed southeasterly to Fox Den Way via curb/gutter to Design Point C6 where it will be collected by a Type R sump inlet. The developed flow from this basin is 2.9cfs and 5.3cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin C2.6
This basin consists of runoff from residential development and Prairie Pine Trail. Runoff will be directed southwesterly via curb/gutter to Design Point C8 where it will be collected by a Type R on-grade inlet. The developed flow from this basin is 3.5cfs and 7.9cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin C2.7
This basin consists of runoff from residential development, Mossy Creek Trail, and Prairie Pine Trail. Runoff will be directed southwesterly via curb/gutter to Design Point C9 where it will be collected by a Type R on-grade inlet. The developed flow from this basin is 6.8cfs and 14.8cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin C2.8
This basin consists of runoff from residential development, Fox Den Way, Echoing Grass Way, and Prairie Pine Trail. Runoff will be directed southwesterly via curb/gutter to Design Point C12 where it will be collected by a Type R on-grade inlet. The developed flow from this basin is 4.6cfs and 10.0cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin C2.9
This basin consists of runoff from residential development, Fox Den Way, Echoing Grass Way, and Prairie Pine Trail. Runoff will be directed southeasterly via curb/gutter to Design Point C13 where it will be collected by a 20' Type R on-grade inlet. The developed flow from this basin is 9.9cfs and 20.9cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin C2.10
This basin consists of runoff from undeveloped land, open space under the electric transmission easement, residential development, Hoof Hallow Place, and Buffalo Hills Way. Runoff will be directed southwesterly via curb/gutter to Design Point C15 where it will be collected by a Type R on-grade inlet. The developed flow from this basin is 5.9cfs and 17.7cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin C2.11
This basin consists of runoff from residential development and Buffalo Hills Way. Runoff will be directed southwesterly via curb/gutter to Design Point C16 where it will be collected by a Type R on-grade inlet. The developed flow from this basin is 5.4cfs and 12.0cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin C2.12
This basin consists of runoff from residential development, Buffalo Hills Way, and Echoing Grass Way. Runoff will be directed southerly via curb/gutter to Design Point C21 where it will be collected by a Type R sump inlet. The developed flow from this basin is 5.5cfs and 12.1cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin C2.13
This basin consists of runoff from residential development, Buffalo Hills Way, and Echoing Grass Way. Runoff will be directed southeasterly via curb/gutter to Design Point C19 where it will be collected by a Type R on-grade inlet. The developed flow from this basin is 6.9cfs and 15.3cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin C2.14
This basin consists of runoff from residential development and Rolling Meadow Parkway. Runoff will be directed southeasterly via curb/gutter to Design Point C21 where it will be collected by a Type R sump inlet. The developed flow from this basin is 5.2cfs and 11.5cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin C2.15
This basin consists of runoff from Prairie Song Drive. Runoff will be directed southwesterly via curb/gutter to Design Point C22 where it will be collected by a Type R on-grade inlet. The developed flow from this basin is 7.3cfs and 15.5cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin C2.16
This basin consists of runoff from undeveloped land, open space under the electric transmission easement, Hoof Hallow Place, residential development, and Prairie Song Drive. Runoff will be directed southwesterly via curb/gutter to Design Point C23 where it will be collected by a Type R on-grade inlet. The developed flow from this basin is 9.3cfs and 25.6cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin C2.17
This basin consists of runoff from residential development and Rolling Meadow Parkway. Runoff will be directed northwesterly via curb/gutter to Design Point C21 where it will be collected by a Type R sump inlet. The developed flow from this basin is 4.4cfs and 9.8cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin C2.18
This basin consists of runoff from Rolling Meadow Parkway. Runoff will be directed northwesterly via curb/gutter to Design Point C27 where it will be collected by a Type R sump inlet. The developed flow from this basin is 5.5cfs and 9.8cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin C3.1
This basin consists of runoff from residential development and Sunlit Meadow Trail. Runoff will be directed southerly via curb/gutter to Design Point C31 where it will be collected by a Type R on-grade inlet. The developed flow from this basin is 4.7cfs and 10.3cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin C3.2
This basin consists of runoff from residential development, Sunlit Meadow Trail, Rolling Meadows Parkway, and Echoing Grass Way. Runoff will be directed southerly via curb/gutter to Design Point C32 where it will be collected by a Type R sump inlet. The developed flow from this basin is 7.2cfs and 15.9cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin C3.3
This basin consists of runoff from residential development and Echoing Grass Way. Runoff will be directed easterly via curb/gutter to Design Point C32 where it will be collected by a Type R sump inlet. The developed flow from this basin is 1.2cfs and 2.6cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin C3.4
This basin consists of runoff from residential development and Echoing Grass Way. Runoff will be directed southerly and easterly via curb/gutter to Design Point C33 where it will be collected by a Type R sump inlet. The developed flow from this basin is 1.0cfs and 2.3cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin ET28a
This basin consists of runoff from undeveloped vacant land east of Meridian Road and 0.54acres of Meridian Road. Runoff will be directed westerly overland and then southerly via curb/gutter to Design Point ET1 where it will flow overland to the south as in existing conditions. The developed flow from this basin is 2.0cfs and 6.6cfs for the 5/100-year storm event. For water quality of the 0.54acres of developed land in this basin we are seeking to use the 1-acre exclusion rule for the 0.54acres of developed land. Runoff does flow over 4000 feet of vacant Bull Hill land prior to entering the East Tributary. See the appendix for detailed calculations.

Basin ET31a
This basin consists of runoff from undeveloped vacant land east of Meridian Road, Bradley Road, and Meridian Road. Runoff will be directed westerly overland and then southerly via curb/gutter to Design

Point D21a where it will be collected by a Type R on-grade inlet. The developed flow from this basin is 6.4cfs and 28.3cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin ET31b
This basin consists of runoff from undeveloped vacant land east of Meridian Road and Meridian Road. Runoff will be directed westerly overland and then southerly via curb/gutter to Design Point D21c where it will be collected by a Type R sump inlet. The developed flow from this basin is 5.3cfs and 28.3cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin ET31c
This basin consists of runoff from undeveloped vacant land east of Meridian Road and Meridian Road. Runoff will be directed westerly overland and then northerly via curb/gutter to Design Point D21c where it will be collected by a Type R sump inlet. The developed flow from this basin is 3.2cfs and 17.3cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin D1.1
This basin consists of runoff from Meridian Road. Runoff will be directed via curb/gutter to Design Point D21e where it will be collected by a Type R sump inlet. The developed flow from this basin is 7.1cfs and 12.8cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin D1.2
This basin consists of runoff from undeveloped land in Bull Hill and open space under the electric transmission line. Runoff will be directed northwesterly overland to Design Point D21 where it will be enter Swale 'D2/D3' flowing west (see Design Pt. D21) towards the Etrib. Some runoff will be collected by a storm sewer at Design Point D26 and the remainder will be allowed to overtop the swale and flow west to the East Tributary at Design Point D26a. The existing flow from this basin is 65.4cfs and 173.7cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin D2.1
This basin consists of runoff from undeveloped land which will eventually be developed as an electric substation site. Runoff will be directed east overland to an on-site substation WQ/Detention Pond then south to Design Point D1. The undeveloped flow from this basin is 1.4cfs and 9.7cfs for the 5/100-year storm event. Future development of the substation site will require an on-site substation WQ/Detention pond with discharge rates limited to the undeveloped site runoff rates. See the appendix for detailed calculations.

Basin D2.2
This basin consists of runoff from open space under an electric transmission line. Runoff will be directed west overland to Design Point D1. The existing flow from this basin is 2.3cfs and 15.7cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin D2.3
This basin consists of runoff from the electric substation site. This area does not include runoff from the transformer portions of the site. Runoff will be directed southeast overland to low point at Design Point D2. At Design Point 2 a small area inlet will connect to an on-site substation drainage system which flows east to the substation pond area where runoff will be detained/treated in the substation pond. The developed flow from this basin is 0.4cfs and 2.6cfs for the 5/100-year storm event and will be added to the flow at Design Point 1. See the appendix for detailed calculations.

Basin D2.4
This basin consists of runoff from residential development, Emerald Glen Lane N and Prairie Pine Trail. Runoff will be directed southwesterly via curb/gutter to Design Point D4 where it will be collected by a

Type R on-grade inlet. The developed flow from this basin is 5.3cfs and 11.6cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin D2.5
This basin consists of runoff from residential development, Emerald Glen Lane N, Emerald Glen Lane S, and Prairie Pine Trail. Runoff will be directed southwesterly via curb/gutter to Design Point D5 where it will be collected by a Type R on-grade inlet. The developed flow from this basin is 6.9cfs and 15.2cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin D2.6
This basin consists of runoff from residential development, Emerald Glen Lane S, and Sky Blue Way. Runoff will be directed southwesterly via curb/gutter to Design Point D7 where it will be collected by a Type R on-grade inlet. The developed flow from this basin is 3.4cfs and 7.5cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin D2.7
This basin consists of runoff from residential development, Hoof Hallow Place, and Calf Creek Drive. Runoff will be directed southwesterly via curb/gutter to Design Point D8 where it will be collected by a Type R on-grade inlet. The developed flow from this basin is 5.5cfs and 14.8cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin D2.8
This basin consists of runoff from residential development, Sky Blue Way, and Calf Creek Drive. Runoff will be directed westerly via curb/gutter to Design Point D11 where it will be collected by a Type R on-grade inlet. The developed flow from this basin is 4.2cfs and 10.0cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin D2.9
This basin consists of runoff from a future townhome residential development. Runoff will be directed south via future drainage systems to Design Point D12 where it will be collected by a storm sewer stub. Pre-developed flows will drain to a temporary sediment basin located at the storm sewer stub. The future developed flow from this basin is 8.6cfs and 20.9cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin D2.10
This basin consists of runoff from residential development, Prairie Pine Trail, Buffalo Hills Way, and Calf Creek Drive. Runoff will be directed westerly via curb/gutter to Design Point D14 where it will be collected by a Type R sump inlet. The developed flow from this basin is 2.4cfs and 5.8cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin D2.11
This basin consists of runoff from a future townhome residential development and Rolling Meadow Parkway. Runoff will be directed south via curb/gutter to Design Point D15 where it will be collected by a Type R sump inlet. The developed flow from this basin is 4.0cfs and 9.7cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin D2.12
This basin consists of runoff from a future commercial development. Runoff will be directed south via future drainage systems to Design Point D17 where it will be collected by a storm sewer stub. Pre-developed flows will drain to a temporary sediment basin located at the storm sewer stub. The future developed flow from this basin is 28.4cfs and 51.7cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin D2.13
This basin consists of runoff from future commercial development, Rolling Meadow Parkway, and Calf Creek Drive. Runoff will be directed westerly via curb/gutter to Design Point D18 where it will be collected by a Type R sump inlet. The developed flow from this basin is 6.7cfs and 12.3cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin D2.14
This basin consists of runoff from residential development and Calf Creek Drive. Runoff will be directed westerly via curb/gutter to Design Point D19 where it will be collected by a Type R sump inlet. The developed flow from this basin is 0.6cfs and 1.4cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin D2.15
This basin consists of runoff from residential development and Echoing Grass Way. Runoff will be directed southerly via curb/gutter to Design Point D29 where it will be collected by a Type R sump inlet. The developed flow from this basin is 4.9cfs and 11.8cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin D2.16
This basin consists of runoff from residential development and Echoing Grass Way. Runoff will be directed northerly via curb/gutter to Design Point D29 where it will be collected by a Type R sump inlet. The developed flow from this basin is 3.4cfs and 8.3cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin D2.17
This basin consists of runoff from residential development and Echoing Grass Way. Runoff will be directed southerly and northerly via curb/gutter to Design Point D30 where it will be collected by a Type R sump inlet. The developed flow from this basin is 5.0cfs and 12.0cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin D2.18
This basin consists of runoff from residential development and Pond C. Runoff flows directly into Pond C. The developed flow from this basin is 6.3cfs and 32.5cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin D2.19
This basin consists of runoff from open space areas and the Etrib of JCC. Runoff flows directly into the Etrib of JCC. The flow from this basin is 7.5cfs and 46.5cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin D3.1
This basin consists of runoff from a roadside swale on the south side of Bradley Road. Runoff will be directed westerly via a Swale D2/D3 to Design Point D22a where it will flow under Rolling Meadow Parkway in a storm sewer system. See Design Point D22a for Swale D2/D3 design. The developed flow from this basin is 0.9cfs and 5.8cfs for the 5/100-year storm event. See the appendix for detailed calculations.

Basin D3.2
This basin consists of runoff from the south side of Bradley Road which includes the future widening of the street to a multi-lane arterial. Runoff will be directed westerly via future curb/gutter to Design Point D22 where it will be collected by a Type R on-grade inlet that flows to Design Point D22a. The future developed flow from this basin is 8.9cfs and 15.9cfs for the 5/100-year storm event. See the appendix for detailed calculations. If an interim condition of Bradley Road is constructed without curb/gutter then

the developed runoff from the street can flow overland directly to Swale D2/D3 on the south side of Bradley Road.

Basin D3.3
This basin consists of runoff from the north side of Bradley Road which includes the future widening of the street to a multi-lane arterial. Runoff will be directed westerly via future curb/gutter to Design Point D23 where it will be collected by a Type R sump inlet that flows to Design Point D26. The future developed flow from this basin is 12.4cfs and 22.3cfs for the 5/100-year storm event. See the appendix for detailed calculations. If an interim condition of Bradley Road is constructed without curb/gutter then the developed runoff from the street can flow overland to the south to Swale D1 and Design Point D26 where runoff is collected and conveyed to Pond C. Water quality for the street runoff not entering Swale D1 will have to be evaluated at that time.

Basin D3.4
This basin consists of runoff from the south side of Bradley Road which includes the future widening of the street to a multi-lane arterial. Runoff will be directed easterly via future curb/gutter to Design Point D25 where it will be collected by a Type R Inlet that flows to Design Point D26. The future developed flow from this basin is 5.6cfs and 9.9cfs for the 5/100-year storm event. See the appendix for detailed calculations. If an interim condition of Bradley Road is constructed without curb/gutter then the developed runoff from the street can flow overland directly to Swale D1 on the south side of Bradley Road and then to Design Point D26.

Basin D3.5
This basin consists of runoff from a roadside swale on the south side of Bradley Road. Runoff will be directed westerly via a swale to Design Point D26 where it will flow south in a storm sewer system to Pond C. The developed flow from this basin is 0.3cfs and 1.9cfs for the 5/100-year storm event. See the appendix for detailed calculations.

See the Developed Conditions Hydrology Calculations in the back of this report and the Developed Conditions Drainage Map (Map Pocket) for the 5-year and 100-year storm event amounts.

5.0 HYDRAULIC SUMMARY

The sizing of the hydraulic structures and detentions ponds were prepared by using the *StormSewers* and *Hydrographs* computer software programs developed by Intellisolve, which conforms to the methods outlined in the "City of Colorado Springs/El Paso County Drainage Criteria Manual". Street capacities and Inlets were sized by Denver Urban Drainage's xcel spreadsheet UD-Inlet.

It is the intent of this drainage report to use the proposed curb/gutter and storm sewer in the streets to convey runoff to detention and water quality ponds then to the East Tributary of Jimmy Camp Creek. Inlet size and location are preliminary only as shown on the storm sewer layout in the appendix. See Appendix C for detailed hydraulic calculations and the storm sewer model.

Table 1: Street Capacities (100-year capacity is only ½ of street)

	Residential Local		Residential Collector		Principal Arterial	
Street Slope	5-year	100-year	5-year	100-year	5-year	100-year
0.5%	6.3	26.4	9.7	29.3	9.5	28.5
0.6%	6.9	28.9	10.6	32.1	10.4	31.2
0.7%	7.5	31.2	11.5	34.6	11.2	33.7
0.8%	8.0	33.4	12.3	37.0	12.0	36.0
0.9%	8.5	35.4	13.0	39.3	12.7	38.2
1.0%	9.0	37.3	13.7	41.4	13.4	40.2

1.4%	10.5	44.1	16.2	49.0	15.9	47.6
1.8%	12.0	45.4	18.4	50.4	18.0	50.4
2.2%	13.3	42.8	19.4	47.5	19.5	47.5
2.6%	14.4	40.7	18.5	45.1	18.5	45.1
3.0%	15.5	39.0	17.7	43.2	17.8	43.2
3.5%	16.7	37.2	16.9	41.3	17.0	41.3
4.0%	17.9	35.7	16.2	39.7	16.3	39.7
4.5%	19.0	34.5	15.7	38.3	15.7	38.3
5.0%	19.9	33.4	15.2	37.1	15.2	37.1

Note: All flows are in cfs (cubic feet per second)

Design Point C1

Design Point C1 is located in the electric transmission line easement on a rear lot line northeast of Hoof Hallow Place/Fox Den Way. A CDOT Type D inlet will capture runoff and convey it via an 18" storm sewer downstream. The total pipe flow is 2.9cfs/15.7cfs in the 5/100-year storm events for this basin. Backyard Swale 'A' will convey runoff to the inlet. See appendix for Swale 'A' hydraulic calculations.

Design Point C2

Design Point C2 is located in the NE corner of Hoof Hallow Place/Fox Den Way and accepts flows from Basin C2.2.

(5-year storm)
Tributary Basins: C2.2 **Inlet/MH Number:** Inlet C2.2
Upstream flowby: 0 **Total Street Flow:** 4.5cfs

Flow Intercepted: 4.5cfs **Flow Bypassed:** 0
Inlet Size: 15' type R, sump

Street Capacity: Street slope = 0.7%, capacity = 7.5cfs, okay

(100-year storm)
Tributary Basins: C2.2 **Inlet/MH Number:** Inlet C2.2
Upstream flowby: 0 **Total Street Flow:** 14.1cfs

Flow Intercepted: 14.1cfs **Flow Bypassed:** 0
Inlet Size: 15' type R, sump

Street Capacity: Street slope = 0.7%, capacity = 31.2cfs (half street) is okay

Design Point C3

Design Point C3 is the storm sewer pipe flow in Fox Den Way at Hoof Hallow Place by adding flows. The total pipe flow is 7.4cfs/29.8cfs in the 5/100-year storm events in the storm sewer.

Design Point C4
Design Point C4 is located on Fox Den Way and accepts flows from Basin C2.3.

(5-year storm)
Tributary Basins: C2.3 **Inlet/MH Number:** Inlet C4
Upstream flowby: 0 **Total Street Flow:** 7.1cfs

Flow Intercepted: 5.9cfs **Flow Bypassed:** 1.2 to Des.Pt. C12
Inlet Size: 10' type R, on-grade

Street Capacity: Street slope = 1.38%, capacity = 8.4cfs, okay

(100-year storm)
Tributary Basins: C2.3 **Inlet/MH Number:** Inlet C4
Upstream flowby: **Total Street Flow:** 15.2cfs

Flow Intercepted: 8.7cfs **Flow Bypassed:** 6.5cfs to Des.Pt. C12
Inlet Size: 10' type R, on-grade

Street Capacity: Street slope = 1.38%, capacity = 33.6cfs (half street) is okay

Design Point C4a
Design Point C4a is the storm sewer pipe flow in Fox Den Way by adding upstream flows. The total pipe flow is 13.3cfs/38.5cfs in the 5/100-year storm events in the storm sewer.

Design Point C5
Design Point C5 is located northeast of Fox Den Way/Echoing Grass Way. A 24" flared end section and pipe will capture runoff and convey it southwest downstream. The total flow is 4.5cfs/27.5cfs in the 5/100-year storm events for this basin. This design point is also the outfall point for runoff from the future school site. For the purposes of this report, a concept pond for the school site was calculated to verify the downstream storm sewer system's ability to serve the future school. When the school site is developed the future pond design will need to adjust flow outfall rates to match existing condition runoff calculated for this basin.

Design Point C6
Design Point C6 is located in the NE corner of Echoing Grass Way/Fox Den Way and accepts flows from Basins C2.4+C2.5 and upstream runby.

(5-year storm)
Tributary Basins: C2.4+C2.5 **Inlet/MH Number:** Inlet C6
Upstream flowby: 0 **Total Street Flow:** 7.0cfs

Flow Intercepted: 7.0cfs **Flow Bypassed:** 0
Inlet Size: 20' type R, sump

Street Capacity: Street slope = 0.9%, capacity = 8.5cfs, okay

(100-year storm)
Tributary Basins: C2.4+C2.5 **Inlet/MH Number:** Inlet C6
Upstream flowby: 2.8cfs from Des.Pt D8 **Total Street Flow:** 14.3+2.8=17.1cfs

Flow Intercepted: 17.1cfs **Flow Bypassed:** 0
Inlet Size: 20' type R, sump

Street Capacity: Street slope = 0.9%, capacity = 35.4cfs (half street) is okay

Design Point C6a

Design Point C6a is the storm sewer pipe flow in Echoing Grass Way at Fox Den Way downstream of Des.Pt. 6 using hydraulic calculations and time of concentration in the spreadsheet. The total pipe flow is 9.4cfs/36.3cfs in the 5/100-year storm events in the storm sewer.

Design Point C7

Design Point C7 is the storm sewer pipe flow in Echoing Grass Way at Fox Den Way using hydraulic calculations and time of concentration in the spreadsheet. The total pipe flow is 20.1cfs/72.2cfs in the 5/100-year storm events in the storm sewer.

Design Point C8

Design Point C8 is located on Prairie Pine Trail and accepts flows from Basin C2.6.

(5-year storm)
Tributary Basins: C2.6 **Inlet/MH Number:** Inlet C8
Upstream flowby: 0 **Total Street Flow:** 3.5cfs

Flow Intercepted: 3.5cfs **Flow Bypassed:** 0
Inlet Size: 10' type R, on-grade

Street Capacity: Street slope = 1.0%, capacity = 7.5cfs, okay

(100-year storm)
Tributary Basins: C2.6 **Inlet/MH Number:** Inlet C8
Upstream flowby: 0 **Total Street Flow:** 7.9cfs

Flow Intercepted: 6.2cfs **Flow Bypassed:** 1.7cfs to Des.Pt. C12
Inlet Size: 10' type R, on-grade

Street Capacity: Street slope = 1.0%, capacity = 29.7cfs (half street) is okay

Design Point C9

Design Point C9 is located on Prairie Pine Trail and accepts flows from Basin C2.7

(5-year storm)
Tributary Basins: C2.7 **Inlet/MH Number:** Inlet C9
Upstream flowby: 0 **Total Street Flow:** 6.8cfs

Flow Intercepted: 6.8cfs **Flow Bypassed:** 0
Inlet Size: 15' type R, on-grade

Street Capacity: Street slope = 1.0%, capacity = 7.5cfs, okay

(100-year storm)
Tributary Basins: C2.7 **Inlet/MH Number:** Inlet C9
Upstream flowby: 0 **Total Street Flow:** 14.8cfs

Flow Intercepted: 11.8cfs **Flow Bypassed:** 3.0cfs to Des.Pt. C12
Inlet Size: 15' type R, on-grade

Street Capacity: Street slope = 1.0%, capacity = 29.7cfs (half street) is okay

Design Point C10
Design Point C10 is the storm sewer pipe flow in Prairie Pine Trail by adding upstream flows. The total pipe flow is 10.3cfs/18.0cfs in the 5/100-year storm events in the storm sewer.

Design Point C11
Design Point C11 is the storm sewer pipe flow in Echoing Grass Way using hydraulic calculations and time of concentration in the spreadsheet. The total pipe flow is 27.0cfs/86.9cfs in the 5/100-year storm events in the storm sewer.

Design Point C12
Design Point C12 is located on Echoing Grass Way and accepts flows from Basin C2.8

(5-year storm)
Tributary Basins: C2.8 **Inlet/MH Number:** Inlet C12
Upstream flowby: 1.2cfs (Des.Pt.C4) **Total Street Flow:** 5.8cfs

Flow Intercepted: 5.8cfs **Flow Bypassed:** 0
Inlet Size: 25' type R, on-grade

Street Capacity: Street slope = 1.2%, capacity = 10.0cfs, okay

(100-year storm)
Tributary Basins: C2.8 **Inlet/MH Number:** Inlet C12
Upstream flowby: 6.5cfs (Des.Pt.C4) **Total Street Flow:** 10.0 + 6.5 + 1.7 + 3.0
1.7cfs (Des.Pt.C8) = 21.2cfs
3.0cfs (Des.Pt.C9)

Flow Intercepted: 19.3cfs **Flow Bypassed:** 1.3cfs to Des.Pt. C21
Inlet Size: 25' type R, on-grade

Street Capacity: Street slope = 1.2%, capacity = 32.6cfs (half street) is okay

Design Point C13
Design Point C13 is located on Echoing Grass Way and accepts flows from Basin C2.9

(5-year storm)
Tributary Basins: C2.9 **Inlet/MH Number:** Inlet C13
Upstream flowby: 0 **Total Street Flow:** 9.9cfs

Flow Intercepted: 9.9cfs **Flow Bypassed:** 0
Inlet Size: 20' type R, on-grade

Street Capacity: Street slope = 1.2%, capacity = 10.0cfs, okay

(100-year storm)
Tributary Basins: C2.9 **Inlet/MH Number:** Inlet C13
Upstream flowby: 0 **Total Street Flow:** 20.9cfs

Flow Intercepted: 17.5cfs **Flow Bypassed:** 3.4cfs to Des.Pt. C19
Inlet Size: 20' type R, on-grade

Street Capacity: Street slope = 1.2%, capacity = 32.6cfs (half street) is okay

Design Point C14

Design Point C14 is the storm sewer pipe flow in Echoing Grass Way using hydraulic calculations and time of concentration in the spreadsheet. The total pipe flow is 36.5cfs/107.0cfs in the 5/100-year storm events in the storm sewer.

Design Point C15

Design Point C15 is located on Buffalo Hills Way and accepts flows from Basin C2.10

(5-year storm)

Tributary Basins: C2.10 **Inlet/MH Number:** Inlet C15
Upstream flowby: 0 **Total Street Flow:** 5.9cfs

Flow Intercepted: 5.3cfs **Flow Bypassed:** 0.6 to Des.Pt.C21
Inlet Size: 10' type R, on-grade

Street Capacity: Street slope = 1.8%, capacity = 13.7 cfs, okay

(100-year storm)

Tributary Basins: C2.10 **Inlet/MH Number:** Inlet C15
Upstream flowby: 0 **Total Street Flow:** 17.7cfs

Flow Intercepted: 9.4cfs **Flow Bypassed:** 8.3cfs to Des.Pt. C21
Inlet Size: 10' type R, on-grade

Street Capacity: Street slope = 1.8%, capacity = 37.9cfs (half street) is okay

Design Point C16

Design Point C16 is located on Buffalo Hills Way and accepts flows from Basin C2.11

(5-year storm)

Tributary Basins: C2.11 **Inlet/MH Number:** Inlet C16
Upstream flowby: 0 **Total Street Flow:** 5.4cfs

Flow Intercepted: 5.4cfs **Flow Bypassed:** 0
Inlet Size: 15' type R, on-grade

Street Capacity: Street slope = 1.8%, capacity = 13.7 cfs, okay

(100-year storm)

Tributary Basins: C2.11 **Inlet/MH Number:** Inlet C16
Upstream flowby: 0 **Total Street Flow:** 12.0cfs

Flow Intercepted: 10.4cfs **Flow Bypassed:** 1.6cfs to Des.Pt. C21
Inlet Size: 15' type R, on-grade

Street Capacity: Street slope = 1.8%, capacity = 37.9cfs (half street) is okay

Design Point C17
Design Point C17 is the storm sewer pipe flow in Buffalo Hills Way by adding upstream flows. The total pipe flow is 10.7cfs/19.8cfs in the 5/100-year storm events in the storm sewer.

Design Point C18
Design Point C18 is the storm sewer pipe flow in Echoing Grass Way by adding Des. Pt. C14 & C17. The total pipe flow is 47.2cfs/126.8cfs in the 5/100-year storm events in the storm sewer.

Design Point C19
Design Point C19 is located on Echoing Grass Way and accepts flows from Basin C2.13

(5-year storm)
Tributary Basins: C2.13 **Inlet/MH Number:** Inlet C19
Upstream flowby: 0 **Total Street Flow:** 6.9cfs

Flow Intercepted: 6.9cfs **Flow Bypassed:** 0
Inlet Size: 25' type R, on-grade

Street Capacity: Street slope = 1.1%, capacity = 10.7cfs, okay

(100-year storm)
Tributary Basins: C2.13 **Inlet/MH Number:** Inlet C19
Upstream flowby: 3.4cfs from Des.Pt.C13 **Total Street Flow:** 15.3 + 3.4 = 18.7cfs

Flow Intercepted: 18.1cfs **Flow Bypassed:** 0.6cfs to Des.Pt. C21
Inlet Size: 25' type R, on-grade

Street Capacity: Street slope = 1.1%, capacity = 32.7cfs (half street) is okay

Design Point C20
Design Point C20 is the storm sewer pipe flow in Echoing Grass Way using hydraulic calculations and time of concentration in the spreadsheet. The total pipe flow is 50.4cfs/142.1cfs in the 5/100-year storm events in the storm sewer.

Design Point C21

Design Point C21 is located on Rolling Meadow Parkway and accepts flows from Basin C2.14 (north) and C2.17 (south)

(5-year storm)

Tributary Basins: C2.12, C2.14, C2.17 **Inlet/MH Number:** Inlet C21

Upstream flowby: 0.6 from Des.Pt. C15 **Total Street Flow:** 14.2+.6+.5 = 15.3cfs
0.5 from Des.Pt. C15

Flow Intercepted: 15.3cfs **Flow Bypassed:** 0

Inlet Size: 40' type R, sump, (25' & 15')

Street Capacity: Street slope = 0.7%, capacity = 11.2cfs, okay

(100-year storm)

Tributary Basins: C2.12, C2.14, C2.17 **Inlet/MH Number:** Inlet C21

Upstream flowby: 1.3cfs (Des.Pt.C12) **Total Street Flow:** 31.4+1.3+8.3+1.6+0.6 +9.9 = 53.1cfs
8.3cfs (Des.Pt.C15)
1.6cfs (Des.Pt.C16)
0.6cfs (Des.Pt.C19)
9.9cfs (Des.Pt.C23) from south of inlet

Flow Intercepted: 53.1cfs **Flow Bypassed:** 0

Inlet Size: 40' type R, sump, (25' & 15')

Street Capacity: Street slope = 0.7%, capacity = 33.7cfs (half street) okay since half is from the south of the inlet

Design Point C22

Design Point C22 is located on Rolling Meadow Parkway and Prairie Song Drive and accepts flows from Basin C2.15. A small amount of flow does flow offsite in the 100-year storm event but the 5-year event is entirely collected by Inlet C22 which drains to Pond C and includes the water quality runoff amounts as well.

(5-year storm)

Tributary Basins: C2.15 **Inlet/MH Number:** Inlet C22

Upstream flowby: 0 **Total Street Flow:** 7.2cfs

Flow Intercepted: 7.2cfs **Flow Bypassed:** 0

Inlet Size: 15' type R, on-grade

Street Capacity: Street slope = 1.0%, capacity = 13.7cfs, okay

(100-year storm)

Tributary Basins: C2.15 **Inlet/MH Number:** Inlet C22

Upstream flowby: 0 **Total Street Flow:** 15.6cfs

Flow Intercepted: 12.2cfs **Flow Bypassed:** 3.4cfs-offsite

Inlet Size: 15' type R,on-grade

Street Capacity: Street slope = 1.0%, capacity = 41.4cfs (half street) okay

Design Point C23

Design Point C23 is located on Rolling Meadow Parkway and Prairie Song Drive and accepts flows from Basin C2.16.

(5-year storm)

Tributary Basins: C2.16 **Inlet/MH Number:** Inlet C23
Upstream flowby: 0 **Total Street Flow:** 9.3cfs

Flow Intercepted: 8.8cfs **Flow Bypassed:** 0.5cfs to Des.Pt.21
Inlet Size: 15' type R, on-grade (south side of inlet)

Street Capacity: Street slope = 1.0%, capacity = 13.7cfs, okay

(100-year storm)

Tributary Basins: C2.16 **Inlet/MH Number:** Inlet C23
Upstream flowby: 0 **Total Street Flow:** 25.6cfs

Flow Intercepted: 15.7cfs **Flow Bypassed:** 9.9cfs to Des.Pt. C21
Inlet Size: 15' type R, on-grade (south side of inlet)

Street Capacity: Street slope = 1.0%, capacity = 41.4cfs (half street) is okay

Design Point C24

Design Point C24 is the storm sewer pipe flow in Rolling Meadow Parkway at the roundabout by adding upstream flows. The total pipe flow is 16.0cfs/27.9cfs in the 5/100-year storm events in the storm sewer.

Design Point C25– not used

Design Point C26

Design Point C26 is the storm sewer pipe flow in Rolling Meadow Parkway by adding Des. Pt. C21 & C24. The total pipe flow is 31.3cfs/81.0cfs in the 5/100-year storm events in the storm sewer.

Design Point C27

Design Point C27 is located on Rolling Meadow Parkway at a low point and accepts flows from Basin C2.18.

(5-year storm)

Tributary Basins: C2.18 **Inlet/MH Number:** Inlet C27

Upstream flowby: 0 **Total Street Flow:** 5.5cfs

Flow Intercepted: 5.5cfs **Flow Bypassed:** 0

Inlet Size: 10' type R, sump

Street Capacity: Street slope = 0.7 %, capacity = 11.2cfs, okay

(100-year storm)

Tributary Basins: C2.18 **Inlet/MH Number:** Inlet C27

Upstream flowby: 0 **Total Street Flow:** 9.8cfs

Flow Intercepted: 9.8cfs **Flow Bypassed:** 0

Inlet Size: 10' type R, sump

Street Capacity: Street slope = 0.7%, capacity = 33.7cfs (half street) okay

Design Point C28

Design Point C28 is the storm sewer pipe flow in Rolling Meadow Parkway by adding Des. Pt. C26 & C27. The total pipe flow is 36.8cfs/90.8cfs in the 5/100-year storm events in the storm sewer.

Design Point C29

Design Point C29 is the storm sewer pipe flow from Rolling Meadow Parkway to Pond C using hydraulic calculations and time of concentration +in the spreadsheet. The total pipe flow is 78.5cfs/207.1cfs in the 5/100-year storm events in the storm sewer.

Design Point C30– not used

Design Point C31

Design Point C31 is located on Sunlit Meadow Trail and accepts flows from Basin C3.1.

(5-year storm)

Tributary Basins: C3.1 **Inlet/MH Number:** Inlet C31
Upstream flowby: 0 **Total Street Flow:** 4.7 cfs

Flow Intercepted: 4.1cfs **Flow Bypassed:** 0.6cfs to Des.Pt.32
Inlet Size: 10' type R, on-grade

Street Capacity: Street slope = 0.7%, capacity = 11.4cfs, okay

(100-year storm)

Tributary Basins: C3.1 **Inlet/MH Number:** Inlet C31
Upstream flowby: 0 **Total Street Flow:** 10.3cfs

Flow Intercepted: 6.3cfs **Flow Bypassed:** 4.0cfs to Des.Pt. C32
Inlet Size: 10' type R, on-grade

Street Capacity: Street slope = 0.7%, capacity = 34.3cfs (half street) is okay

Design Point C32

Design Point C32 is located on Echoing Grass Way at a low point and accepts flows from Basin C3.2 and C3.3.

(5-year storm)

Tributary Basins: C3.2 & C3.3 **Inlet/MH Number:** Inlet C32
Upstream flowby: 0.6cfs from Des.Pt. C31 **Total Street Flow:** 8.1 + 0.6 = 8.7cfs

Flow Intercepted: 8.7cfs **Flow Bypassed:** 0
Inlet Size: 25' type R, sump

Street Capacity: Street slope = 1.0%, capacity = 7.5cfs, okay since 1.2cfs (Basin C3.3) comes from west side of the inlet.

(100-year storm)

Tributary Basins: C3.2 & C3.3 **Inlet/MH Number:** Inlet C32

Upstream flowby: 4.0cfs from Des.Pt C31 **Total Street Flow:** 17.9 + 4.0 = 21.9cfs

Flow Intercepted: 21.9cfs **Flow Bypassed:** 0
Inlet Size: 25' type R, sump

Street Capacity: Street slope = 1.0%, capacity = 29.7cfs (half street) okay

Design Point C33
Design Point C33 is located on Echoing Grass Way at a low point and accepts flows from Basin C3.4.

(5-year storm)
Tributary Basins: C3.4 **Inlet/MH Number:** Inlet C33
Upstream flowby: 0 **Total Street Flow:** 1.0cfs

Flow Intercepted: 1.0cfs **Flow Bypassed:** 0
Inlet Size: 5' type R, sump

Street Capacity: Street slope = 1.0%, capacity = 7.5cfs, okay since 1.2cfs (Basin C3.3) comes from west side of the inlet.

(100-year storm)
Tributary Basins: C3.4 **Inlet/MH Number:** Inlet C33

Upstream flowby: 0 **Total Street Flow:** 2.3cfs

Flow Intercepted: 2.3cfs **Flow Bypassed:** 0
Inlet Size: 5' type R, sump

Street Capacity: Street slope = 1.0%, capacity = 29.7cfs (half street) okay

Design Point C34
Design Point C34 is the storm sewer pipe flow from Echoing Grass Way to Pond C using hydraulic calculations and time of concentration in the spreadsheet. The total pipe flow is 13.7cfs/30.1cfs in the 5/100-year storm events in the storm sewer.

Design Point C35
Design Point C35 is the storm sewer pipe flow entering Pond C from Design Points C29 & C34 using hydraulic calculations and time of concentration in the spreadsheet. The total pipe flow is 89.2cfs/230.7cfs in the 5/100-year storm events in the storm sewer.

Design Point D1
Design Point D1 is located southeast of the electric transmission line easement at a low point. Flow is from Basin D2.2 (open space), Basin D2.3, and existing runoff from the future electric substation site (Basin D2.1). Flow drains southwest to a proposed 30" flared end section via an existing natural swale. The existing natural swale used to accept flow from numerous upstream basins (See Design Pt. D21, over 200cfs) but flows been redirect to Swale D2/D3 which leaves only Basin D2.2 flowing to the natural swale. By observation, the natural swale has adequate capacity to handle runoff from Basin D2.2 and the EURV flow from future Pond D (7cfs). Design Point D1 will also accept flow from future Pond D (see MDDP) for the EURV storm event which adds an additional 7cfs to pipe flows for the 5&100 year storm events per the approved MDDP. A 30" flared end section and pipe will capture runoff and convey it southwest downstream. The CALCULATED flow is 3.7cfs/24.9cfs in the 5/100-year storm events for this basin. *The design flow adds 7cfs for a total of 10.7cfs/31.9cfs in the 5/100-year storm events in the pipe*. This design point is also the outfall point for runoff from the future substation site. For the purposes of this report, a concept pond for the substation site was calculated to verify downstream storm sewer system's ability to serve the future substation. When the substation site is developed the future pond design will need to adjust flow outfall rates to match existing conditions runoff calculated for Basin D2.1 and Basin D2.3.

Design Point D2

Design Point D2 is located just west of the substation site at a low point. Flow is from grass/gravel road areas within the substation parcel. No drainage from the transformer areas will flow to this design point. A small area inlet will capture runoff and a substation drainage system will convey the flow east to the substation pond. The total flow is 0.4cfs/2.6cfs in the 5/100-year storm events for this basin.

Design Point D3

Design Point D3 is not used

Design Point D4

Design Point D4 is located on Prairie Pine Trail and accepts flows from Basin D2.4.

(5-year storm)
Tributary Basins: D2.4 **Inlet/MH Number:** Inlet D4
Upstream flowby: 0 **Total Street Flow:** 5.3 cfs

Flow Intercepted: 5.3cfs **Flow Bypassed:** 0
Inlet Size: 15' type R, on-grade

Street Capacity: Street slope = 0.7%, capacity = 8.1cfs, okay

(100-year storm)
Tributary Basins: D2.4 **Inlet/MH Number:** Inlet D4
Upstream flowby: 0 **Total Street Flow:** 11.6cfs

Flow Intercepted: 10.3cfs **Flow Bypassed:** 1.3cfs to Des.Pt. D11
Inlet Size: 15' type R, on-grade

Street Capacity: Street slope = 0.7%, capacity = 24.7cfs (half street) is okay

Design Point D5

Design Point D5 is located on Prairie Pine Trail and accepts flows from Basin D2.5.

(5-year storm)
Tributary Basins: D2.5 **Inlet/MH Number:** Inlet D5
Upstream flowby: 0 **Total Street Flow:** 6.9cfs

Flow Intercepted: 6.9cfs **Flow Bypassed:** 0
Inlet Size: 15' type R, on-grade

Street Capacity: Street slope = 0.7%, capacity = 8.1cfs, okay

(100-year storm)
Tributary Basins: D2.5 **Inlet/MH Number:** Inlet D5
Upstream flowby: 0 **Total Street Flow:** 15.2cfs

Flow Intercepted: 12.1cfs **Flow Bypassed:** 3.1cfs to Des.Pt. D11
Inlet Size: 15' type R, on-grade

Street Capacity: Street slope = 0.7%, capacity = 24.7cfs (half street) is okay

Design Point D6

Design Point D6 is the storm sewer pipe flow on Prairie Pine Trail using hydraulic calculations and time of concentration in the spreadsheet. The CALCULATED pipe flow is 14.0cfs/46.9cfs in the 5/100-year storm events in the storm sewer. *The design flow adds 7cfs for a total of 21.0cfs/53.9cfs in the 5/100-year storm events in the pipe*.

Design Point D7

Design Point D7 is located on Sky Blue Way and accepts flows from Basin D2.6.

(5-year storm)
Tributary Basins: D2.6 **Inlet/MH Number:** Inlet D7
Upstream flowby: 0 **Total Street Flow:** 3.4cfs

Flow Intercepted: 3.4cfs **Flow Bypassed:** 0
Inlet Size: 10' type R, on-grade

Street Capacity: Street slope = 0.5%, capacity = 6.8cfs, okay

(100-year storm)
Tributary Basins: D2.6 **Inlet/MH Number:** Inlet D7
Upstream flowby: 0 **Total Street Flow:** 7.5cfs

Flow Intercepted: 6.1cfs **Flow Bypassed:** 1.4cfs to Des.Pt. D11
Inlet Size: 10' type R, on-grade

Street Capacity: Street slope = 0.5%, capacity = 20.8cfs (half street) is okay

Design Point D8

Design Point D8 is located on Calf Creek Drive and accepts flows from Basin D2.7.

(5-year storm)
Tributary Basins: D2.7 **Inlet/MH Number:** Inlet D8
Upstream flowby: 0 **Total Street Flow:** 5.5cfs

Flow Intercepted: 5.5cfs **Flow Bypassed:** 0
Inlet Size: 15' type R, on-grade

Street Capacity: Street slope = 0.8%, capacity = 6.9cfs, okay

(100-year storm)
Tributary Basins: D2.7 **Inlet/MH Number:** Inlet D8
Upstream flowby: 0 **Total Street Flow:** 14.8cfs

Flow Intercepted: 12.0cfs **Flow Bypassed:** 2.8cfs to Des.Pt. C6
Inlet Size: 15' type R, on-grade

Street Capacity: Street slope = 0.8%, capacity = 26.6cfs (half street) is okay

Design Point D9

Design Point D9 is the storm sewer pipe flow on Calf Creek Drive/Sky Blue Way by adding flows intercepted by the upstream inlets. The total pipe flow is 8.5cfs/18.1cfs (Des.Pt.7+Des.Pt.8) in the 5/100-year storm events in the storm sewer

Design Point D10

Design Point D10 is the storm sewer pipe flow on Calf Creek Drive/Prairie Pine Drive using hydraulic calculations and time of concentration in the spreadsheet. The CALCULATED pipe flow is 18.7cfs/56.8cfs in the 5/100-year storm events in the storm sewer. *The design flow adds 7cfs for a total of 25.7cfs/63.8cfs in the 5/100-year storm events in the pipe*.

Design Point D11

Design Point D11 is located on Calf Creek Drive at Buffalo Hills Way and accepts flows from Basin D2.8.

(5-year storm)

Tributary Basins: D2.8
Upstream flowby: 0
Inlet/MH Number: Inlet D11
Total Street Flow: 4.2cfs

Flow Intercepted: 4.2cfs
Flow Bypassed: 0
Inlet Size: 15' type R, on-grade

Street Capacity: Street slope = 1.0%, capacity = 9.7cfs, okay

(100-year storm)

Tributary Basins: D2.8
Upstream flowby: 1.3cfs (Des.Pt. D4)
3.1cfs (Des.Pt. D5)
1.4cfs (Des.Pt. D7)
Inlet/MH Number: Inlet D11
Total Street Flow: 10.0 + 1.3 + 3.1 + 1.4 =15.8cfs

Flow Intercepted: 12.4cfs
Flow Bypassed: 3.4cfs to Des.Pt. D15
Inlet Size: 15' type R, on-grade

Street Capacity: Street slope = 1.0%, capacity = 29.5cfs (half street) is okay

Design Point D11a

Design Point D11a is the storm sewer pipe flow for storm sewer downstream of Des. Pt. D11. The total pipe flow is 12.8cfs/33.3cfs (Des.Pt.11+Des.Pt.12) in the 5/100-year storm events in the storm sewer.

Design Point D12

Design Point D12 is the storm sewer pipe flow for a storm sewer stub out on Buffalo Hills Way north to serve a future multi-family housing site. The total pipe flow is 8.6cfs/20.9cfs in the 5/100-year storm events in the storm sewer.

Design Point D13

Design Point D13 is the storm sewer pipe flow on Calf Creek Drive/Buffalo Hills Way using hydraulic calculations and time of concentration in the spreadsheet. The CALCULATED pipe flow is 27.5cfs/77.1cfs in the 5/100-year storm events in the storm sewer. *The design flow adds 7cfs for a total of 34.5cfs/84.1cfs in the 5/100-year storm events in the pipe*.

Design Point D14

Design Point D14 is located on Calf Creek Drive east of Rolling Meadow Parkway at a low point and accepts flows from Basin D2.10.

(5-year storm)

Tributary Basins: D2.10 **Inlet/MH Number:** Inlet D14
Upstream flowby: 0 **Total Street Flow:** 2.4cfs

Flow Intercepted: 2.4cfs **Flow Bypassed:** 0
Inlet Size: 5' type R, sump

Street Capacity: Street slope = 1.0%, capacity = 9.7cfs, okay

(100-year storm)

Tributary Basins: D2.10 **Inlet/MH Number:** Inlet D14
Upstream flowby: 0 **Total Street Flow:** 5.8cfs

Flow Intercepted: 5.8cfs **Flow Bypassed:** 0
Inlet Size: 5' type R, sump

Street Capacity: Street slope = 1.0%, capacity = 29.5cfs (half street) is okay

Design Point D15

Design Point D15 is located on Calf Creek Drive east of Rolling Meadow Parkway at a low point and accepts flows from Basin D2.11.

(5-year storm)

Tributary Basins: D2.11 **Inlet/MH Number:** Inlet D15
Upstream flowby: 0 **Total Street Flow:** 4.0cfs

Flow Intercepted: 4.0cfs **Flow Bypassed:** 0
Inlet Size: 15' type R, sump

Street Capacity: Street slope = 1.0%, capacity = 9.7cfs, okay

(100-year storm)

Tributary Basins: D2.11 **Inlet/MH Number:** Inlet D15
Upstream flowby: 3.4cfs from Des.Pt. D11
1.1cfs from Des.Pt. D22 **Total Street Flow:** 9.7 + 3.4 + 1.1= 14.2cfs

Flow Intercepted: 14.2cfs **Flow Bypassed:** 0
Inlet Size: 15' type R, sump

Street Capacity: Street slope = 1.0%, capacity = 29.5cfs (half street) is okay

Design Point D16

Design Point D16 is the storm sewer pipe flow on Calf Creek Drive under Rolling Meadow Parkway using hydraulic calculations and time of concentration in the spreadsheet. The CALCULATED pipe flow is 28.3cfs/85.0cfs in the 5/100-year storm events in the storm sewer. *The design flow adds 7cfs for a total of 35.3cfs/92.0cfs in the 5/100-year storm events in the pipe*.

Design Point D17

Design Point D17 is the storm sewer pipe flow for a storm sewer stub out on Calf Creek Drive at Echoing Grass Way north to serve a portion of the future commercial site. The total flow from Basin D2.12 is 28.4cfs/51.7cfs in the 5/100-year storm events. A portion of the flow is allocated to the storm sewer at this design point and the remainder is allocated to Design Point D27 via future storm sewer. The allocated storm sewer flow is 10.0cfs/30.0cfs in the 5/100-year storm events in the storm sewer at this design point. The remainder of the flow (18.4cfs/21.7cfs in the 5/100-year storm events) from the future commercial will be allocated to Design Point D27 and will be conveyed by a future storm sewer. This allocation will need to be verified when the future commercial land is developed.

Design Point D18

Design Point D18 is located on Calf Creek Drive east of Echoing Grass Way at a low point and accepts flows from Basin D2.13.

(5-year storm)
Tributary Basins: D2.13 **Inlet/MH Number:** Inlet D18
Upstream flowby: 0 **Total Street Flow:** 6.7cfs

Flow Intercepted: 6.7cfs **Flow Bypassed:** 0
Inlet Size: 10' type R, sump

Street Capacity: Street slope = 0.6%, capacity = 6.8cfs, okay

(100-year storm)
Tributary Basins: D2.13 **Inlet/MH Number:** Inlet D18
Upstream flowby: 0 **Total Street Flow:** 12.3cfs

Flow Intercepted: 12.3cfs **Flow Bypassed:** 0
Inlet Size: 10' type R, sump

Street Capacity: Street slope = 0.6%, capacity = 20.8cfs (half street) is okay

Design Point D18a

Design Point D18a is the storm sewer pipe flow for storm sewer downstream of Des. Pt. D18. The total pipe flow is 16.7cfs/42.3cfs (Des.Pt.17+Des.Pt.18) in the 5/100-year storm events in the storm sewer.

Design Point D19

Design Point D19 is located on Calf Creek Drive east of Echoing Grass Way at a low point and accepts flows from Basin D2.14.

(5-year storm)

Tributary Basins: D2.14 **Inlet/MH Number:** Inlet D19
Upstream flowby: 0 **Total Street Flow:** 0.6cfs

Flow Intercepted: 0.6cfs **Flow Bypassed:** 0
Inlet Size: 5' type R, sump

Street Capacity: Street slope = 0.6%, capacity = 6.8cfs, okay

(100-year storm)

Tributary Basins: D2.14 **Inlet/MH Number:** Inlet D19
Upstream flowby: 0 **Total Street Flow:** 1.4cfs

Flow Intercepted: 1.4cfs **Flow Bypassed:** 0
Inlet Size: 5' type R, sump

Street Capacity: Street slope = 0.6%, capacity = 20.8cfs (half street) is okay

Design Point D20

Design Point D20 is the storm sewer pipe flow for storm sewer downstream of Des. Pt. D19. The CALCULATED pipe flow is 52.8cfs/123.8cfs in the 5/100-year storm events in the storm sewer using hydraulic calculations and time of concentration in the spreadsheet. *The design flow adds 7cfs for a total of 59.8cfs/130.8cfs in the 5/100-year storm events in the pipe*.

Design Point D21a

Design Point D21a is located on Meridian Road and accepts flows from Basin ET31a.

(5-year storm)

Tributary Basins: ET31a **Inlet/MH Number:** Inlet D21a
Upstream flowby: 0 **Total Street Flow:** 6.4cfs

Flow Intercepted: 6.4cfs **Flow Bypassed:** 0
Inlet Size: 20' type R, on-grade

Street Capacity: Street slope = 1.0%, capacity = 9.7cfs, okay

(100-year storm)

Tributary Basins: ET31a **Inlet/MH Number:** Inlet D21a
Upstream flowby: 0 **Total Street Flow:** 28.3cfs

Flow Intercepted: 21.1cfs **Flow Bypassed:** 7.2cfs to Des.Pt. D21c
Inlet Size: 20' type R, on-grade

Street Capacity: Street slope = 1.0%, capacity = 29.5cfs (half street) is okay

Design Point D21b

Design Point D21b is a storm sewer stub for future development east of Meridian Road. The stub will be the same size as the downstream storm sewer at Design Point D21c.

Design Point D21c

Design Point D21c is located on Meridian Road at a low point and accepts flows from Basin ET31b,c.

(5-year storm)

Tributary Basins: ET31b,c **Inlet/MH Number:** Inlet D21c
Upstream flowby: 0 **Total Street Flow:** 8.2cfs

Flow Intercepted: 8.2cfs **Flow Bypassed:** 0
Inlet Size: 45' type R, sump

Street Capacity: Street slope = 2.5%, capacity = 18.5cfs, okay

(100-year storm)

Tributary Basins: ET31b,c **Inlet/MH Number:** Inlet D21c
Upstream flowby: 7.2cfs from Des.Pt.D21a **Total Street Flow:** 43.8 + 7.2 = 51.0cfs

Flow Intercepted: 51.0cfs **Flow Bypassed:** 0
Inlet Size: 45' type R, sump

Street Capacity: Street slope = 2.5%, capacity = 45.1cfs (half street) is okay since approximately 17cfs is from the south side

Design Point D21d

Design Point D21d is the storm sewer pipe flow under Meridian Road using hydraulic calculations and time of concentration in the spreadsheet. The total pipe flow is 14.3cfs/70.9cfs in the 5/100-year storm events in the storm sewer.

Design Point D21e

Design Point D21e is located on Meridian Road at a low point and accepts flows from Basin D1.1

(5-year storm)

Tributary Basins: D1.1 **Inlet/MH Number:** Inlet D21e
Upstream flowby: 0 **Total Street Flow:** 7.1cfs

Flow Intercepted: 7.1cfs **Flow Bypassed:** 0
Inlet Size: 10' type R, sump

Street Capacity: Street slope = 2.5%, capacity = 18.5cfs, okay

(100-year storm)

Tributary Basins: D1.1 **Inlet/MH Number:** Inlet D21e
Upstream flowby: 0 **Total Street Flow:** 12.8cfs

Flow Intercepted: 12.8cfs **Flow Bypassed:** 0
Inlet Size: 10' type R, sump

Street Capacity: Street slope = 2.5%, capacity = 45.1cfs (half street), okay

Design Point D21f

Design Point D21f is the storm sewer pipe flow downstream of Meridian Road using hydraulic calculations and time of concentration in the spreadsheet. The total pipe flow is 19.2cfs/79.7cfs in the 5/100-year storm events in the storm sewer. See appendix for rip rap design for the culvert.

Design Point D21

Design Point D21 is the surface runoff entering a diversion swale on the south side of Bradley Road. The runoff entering Swale D2/D3 is from Basin D1.2 and Des.Pt. D21f and is 71.1cfs/212.2cfs in the 5/100-year storm events in the storm sewer. However, Swale D2/D3 will also function as the emergency overflow for future Pond D (see MDDP) which has a design flow of 260cfs. Swale D2/D3 will be a trapezoidal swale with a 5' bottom, 3:1 side slopes, 4' of depth, and a 0.3% longitudinal slope. The sides will be blanketed with straw ECB since velocities are less than 6ft/s.

Design Point D22

Design Point D22 is located on Bradley Road at Rolling Meadow Pkwy and accepts flows from Basin D3.2.

(5-year storm)

Tributary Basins: D3.2 **Inlet/MH Number:** Inlet D22
Upstream flowby: 0 **Total Street Flow:** 8.9cfs

Flow Intercepted: 8.9cfs **Flow Bypassed:** 0
Inlet Size: 20' type R, on-grade

Street Capacity: Street slope = 2.2%, capacity = 17.3cfs, okay

(100-year storm)

Tributary Basins: D3.2 **Inlet/MH Number:** Inlet D22
Upstream flowby: 0 **Total Street Flow:** 15.9cfs

Flow Intercepted: 14.8cfs **Flow Bypassed:** 1.1cfs to Des.Pt. D15
Inlet Size: 20' type R, on-grade

Street Capacity: Street slope = 2.2%, capacity = 57.0cfs (half street) is okay

Design Point D22a

Design Point D22a is the runoff entering a diversion swale on the south side of Bradley Road on the east side of Rolling Meadow Parkway. The runoff entering Swale D2/D3 is from Des.Pt. D21, Des.Pt. D22, and Basin D3.1 and is 73.2cfs/213.4cfs in the 5/100-year storm events in the storm sewer. However, Swale D2/D3 will also function as the emergency overflow for future Pond D (see MDDP) which has a design flow of 260cfs. Swale D2/D3 will be designed for 260cfs. Double 48" culverts will be required to convey runoff under Rolling Meadows Parkway to the west. See appendix for rip rap design for the culverts.

Design Point D23

Design Point D23 is the future runoff intercepted by future inlets to flow to the south side of Bradley Road using hydraulic calculations and time of concentration in the spreadsheet. The total pipe flow is 12.4cfs/22.3cfs in the 5/100-year storm events in the storm sewer. Storm sewer and inlets for this design point are not sized yet because the future roadway has not been determined.

Design Point D24
Design Point D24 is the future runoff intercepted by future inlets to flow to the south side of Bradley Road using hydraulic calculations and time of concentration in the spreadsheet. The total runoff is 5.6cfs/9.9cfs in the 5/100-year storm events in the storm sewer. Storm sewer and inlets for this design point are not sized yet because the future roadway has not been determined.

Design Point D25
Design Point D25 is the storm sewer pipe flow from Bradley Road into the swale on the south side of Bradley Road using hydraulic calculations and time of concentration in the spreadsheet. The total pipe flow is 16.3cfs/29.3cfs in the 5/100-year storm events in the storm sewer. Storm sewer and inlets for this design point are not sized yet because the future roadway has not been determined.

Design Point D26
Design Point D26 is included to calculate the runoff from Basins D3.1-D3.5 (future Bradley Rd) which are required to flow to Pond C to be detained and treated for WQ. The flow is calculated using hydraulic calculations and time of concentration in the spreadsheet. A storm sewer flared end section will be located at this design point to convey the total flow of 25.8cfs/51.4cfs in the 5/100-year storm events south in the storm sewer to Design Point D28.

Design Point D26a
Design Point D26a is included to calculate the flow that will directed west from Swale D overland to the reconstructed Etrib. The 5-year estimated flow is from subtracting Design Pt. 26 from Design Pt. D22a 73.2-cfs-25.8cfs) = 47.4cfs in the 5-year storm event. The 100-year estimated flow is from subtracting Design Pt. 26 from the Design Pt. D22a (future Pond D emergency overflow) (260cfs-51.4cfs) = 208.6cfs in the 100-year storm event.

Design Point D27
Design Point D27 is located at a manhole which will serve as a collection point for the remaining flow from the future commercial site. The estimated flow is 18.4cfs/21.7cfs in the 5/100-year storm events (Basin D12-Des.Pt. D17). This flow will be collected by a future storm sewer system and will be directed to Des.Pt. 27 when the future commercial land is developed.

Design Point D28
Design Point D28 is the storm sewer pipe flow from Basins D2.1 – D2.14 and Basins D3.1-D3.5 using hydraulic calculations and time of concentration in the spreadsheet. The CALCULATED pipe flow is 72.1cfs/162.0cfs in the 5/100-year storm events in the storm sewer. The storm sewer flows south to Des.Pt. 32 and Pond C. *The design flow adds 7cfs for a total of 79.1cfs/169.0cfs in the 5/100-year storm events in the pipe*.

Design Point D29

Design Point D29 is located on Echoing Grass Way at a low point and accepts flows from Basin D2.15 & D2.16.

(5-year storm)

Tributary Basins: D2.15 & D2.16 **Inlet/MH Number:** Inlet D29
Upstream flowby: 0 **Total Street Flow:** 8.1cfs

Flow Intercepted: 8.1cfs **Flow Bypassed:** 0
Inlet Size: 15' type R, sump

Street Capacity: Street slope = 0.6%, capacity = 6.9cfs, okay since half flow is from the south

(100-year storm)

Tributary Basins: D2.15 & D2.16 **Inlet/MH Number:** Inlet D29
Upstream flowby: 0 **Total Street Flow:** 19.6cfs

Flow Intercepted: 15.1cfs **Flow Bypassed:** 4.5 to Des.Pt. D30
Inlet Size: 15' type R, sump

Street Capacity: Street slope = 0.6%, capacity = 28.9cfs (half street), okay since half flow is from the south

Design Point D30

Design Point D30 is located on Echoing Grass Way at a low point and accepts flows from Basin D2.17

(5-year storm)

Tributary Basins: D2.17 **Inlet/MH Number:** Inlet D30
Upstream flowby: 0 **Total Street Flow:** 5.0cfs

Flow Intercepted: 5.0cfs **Flow Bypassed:** 0
Inlet Size: 15' type R, sump

Street Capacity: Street slope = 0.6%, capacity = 6.9cfs, okay

(100-year storm)

Tributary Basins: D2.17 **Inlet/MH Number:** Inlet D30
Upstream flowby: 4.5cfs from Des.Pt. D29 **Total Street Flow:** 12.0 + 4.5 = 16.5cfs

Flow Intercepted: 16.5cfs **Flow Bypassed:** 0
Inlet Size: 15' type R, sump

Street Capacity: Street slope = 0.6%, capacity = 28.9cfs (half street), okay

Design Point D31

Design Point D31 is the storm sewer pipe flow from Echoing Grass Way west to Design Point D32 using hydraulic calculations and time of concentration in the spreadsheet. The total pipe flow is 13.0cfs/31.6cfs in the 5/100-year storm events in the storm sewer. An overflow swale between the lot lines will convey the flow westward to Pond C in the event both inlets become clogged.

Design Point D32
Design Point D32 is the storm sewer pipe flow from Design Point 28 and Design Point D31 using hydraulic calculations and time of concentration in the spreadsheet. The CALCULATED pipe flow is 80.4cfs/182.3cfs in the 5/100-year storm events in the storm sewer flowing south into Pond C. *The design flow adds 7cfs for a total of 87.4cfs/189.3cfs in the 5/100-year storm events in the pipe*.

Design Point D33
Design Point D33 is the total flow into Pond C from Design Point C35, Design Point D32, and Basin D2.18 using hydraulic calculations and time of concentration in the spreadsheet. The total flow into Pond C is 170.3cfs/415.3cfs in the 5/100-year storm events in the storm sewer flowing into Pond C.

Design Point D34
Design Point D34 is the total Pond C outflow into the East Tributary of Jimmy Camp Creek. The total Pond C outflow is 24.4cfs/219.7cfs in the 5/100-year storm events which is around 80% of the CUHP pre-developed hydrograph inflows of 261.0cfs (100-yr stm). This is slightly higher than the MDDP rates of 21.6cfs/172.8cfs in the 5/100-year storm events which is around 70% of the CUHP pre-developed hydrograph inflows of 255.5cfs (100-yr stm). The pond outflow for this report is still well below the CUHP pre-developed inflows of both the MDDP (85.9% of 255.5cfs) and Pond C (80% of 261.0cfs) and should have no adverse impacts on the creek design.

See Pond C discussion in Section 6.0 of this report.

Design Point ET1
Design Point ET1 is the runoff at the south end of Meridian Road at the curb/gutter and receives runoff from Basin ET28a. The developed flow from this basin is 2.0cfs and 6.6cfs for the 5/100-year storm event. Runoff will be allowed to flow southwesterly overland as in existing conditions. Water quality for this design point is required for the 0.54acres of asphalt/curb/boulevard on Meridian Road. For water quality of the 0.54acres of developed land in this basin we are seeking to use the 1-acre exclusion rule for the 0.54acres of developed land. Runoff does flow over 4000 feet of vacant Bull Hill land prior to entering the East Tributary. See the appendix for detailed calculations.

6.0 DETENTION AND WATER QUALITY PONDS

Detention and Storm Water Quality for Antelope Ridge at Bull Hill is required per El Paso County criteria. We have implemented the Full Spectrum approach for detention per the Denver Urban Drainage Districts specifications. Pond C will be constructed to treat/detain storm runoff for this site and to comply with the Bull Hill MDDP. The pond will treat runoff from this site and include access roads, outlet pipes, overflow structures, and low flow channels. This drainage report provides design information on the outlet structure, trickle channel, and the forebays.

Full Spectrum Pond Construction Requirements

Design calculations for all proposed full spectrum ponds are included in this report. Grading and final design details of Pond C is shown on the Early Grading plans for Antelope Ridge at Bull Hill at this time in the Preliminary Plan submittal. The final design of the full spectrum pond consists of an outlet structure, storm sewer outfall, concrete low flow channels, sediment forebays, and overflow weirs. Soil borings, embankment, slope, and compaction requirements for detention ponds can be found in the geotechnical report for the Antelope Ridge at Bull Hill prepared by RMG.

Future Pond C1 and Future MVEA substation Pond
Both of these future ponds will be constructed by others and are located upstream of Pond C. Since these two ponds drain to Pond C, we needed to provide generic pond sizing/routing so the pond outflows can be routed in series to Pond C using the full spectrum spreadsheets. The outflow

hydrographs then can be added to the inflow hydrograph of Pond C to obtain a combined inflow hydrograph for Pond C. The generic pond sizes and combined hydrographs can be found in the appendix. The undetained pre-developed runoff from the vacant land prior to development is similar to the developed pond release rates for the substation and school ponds and should produce similar inflow hydrographs when routing these two ponds into Pond C.

Below are some of the pond parameters:

Substation Pond	School Pond
Watershed Area: 4.5 ac	Watershed Area: 14.29ac
% impervious: 40% (estimated)	% Impervious: 80%
Soil Type A (100%)	Soil Type A (70%), Type C/D (30%)
5yr Outflow: 0.3cfs (1.4cfs max.)	5-yr Outflow: 2.0cfs
100yr Outflow: 5.3cfs (9.7cfs max.)	100-yr Outflow: 19.2cfs

Detention Pond C

This is an on-site permanent full spectrum detention pond that includes water quality and discharges downstream directly into the reconstructed East Tributary of Jimmy Camp Creek. The outlet Structure, low flow channel, forebays, and overflow wall will be built as part of the early grading plan. Pond C is designed in the UDCF Full Spectrum spreadsheets for Water Quality and EURV volumes. The total pond inflow has been calculated using the directly tributary area CUHP Inflow hydrograph (160.9ac) and adding outflows hydrographs from future Pond C1 (school) and the MVEA substation pond (see spreadsheet in appendix). The inflow hydrograph is then inputted in the UD-Detention spreadsheet and routed through Pond C.

The 5-year and 100-year flow rates meet the Bull Hill MDDP and have been modeled in the full spectrum worksheets. The outlet structure is a standard full spectrum extended detention basin structure and the Xcel print outs are in the appendix of this report. See Design Point 34 for discussion on outflow comparisons between the Bull MDDP and this final design. See map in appendix for watershed areas.

- Watershed Area: 160.9 acres
- Watershed Imperviousness: 56%
- Hydrologic Soils Group B (76%, C/D (24%)
- Zone 1 WQCV: 3.01ac-ft, WSEL: 5778.97
- Zone 2 EURV: 9.463ac-ft, WSEL: 5780.68, Top outlet structure set at 5781.00, 30'x6' outlet structure with type C grate
- (5-yr): 10.16ac-ft, WSEL: 5780.84, 24.4cfs
- Zone 3 (100-yr): 17.956ac-ft, WSEL: 5782.36, 219.2cfs
- Pipe Outlet: 60" RCP at 0.5%
- Overflow Spillway: 55' wide bottom, elevation=5782.50
- Micropool Elevation: 5774.50

Water Quality Design

Water quality will be provided by one detention basin for the PUD area with the exception of Basin ET-28a (Meridian Road) and a small portion of the roundabout (see map in appendix). Both areas will be treated by a future pond in future developments of Bull Hill. Only 1.0acres of land in the project site is not treated and we are seeking to use the 1-ac exclusion rule (ECM Appendix I.7.1.C.1.A) for this runoff area. One additional exclusion for ground disturbance is a utility construction exclusion which does not add any impervious areas. There are several separate pervious areas that drain to Pond C and offsite which do not require WQ design which flow to Pond C and offsite. Pond C provides on-site detention and WQ for the remaining proposed areas within this development. See map in appendix for pond areas and WQ areas along with impervious percents.

7.0 DRAINAGE AND BRIDGE FEES

Antelope Ridge at Bull Hill Filing No. 1 is located within the Jimmy Camp Creek drainage basin which is currently a fee basin in El Paso County. Current El Paso County regulations require drainage and bridge fees to be paid for platting of land as part of the plat recordation process. Eagle Development Company has completed the closure of Jimmy Camp Creek drainage basin for Bull Hill and it has approved by The Pikes Peak Drainage Board and El Paso County BOCC (Resolution 24-233). Therefore, no drainage fees or bridge fees are required to be paid at this time.

Table 7.1: Private Drainage Facility Costs (non-reimbursable)

Item	Quantity	Unit	Unit Cost	Item Total
5' Inlet	3	EA	$10,800/EA	$32,400
10' Inlet	9	EA	$10,997/EA	$98,973
15' Inlet	12	EA	$14,873/EA	$178,476
+20' Inlet	8	EA	$16,320/EA	$130,560
Type C/D Inlet	1	EA	7,000	$7,000
18" Storm	1251	LF	$88	$110,088
24" Storm	3424	LF	$105	$359,520
30" Storm	1820	LF	$132	$240,240
36" Storm	1565	LF	$162	$253,530
42" Storm	664	LF	$216	$143,424
48" Storm	626	LF	$263	$164,638
54" Storm	1345	LF	$344	$462,680
60" Storm	163	LF	$402	$65,526
Manholes	32	EA	$10,000	$320,000
			Subtotal	$2,567,055
			Eng/Cont (10%)	$256,705
			Total Est. Cost	$2,823 760

Table 7.2: Bull Hill Metro District Drainage Facility Costs (non-reimbursable)

Item	Quantity	Unit	Unit Cost	Item Total
Full Spectrum Pond Outlet Structure	1	EA	$60,000	$80,000
Pond Forebay	2	EA	$30,000	$60,000
Pond Trickle Channel	1550	LF	$30	$46,500
Pond Access Road	1	EA	$20,000	$20,000
Pond Overflow Structure	1	EA	$10,000	$10,000
Soil Rip Rap	110	CY	$150	$16,500
			Subtotal	$233,000
			Eng/Cont (15%)	$34,950
			Total Est. Cost	$267,950

8.0 FOUR STEP PROCESS

The site has been developed to minimize wherever possible the rate of developed runoff that will leave the site and to provide water quality management for the runoff produced by the site as proposed on the development plan. The following four step process should be considered and incorporated into the storm water collection system and storage facilities where applicable.

Step 1: Employ Runoff Reduction Practices
This project has employed several methods of reducing runoff.

- The street configuration was laid out to minimize the length of streets. Many streets are straight and perpendicular resulting in lots with less wasted space.
- There are large open space buffers under the 325' wide electric transmission easement and a "open space" area next to the East Tributary.
- Construct outlet structures for one Full Spectrum Detention Pond. The full spectrum detention mimics existing storm discharges and includes water quality.

Step 2: Stabilize Drainageways
East Tributary of Jimmy Camp Creek is a major drainageway located west of this site. The East Tributary of JCC will be reconstructed and stabilized per county criteria as part of the Bull Hill development. The design included a natural sand bottom and armored sides.

Step 3: Provide Water Quality Capture Volume
Treatment of the water quality capture volume (WQCV) is required for all new developments. This project will construct one full spectrum stormwater extended detention basin which includes Water Quality Volumes and WQ outlet structures. The majority of the disturbed land within the PUD limits drains to and will be treated by Pond C. See map in appendix for a exhibit of all WQ areas and exclusions.

The following basins do not drain to Pond C and/or are not treated by Pond C for WQ:

- Basin C1.1 – future school site drains to Pond C but will be required to provide on-site wq/detention when school is built
- Basin ET28a – the roadway portions (0.4ac) will be excluded by the 1.0-ac exclusion (ECM Appendix I.7.1.C.1.A) allowed by county criteria. The remaining areas are off-site and undeveloped and will flow to the Etrib without WQ.
- SW corner of Roundabout at Rolling Meadow Pkwy/Prairie Song Dr. – the roadway portions (0.6ac) will be excluded by the 1.0-ac exclusion (ECM Appendix I.7.1.C.1.A) allowed by county criteria. The areas will drain off-site onto land owned by Bull Hill.
- Basins ET31a,b,c – the roadway portions will drain and treat for WQ to Pond C in the interim conditions and future conditions will drain to future Pond D for WQ. The remaining areas are off-site and undeveloped and are separate pervious areas not requiring WQ.
- Basin D1.2– Undeveloped Basin – WQ not required, no development in this basin, drains to Etrib and a small portion to Pond C. Future development will require Future Pond D to be built in the NW corner of this basin
- Basin D2.1 - Electric Substation Site – drains to Pond C but will be required to provide on-site wq/detention when substation is built
- Basin D2.19 – comprised of the East Tributary and open space draining to the Etrib. WQ not required.

Step 4: Consider Need for Industrial and Commercial BMP's

There are no industrial areas within this site. The future commercial area of this site will drain to Pond C where it will be detained/treated for WQ. The electric substation will provide their own on-site WQ pond.

9.0 CONCLUSIONS

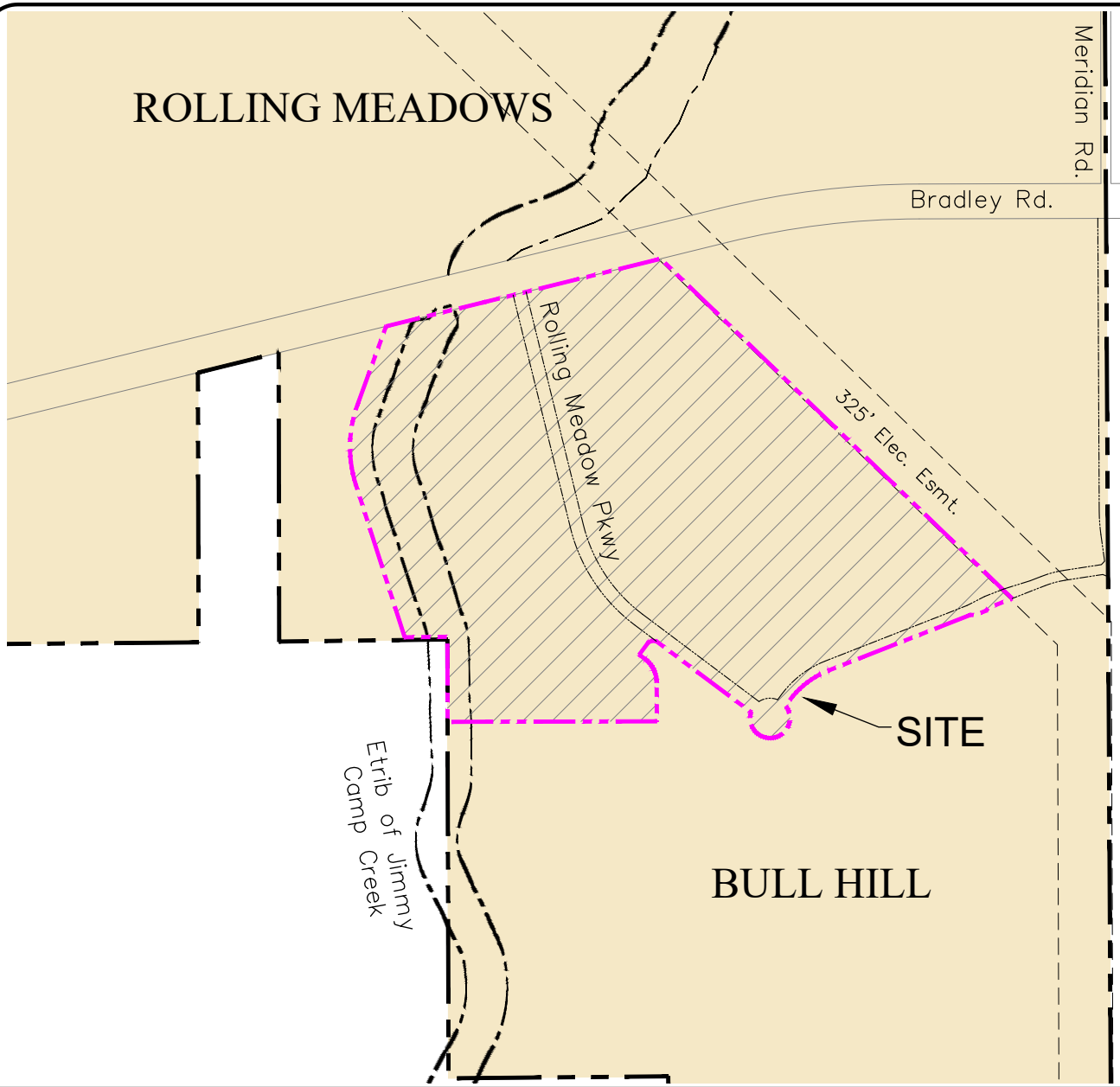
This drainage report has been prepared in accordance with the City of Colorado Springs/El Paso County Drainage Criteria Manual. The proposed development and drainage infrastructure will not cause adverse impacts to adjacent properties or properties located downstream. Several key aspects of the development discussed above are summarized as follows:

- Developed runoff will be conveyed via curb/gutter and storm sewer facilities
- The East Tributary of Jimmy Camp Creek will be reconstructed west of this study area
- Access to this site is from Bradley Road.
- Detention and water quality for this site area will be provided in permanent ponds
- Existing runoff rates into the Jimmy Camp Creek Drainage basin have been maintained

10.0 REFERENCES

1. City of Colorado Springs/El Paso County Drainage Criteria Manual DCM, dated November, 1991
2. Soil Survey of El Paso County Area, Colorado by USDA, SCS
3. Jimmy Camp Creek Drainage Basin Planning Study, dated February 13, 2025, by Stantec
4. City of Colorado Springs "Drainage Criteria Manual, Volume 2
5. El Paso County "Engineering Criteria Manual"
6. El Paso County Resolution #15-042, El Paso County adoption of Chapter 6 and Section 3.2.1 of the City of Colorado Springs Drainage Criteria Manual dated May, 2014.
7. Bull Hill / Rolling Meadows MDDP prepared by Core Engineering Group, dated May, 2024, approved on October 17, 2024.

APPENDIX A – VICINTIY MAP, SOILS MAP, FEMA MAP



N

VICINITY MAP
SCALE: 1"=1000'

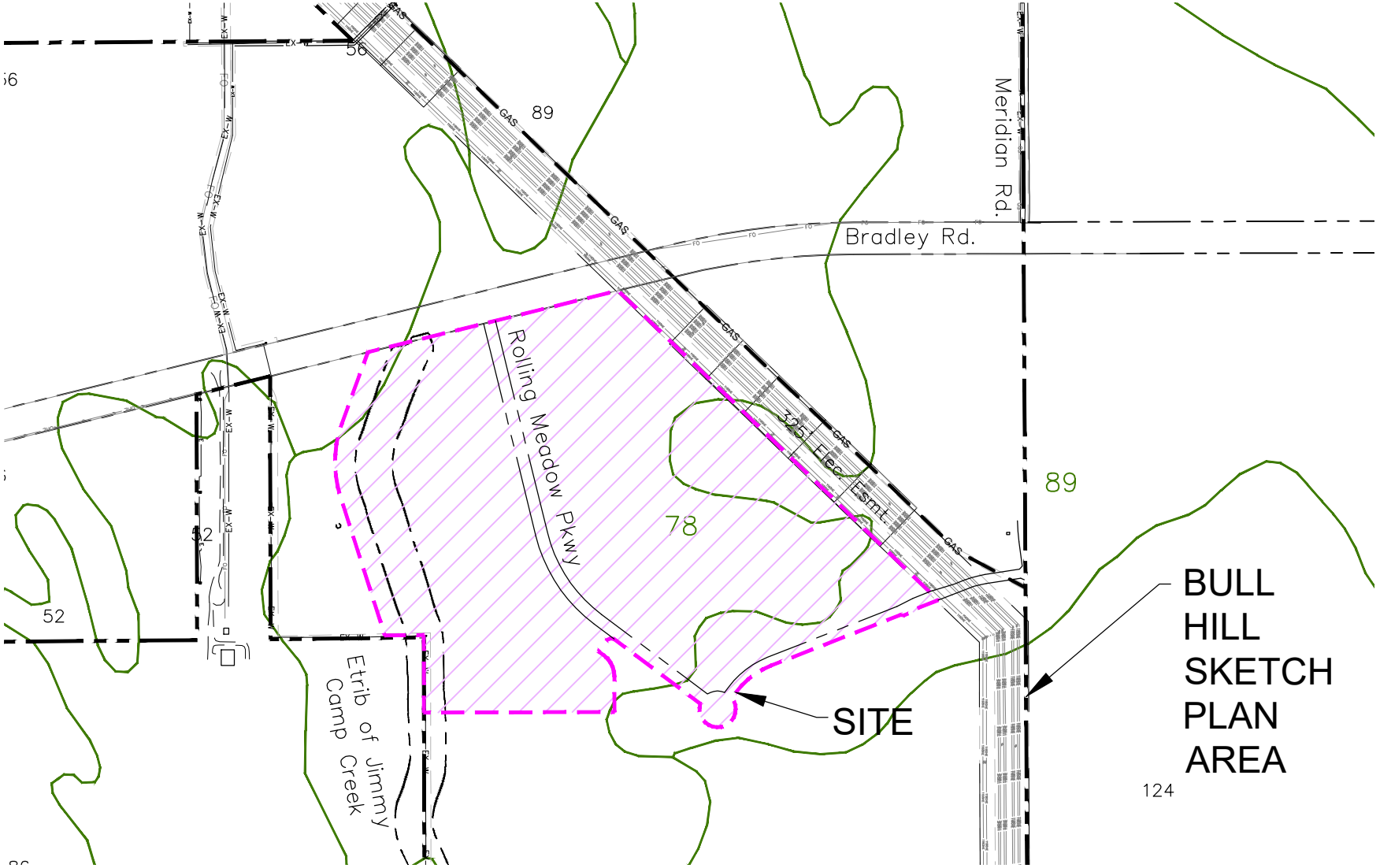
CORE
ENGINEERING GROUP

15004 1ST AVE. S.
BURNSVILLE, MN 55306
PH: 719.659-7800

CONTACT: RICHARD L. SCHINDLER, P.E.
EMAIL: Rich@ceg1.com

ANTELOPE RIDGE AT BULL HILL FIL. NO. 1
VICINITY MAP

SCALE:	DATE:	FIGURE NO.
NTS	MAY, 2025	--



VICINITY MAP
SCALE: 1"=1000'

CORE ENGINEERING GROUP
15004 1ST AVENUE S.
BURNSVILLE, MN 55306
PH: 719.570.1100
CONTACT: RICHARD L. SCHINDLER, P.E.
EMAIL: Rich@ceg1.com

ANTELOPE RIDGE AT BULL HILL FIL. NO. 1
SOILS MAP

SCALE:	DATE:	FIGURE NO.
NTS	MAY, 2025	--

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El Paso County Area, Colorado

78—Sampson loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 369s
Elevation: 5,500 to 6,500 feet
Mean annual precipitation: 13 to 15 inches
Mean annual air temperature: 47 to 50 degrees F
Frost-free period: 135 to 155 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Sampson and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sampson

Setting

Landform: Terraces, alluvial fans, depressions
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

A - 0 to 15 inches: loam
Bt - 15 to 34 inches: clay loam
Bk - 34 to 60 inches: sandy clay loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 9.2 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 3c
Hydrologic Soil Group: B
Ecological site: R049XB202CO - Loamy Foothill
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit: 4 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 20, Sep 2, 2022

El Paso County Area, Colorado

89—Tassel fine sandy loam, 3 to 18 percent slopes

Map Unit Setting

National map unit symbol: 36b5
Elevation: 5,600 to 6,400 feet
Mean annual precipitation: 13 to 15 inches
Mean annual air temperature: 47 to 51 degrees F
Frost-free period: 135 to 155 days
Farmland classification: Not prime farmland

Map Unit Composition

Tassel and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Tassel

Setting

Landform: Hills
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Calcareous slope alluvium over residuum weathered from sandstone

Typical profile

A - 0 to 4 inches: fine sandy loam
C - 4 to 10 inches: sandy loam
Cr - 10 to 14 inches: weathered bedrock

Properties and qualities

Slope: 3 to 18 percent
Depth to restrictive feature: 6 to 20 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Available water supply, 0 to 60 inches: Very low (about 1.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: D
Ecological site: R067BY024CO - Sandy Plains
Other vegetative classification: SANDY PLAINS (069AY026CO)

Hydric soil rating: No

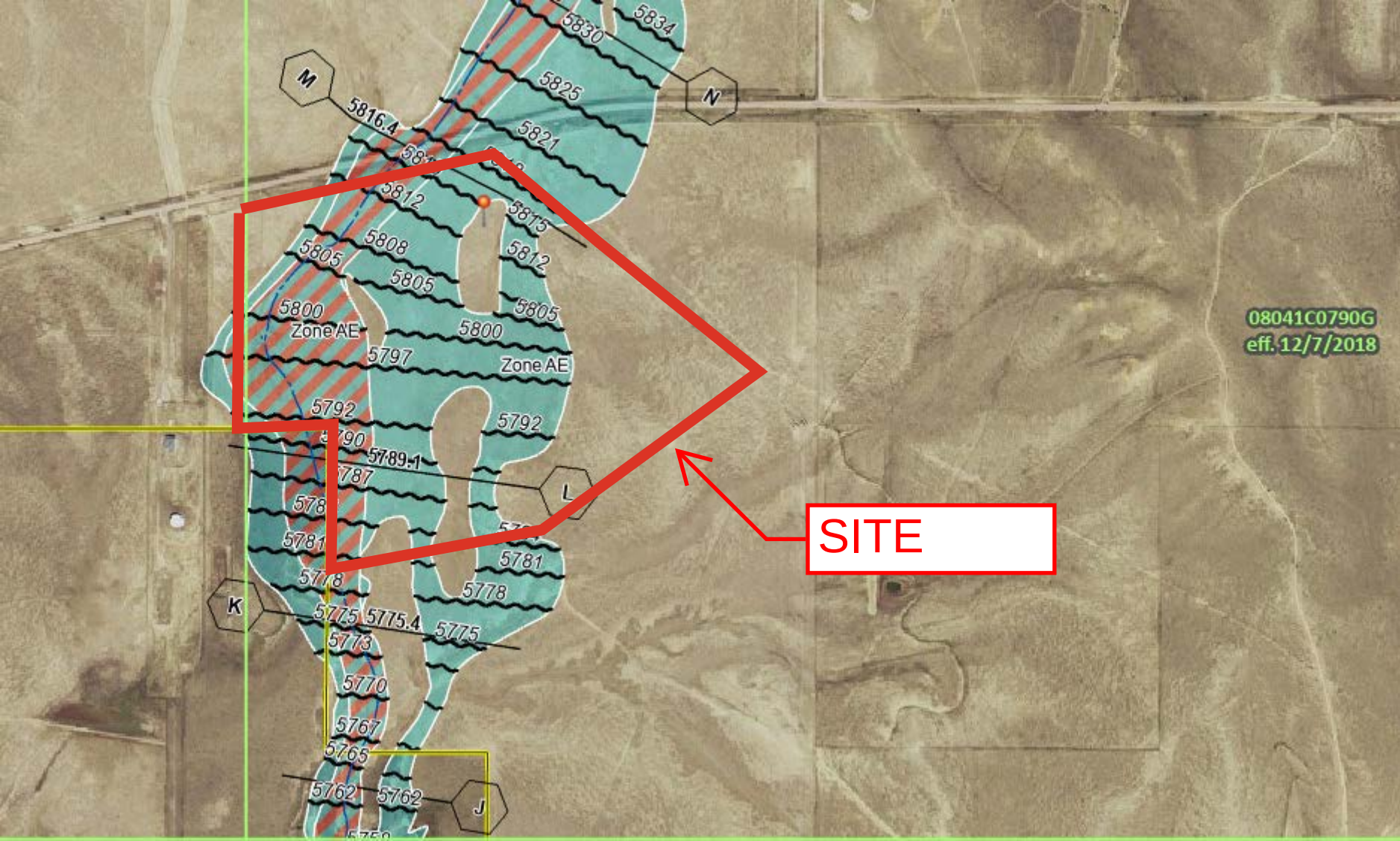
Minor Components

Other soils

Percent of map unit: 5 percent
Hydric soil rating: No

Data Source Information

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


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eff. 12/7/2018
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Zone AE
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APPENDIX B – HYDROLOGY CALCULATIONS

CORE ENGINEERING GROUP

Standard Form SF-2. Storm Drainage System Design (Rational Method Procedure)

Calculated By: Leonard Beasley
Date: May, 2025
Checked By: Leonard Beasley

Job No: 100.302
Project: Antelope Ridge 1
Design Storm: **5 - Year Event (Existing)**

Street or Basin	Design Point	Direct Runoff							Total Runoff				Street		Pipe			Travel Time			Remarks
		Area Design	Area (A)	Runoff Coeff. (C)	t_c	CA	i	Q	t_c	$\sum$ (CA)	i	Q	Slope	Street Flow	Design Flow	Slope	Pipe Size	Length	Velocity	t_t	
		ac.			min.		in/hr	cfs	min		in/hr	cfs	%	cfs	cfs	%	in	ft	ft/sec	min	
ET-28			69.31	0.13	32.8	9.01	2.35	21.2													
ET-31			28.35	0.15	23.2	4.25	2.86	12.2													
EX-S4			84.39	0.12	43.8	10.13	1.91	19.4													
(ET-31 & EX-S4)	**DP-S1**	112.74							52.0	14.38	1.66	23.8									
EX-S5			94.81	0.11	49.7	10.43	1.73	18.0													
(DP-S1 & EX-S5)	**DP-S3**	207.55							55.0	24.81	1.57	39.0									
EX-S6			207.92	0.09	72.4	18.71	1.16	21.7													

CORE ENGINEERING GROUP

Standard Form SF-2. Storm Drainage System Design (Rational Method Procedure)

Calculated By: Leonard Beasley
Date: May, 2025
Checked By: Leonard Beasley

Job No: 100.302
Project: Antelope Ridge 1
Design Storm: **100-Year Event (Existing)**

Street or Basin	Design Point	Direct Runoff							Total Runoff				Street		Pipe			Travel Time			Remarks
		Area Design	Area (A)	Runoff Coeff. (C)	t_c	CA	i	Q	t_c	$\sum$ (CA)	i	Q	Slope	Street Flow	Design Flow	Slope	Pipe Size	Length	Velocity	t_t	
		ac.			min.		in/hr	cfs	min		in/hr	cfs	%	cfs	cfs	%	in	ft	ft/sec	min	
ET-28			69.31	0.46	32.8	31.88	3.94	125.7													
ET-31			28.35	0.50	23.2	14.18	4.81	68.1													
EX-S4			84.39	0.43	43.8	36.29	3.21	116.6													
(ET-31 & EX-S4)	**DP-S1**	112.74							52.0	50.46	2.78	140.3									
EX-S5			94.81	0.41	49.7	38.87	2.89	112.5													
(DesPt S1 & EX-S5)	**DP-S3**	207.55							55.0	89.33	2.64	235.5									
EX-S6			207.92	0.38	72.4	79.01	1.94	153.6													

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CORE ENGINEERING GROUP

15004 1st Avenue South
Burnsville, MN 55306

PROJECT NAME: *Antelope Ridge 1*
PROJECT NUMBER: *100.302*
ENGINEER: *LAB*
DATE: May, 2025

Preliminary / Final Drainage Plan
CURRENT CONDITIONS COEFFICIENT "C" CALCULATIONS

BASIN	Soil No.	Hydro Group	Area	Cover (%)	C5	Wtd. C5	C100	Wtd. C100	CN	Wtd. CN	Impervious	Type of Cover
ET-28	105	A	2.33	3.36%	0.08	0.00	0.35	0.01	49	1.65	0%	Pasture/Meadow
	108/124	B	17.04	24.59%	0.08	0.02	0.35	0.09	69	16.96	0%	Pasture/Meadow
	89	D	49.94	72.05%	0.15	0.11	0.50	0.36	84	60.52	0%	Pasture/Meadow
			69.31	100.00%		0.13		0.46		79.14		
ET-31	89	D	28.35	100.00%	0.15		0.50		84	84.00	0%	Pasture/Range
EX-S4	78	B	38.92	34.52%	0.08	0.03	0.35	0.12	69	23.82	0%	Pasture/Range
	89	D	73.82	65.48%	0.15	0.10	0.50	0.33	84	55.00	0%	Pasture/Range
			112.74	100.00%		0.13		0.45		78.82		
EX-S5	78	B	57.29	60.43%	0.08	0.05	0.35	0.21	69	41.69	0%	Pasture/Range
	89	D	37.52	39.57%	0.15	0.06	0.50	0.20	84	33.24	0%	Pasture/Range
			94.81	100.00%		0.11		0.41		74.94		
EX-S6	56/78	B	169.64	81.59%	0.08	0.07	0.35	0.29	69	56.30	0%	Pasture/Range
	52	C	38.28	18.41%	0.15	0.03	0.50	0.09	79	14.54	0%	Pasture/Range
			207.92	100.00%		0.09		0.38		70.84		

CORE ENGINEERING GROUP

Standard Form SF-1. Time of Concentration-Current

Calculated By: Leonard Beasley
Date: May, 2025
Checked By: Leonard Beasley

Job No: 100.302
Project: Antelope at Bull Hill 1

Sub-Basin Data				Initial Overland Time (t_i)				Travel Time (t_t)					Final t_c
BASIN or DESIGN	C_5	AREA (A) acres	NRCS Convey.	LENGTH (L) feet	SLOPE (S) %	VELOCITY (V) ft/sec	t_i minutes	LENGTH (L) feet	SLOPE (S) %	VELOCITY (V) ft/sec	t_t minutes	Computed t_c Minutes	USDCM Recommended $t_c=t_i+t_t$ (min)
ET-28	0.13	69.31	15.0	300.00	7.00%	0.31	16.00	1633.00	6.12%	3.71	7.33		
			15.0					1806.00	4.54%	3.20	9.42	32.76	32.76
ET-31	0.15	28.35	5.0	300.00	8.33%	0.34	14.80	522.00	7.09%	1.33	6.53		
			15.0					402.00	5.47%	3.51	1.91	23.24	23.24
EX-S4	0.12	84.39	7.0	300.00	5.67%	0.29	17.34	965.00	3.83%	1.37	11.74		
			15.0					1518.00	1.32%	1.72	14.68	43.76	43.76
EX-S5	0.11	94.81	15.0	300.00	4.50%	0.26	18.91	1981.00	3.71%	2.89	11.43		
			15.0					1093.00	0.73%	1.28	14.21		
			15.0					291.00	0.40%	0.95	5.11	49.66	49.66

CORE ENGINEERING GROUP

Standard Form SF-1. Time of Concentration-Current

Calculated By: Leonard Beasley
Date: May, 2025
Checked By: Leonard Beasley

Job No: 100.302
Project: Antelope at Bull Hill 1

Sub-Basin Data				Initial Overland Time (t_i)				Travel Time (t_t)					Final t_c
BASIN or DESIGN	C_5	AREA (A) acres	NRCS Convey.	LENGTH (L) feet	SLOPE (S) %	VELOCITY (V) ft/sec	t_i minutes	LENGTH (L) feet	SLOPE (S) %	VELOCITY (V) ft/sec	t_t minutes	Computed t_c Minutes	USDCM Recommended $t_c=t_i+t_t$ (min)
DP-S1	0.13	112.74	5.0	300.00	8.33%	0.33	15.11	522.00	7.09%	1.33	6.53		
(ET-31 & EX-S4)			15.0					402.00	5.47%	3.51	1.91		
			7.0					1516.00	3.83%	1.37	18.44		
			15.0					1088.00	1.47%	1.82	9.97	51.97	51.97
DP-S3	0.13	207.55	5.0	300.00	8.33%	0.33	15.11	522.00	7.09%	1.33	6.53		
(DsPT S1 & EX-S4)			15.0					402.00	5.47%	3.51	1.91		
			7.0					1516.00	3.83%	1.37	18.44		
			15.0					1088.00	1.47%	1.82	9.97		
			15.0					2500.00	73.00%	12.82	3.25	55.22	55.22
EX-S6	0.09	207.92	15.0	45.00	15.56%	0.15	4.95	1982.00	2.22%	2.23	14.78		
			15.0					3466.00	1.99%	2.12	27.30		
			15.0					1270.00	0.31%	0.84	25.34	72.38	72.38

CORE ENGINEERING GROUP

Standard Form SF-2. Storm Drainage System Design (Rational Method Procedure)

Calculated By: Leonard Beasley
Date:Feb. 19, 2025
Checked By: Leonard Beasley

Job No: 300.302
Project: Antelope Ridge at Bull Hill Filing No. 1
Design Storm: **5 - Year Event (Proposed)**

Street or Basin	Design Point	Direct Runoff							Total Runoff				Street		Pipe			Travel Time			Remarks
		Area Design	Area (A)	Runoff Coeff. (C)	t_c	CA	i	Q	t_c	$\sum$ (CA)	i	Q	Slope	1/2 Street Cap. Flow	Flow to pipe	Slope	Pipe Size	Length	Velocity	t_t	
			ac.		min.		in/hr	cfs	min		in/hr	cfs	%	cfs	cfs	%	in	ft	ft/sec	min	
ET28a			2.21	0.29	18.9	0.64	3.17	2.0													
C1.1	**C5**		14.29	0.11	26.5	1.57	2.67	4.5													FES Pipe Inlet
C2.1	**C1**		7.58	0.15	29.2	1.14	2.52	2.9													Type "D" inlet
C2.2	**C2**		4.05	0.30	13.4	1.22	3.69	4.5					Sump								Sump Inlet #C2
C2.1-C2.2	**C3**	**11.63**							Additive "Q" (C2.1+C2.2)			7.4							Pipe Flow		
C2.3	**C4**		3.82	0.46	10.7	1.76	4.03	7.1					1.38%	8.6							On grade Inlet #C4
C2.1-C2.3	**C4a**	**15.45**							Additive "Q" (Des.Pt C3+C2.3-bypass)			13.3							Pipe Flow		
C2.4			2.65	0.47	17.7	1.25	3.27	4.1													
C2.5			0.77	0.90	9.2	0.69	4.25	2.9													
C2.4-C2.5	**C6**	**3.42**							Additive "Q" (C2.4+C2.5)			7.0	Sump								Sump Inlet #C6
C1.1, C2.4-C2.5	**C6a**	**17.71**							26.5	3.51	2.67	9.4									
C1.1, C2.1-C2.5	**C7**	**33.16**							27.1	7.62	2.63	20.1							**Pipe Flow**		
C2.6	**C8**		1.94	0.45	10.4	0.87	4.06	3.5					1.16%	7.9							On grade Inlet #C8
C2.7	**C9**		3.77	0.47	12.2	1.77	3.83	6.8					1.16%	7.9							On grade Inlet #C9
C2.6-C2.7	**C10**	**5.71**							Additive "Q" (C2.6+C2.7-bypass at inlets)			10.3							Pipe Flow		
C1.1, C2.1-C2.7	**C11**	**38.87**							27.1	10.26	2.63	27.0							**Pipe Flow**		
C2.8	**C12**		2.98	0.45	16.3	1.34	3.39	4.6					1.20%	8.0	does not include upstream bypass (1.2cfs)						On grade Inlet #C12
C2.9	**C13**		4.80	0.47	8.4	2.26	4.40	9.9					1.20%	8.0							On grade Inlet #C13
C1.1, C2.1-C2.9	**C14**	**46.65**							27.1	13.86	2.63	36.5							**Pipe Flow**		

CORE ENGINEERING GROUP

Standard Form SF-2. Storm Drainage System Design (Rational Method Procedure)

Calculated By: Leonard Beasley
Date:Feb. 19, 2025
Checked By: Leonard Beasley

Job No: 300.302
Project: Antelope Ridge at Bull Hill Filing No. 1
Design Storm: **5 - Year Event (Proposed)**

Street or Basin	Design Point	Direct Runoff							Total Runoff				Street		Pipe			Travel Time			Remarks
		Area Design	Area (A)	Runoff Coeff. (C)	t_c	CA	i	Q	t_c	Σ (CA)	i	Q	Slope	1/2 Street Cap. Flow	Flow to pipe	Slope	Pipe Size	Length	Velocity	t_t	
			ac.		min.		in/hr	cfs	min		in/hr	cfs	%	cfs	cfs	%	in	ft	ft/sec	min	
C2.10	**C15**		6.32	0.32	22.4	2.02	2.92	5.9					2.91%	12.5							On grade Inlet #C15
C2.11	**C16**		2.93	0.48	11.9	1.41	3.87	5.4					2.78%	12.2							On grade Inlet #C16
C2.10-C2.11	**C17**	**9.25**							Additive "Q" (C2.10+C2.11-bypass at inlets)			10.7							Pipe Flow		
C1.1, C2.1-C2.11	**C18**	**55.90**							Additive "Q" (Des.Pt. C14+Des.Pt. C17)			47.2							**Pipe Flow**		
C2.12			3.36	0.46	14.9	1.55	3.53	5.5					2.78%	12.2							
C2.13	**C19**		4.52	0.45	16.2	2.03	3.41	6.9													On grade Inlet #C19
C1.1, C2.1-C2.11&C1.13	**C20**	**63.78**							27.6	19.32	2.61	50.4							**Pipe Flow**		
C2.14			3.51	0.45	17.2	1.58	3.31	5.2													
C2.15	**C22**		3.05	0.63	12.7	1.92	3.77	7.2													On grade Inlet #C22
C2.16	**C23**		9.08	0.36	23.4	3.27	2.85	9.3													On grade Inlet #C23
C2.15-C2.16	**C24**	**12.13**							Additive "Q" (C2.15+C2.16-bypass at inlets)			16.0							**Pipe Flow**		
C2.15-C2.16	**C25**	**11.08**							DESIGN POINT NOT USED												
C2.17			2.63	0.47	14.5	1.24	3.57	4.4													
C2.12,14,17	**C21**								17.9	4.36	3.26	14.2	flow does not include upstream bypass (1.1cfs)								
	C26								Additive "Q" (Des.Pt. C21+Des.Pt. C24)			31.3							**Pipe Flow**		
C2.18	**C27**		1.40	0.90	8.7	1.26	4.34	5.5													Sump Inlet #C27
	C28								Additive "Q" (Des.Pt. C26+Des.Pt. C27)			36.8							**Pipe Flow**		
C1.1, C2.1-C2.18	**C29**	**82.40**							27.7	30.14	2.60	78.5							**Pipe Flow**		
C2.19			0.60	0.90	3.7	0.54	5.62	3.0													

CORE ENGINEERING GROUP

Standard Form SF-2. Storm Drainage System Design (Rational Method Procedure)

Calculated By: Leonard Beasley
Date:Feb. 19, 2025
Checked By: Leonard Beasley

Job No: 300.302
Project: Antelope Ridge at Bull Hill Filing No. 1
Design Storm: **5 - Year Event (Proposed)**

Street or Basin	Design Point	Direct Runoff							Total Runoff				Street		Pipe			Travel Time			Remarks
		Area Design	Area (A)	Runoff Coeff. (C)	t_c	CA	i	Q	t_c	Σ (CA)	i	Q	Slope	1/2 Street Cap. Flow	Flow to pipe	Slope	Pipe Size	Length	Velocity	t_t	
			ac.		min.		in/hr	cfs	min		in/hr	cfs	%	cfs	cfs	%	in	ft	ft/sec	min	
C3.1	**C31**		3.19	0.45	17.9	1.44	3.26	4.7													On grade Inlet #C31
C3.2			4.86	0.45	17.5	2.19	3.29	7.2													
C3.3			0.63	0.45	10.1	0.28	4.12	1.2													
C3.2-C3.3	**C32**	**5.49**							17.5	2.47	3.29	8.1			does not include upstream bypass (0.6cfs)						Sump Inlet #C32
C3.4	**C33**		0.57	0.45	10.9	0.26	4.01	1.0													Sump Inlet #C33
C3.1-C3.4	**C34**	**9.25**							17.5	4.16	3.29	13.7							**Pipe Flow**		
Des.Pt C29+Des.Pt.	**C35**	**91.65**							27.7	34.30	2.60	89.2									
ET31a	**D21a**		10.53	0.20	20.9	2.11	3.02	6.4													On Grade Inlet #21a
ET31b			10.66	0.16	19.9	1.71	3.10	5.3													
ET31c			6.97	0.16	22.7	1.12	2.90	3.2													
	D21b								THIS DESIGN POINT IS A FUTURE STUB AND IS SAME FLOW AS DESIGN POINT D21c												
ET31b-ET31c	**D21c**	**17.63**							22.7	2.82	2.90	8.2									Sump Inlet #21c

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Standard Form SF-2. Storm Drainage System Design (Rational Method Procedure)

Calculated By: Leonard Beasley
Date:Feb. 19, 2025
Checked By: Leonard Beasley

Job No: 300.302
Project: Antelope Ridge at Bull Hill Filing No. 1
Design Storm: **5 - Year Event (Proposed)**

Street or Basin	Design Point	Direct Runoff							Total Runoff				Street		Pipe			Travel Time			Remarks
		Area Design	Area (A)	Runoff Coeff. (C)	t_c	CA	i	Q	t_c	Σ (CA)	i	Q	Slope	1/2 Street Cap. Flow	Flow to pipe	Slope	Pipe Size	Length	Velocity	t_t	
			ac.		min.		in/hr	cfs	min		in/hr	cfs	%	cfs	cfs	%	in	ft	ft/sec	min	
ET31a-ET31c	**D21d**	**28.16**							22.7	4.93	2.90	14.3							**Pipe Flow**		
D1.1	**D21e**		1.87	0.90	9.2	1.68	4.25	7.1													Sump Inlet #21d
ET31a-D1.1	**D21f**	**30.03**							22.7	6.61	2.90	19.2							Pipe Flow		Pipe outlet
D1.2			65.76	0.36	24.9	23.67	2.76	65.4													
D1.1 & D1.2		**67.63**																			
E31a-D1.2	**D21**	**95.79**							32.8	30.28	2.35	71.1									
D3.1			3.03	0.09	19.3	0.27	3.14	0.9													
ET31a - D3.1		**98.82**							36.3	30.56	2.20	67.1									
D3.2	**D22**		3.07	0.90	18.4	2.76	3.21	8.9													On grade Inlet #D22
ET31a - D3.2	**D22a**	**101.89**							36.3	33.32	2.20	73.2							**Pipe Flow**		2-48" RCP's
D3.3	**D23**		4.52	0.90	20.4	4.07	3.06	12.4													Sump Inlet #24(future
D3.4	**D24**		1.42	0.90	8.7	1.28	4.34	5.6													Sump Inlet #25(future
D3.3&D3.4	**D25**	**5.94**							20.4	5.35	3.06	16.3									
D3.5			0.72	0.09	9.2	0.06	4.26	0.3													
D3.1-D3.5	**D26**	**12.76**							20.4	8.45	3.06	25.8									FES pipe inlet
	D26a											47.4									
	D27		see design point later in this table																		
D2.1			4.48	0.09	14.4	0.40	3.58	1.4													

CORE ENGINEERING GROUP

Standard Form SF-2. Storm Drainage System Design (Rational Method Procedure)

Calculated By: Leonard Beasley
Date:Feb. 19, 2025
Checked By: Leonard Beasley

Job No: 300.302
Project: Antelope Ridge at Bull Hill Filing No. 1
Design Storm: **5 - Year Event (Proposed)**

Street or Basin	Design Point	Direct Runoff							Total Runoff				Street		Pipe			Travel Time			Remarks
		Area Design	Area (A)	Runoff Coeff. (C)	t_c	CA	i	Q	t_c	Σ (CA)	i	Q	Slope	1/2 Street Cap. Flow	Flow to pipe	Slope	Pipe Size	Length	Velocity	t_t	
			ac.		min.		in/hr	cfs	min		in/hr	cfs	%	cfs	cfs	%	in	ft	ft/sec	min	
D2.2			7.15	0.09	13.9	0.64	3.64	2.3													
D2.3	**D2**		1.09	0.09	11.4	0.10	3.93	0.4													Area Inlet
D2.1-D2.3	**D1**	**12.72**							18.1	1.14	3.24	3.7									M.H. & pipe
D2.4	**D4**		3.35	0.45	15.2	1.51	3.50	5.3													On Grade Inlet #D4
D2.5	**D5**		4.37	0.45	15.0	1.97	3.52	6.9													On Grade Inlet #D5
D2.1-D2.5	**D6**	**20.44**							20.7	4.62	3.04	14.0							**Pipe Flow**		
D2.6	**D7**		1.85	0.46	10.6	0.85	4.04	3.4													On Grade Inlet #D7
D2.7	**D8**		4.52	0.35	15.5	1.58	3.47	5.5													On Grade Inlet #D8
D2.6-D2.7	**D9**	**6.37**							15.5	2.43	3.47	8.5							**Pipe Flow**		
D2.1-D2.7	**D10**	**26.81**							26.8	7.05	2.65	18.7							**Pipe Flow**		
D2.8	**D11**		3.77	0.46	30.8	1.73	2.44	4.2													On Grade Inlet #D11
D2.9	**D12**		5.49	0.45	15.4	2.47	3.48	8.6													Pipe inlet
	D11a	9.26							Additive "Q" (Des.Pt. D11+Des.Pt.D12)			12.8							**Pipe Flow**		
D2.1-D2.9	**D13**	**36.07**							30.8	11.26	2.44	27.5							**Pipe Flow**		
D2.10	**D14**		1.26	0.45	9.6	0.57	4.20	2.4													Sump Inlet #D14
D2.11	**D15**		2.29	0.45	11.9	1.03	3.87	4.0													Sump Inlet #D15
D2.1-D2.11	**D16**	**39.62**							31.7	11.81	2.40	28.3							**Pipe Flow**		
D2.12	**D17**		10.40	0.81	16.6	8.42	3.37	28.4					A portion of this flow allocated to Des.Pt. 27						**Pipe Flow**		

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Standard Form SF-2. Storm Drainage System Design (Rational Method Procedure)

Calculated By: Leonard Beasley
Date:Feb. 19, 2025
Checked By: Leonard Beasley

Job No: 300.302
Project: Antelope Ridge at Bull Hill Filing No. 1
Design Storm: **5 - Year Event (Proposed)**

Street or Basin	Design Point	Direct Runoff							Total Runoff				Street		Pipe			Travel Time			Remarks
		Area Design	Area (A)	Runoff Coeff. (C)	t_c	CA	i	Q	t_c	Σ (CA)	i	Q	Slope	1/2 Street Cap. Flow	Flow to pipe	Slope	Pipe Size	Length	Velocity	t_t	
			ac.		min.		in/hr	cfs	min		in/hr	cfs	%	cfs	cfs	%	in	ft	ft/sec	min	
D2.13	**D18**		2.18	0.81	12.4	1.77	3.81	6.7													Sump Inlet #D18
	D18a								Additive "Q" (Des.Pt. D17+Des.Pt.D18-Des.Pt. 27)			16.7							**Pipe Flow**		
D2.14	**D19**		0.28	0.45	7.0	0.13	4.67	0.6													Sump Inlet #D19
D2.1-D2.14	**D20**	**52.48**							34.3	23.17	2.28	52.8							**Pipe Flow**		
	D27											18.4	THIS DES. PT. IS A MANHOLE NW OF CALF CREEK/ECHOING GRASS. EXCESS FLOW FROM DES.PT. 17 ROUTED HERE VIA FUTURE STM SWR								
Des. Pts. D20 & D26	**D28**	**65.24**							34.3	31.62	2.28	72.1							**Pipe Flow**		
D2.15			3.04	0.45	14.6	1.37	3.56	4.9													
D2.16			1.99	0.45	12.2	0.90	3.83	3.4													
D2.15&D2.16	**D29**	**5.03**							14.6	2.26	3.56	8.1									Sump Inlet #D29
D2.17	**D30**		3.09	0.45	14.5	1.39	3.57	5.0													Sump Inlet #D30
D2.15-D2.17	**D31**	**8.12**							14.6	3.65	3.56	13.0							**Pipe Flow**		
Des. Pts. D28 & D31	**D32**	**73.36**							34.3	35.27	2.28	80.4							**Pipe Flow**		
D2.18			15.58	0.13	19.8	2.03	3.10	6.3													
Basin D2.18,Des. Pts. C35 & D32	**D33**	**180.59**							34.3	71.59	2.28	170.3									
D2.19			27.81	0.10	26.2	2.78	2.69	7.5													

CORE ENGINEERING GROUP

Standard Form SF-2. Storm Drainage System Design (Rational Method Procedure)

Calculated By: Leonard Beasley
Date:Feb. 19, 2025
Checked By: Leonard Beasley

Job No: 300.302
Project: Antelope Ridge at Bull Hill Filing No. 1
Design Storm: **100 - Year Event (Proposed)**

Street or Basin	Design Point	Direct Runoff							Total Runoff				Street		Pipe			Travel Time			Remarks
		Area Design	Area (A)	Runoff Coeff. (C)	t_c	CA	i	Q	t_c	Σ (CA)	i	Q	Slope	1/2 Street Cap. Flow	Design Flow	Slope	Pipe Size	Length	Velocity	t_t	
			ac.		min.		in/hr	cfs	min		in/hr	cfs	%	cfs	cfs	%	in	ft	ft/sec	min	
ET28a			2.21	0.58	18.9	1.28	5.32	6.8													
C1.1	**C5**		14.29	0.40	26.5	5.72	4.47	27.5													FES Pipe Inlet
C2.1	**C1**		7.58	0.49	29.2	3.71	4.23	15.7													Type "D" inlet
C2.2	**C2**		4.05	0.56	13.4	2.27	6.20	14.1					Sump								Sump Inlet #C2
C1.1-C1.2	**C3**	**11.63**							Additive "Q" (C2.1+C2.2)			29.8							Pipe Flow		
C2.3	**C4**		3.82	0.59	10.7	2.25	6.76	15.2													On grade Inlet #C4
C2.1-C2.3	**C4a**	**15.45**							Additive "Q" (Des.Pt C3+C2.3-bypass)			38.5							Pipe Flow		
C2.4			2.65	0.62	17.7	1.64	5.49	9.0													
C2.5			0.77	0.96	9.2	0.74	7.14	5.3													
C2.4-C2.5	**C6**	**3.42**							Additive "Q" (C2.4+C2.5)			14.3	Sump		does not include upstream bypass (2.8cfs)						Sump Inlet #C6
C1.1, C2.4-C2.5	**C6a**	**17.71**							26.5	8.10	4.48	36.3									
C1.1, C2.1-C2.5	**C7**	**33.16**							27.1	16.33	4.42	72.2							**Pipe Flow**		
C2.6	**C8**		1.94	0.60	10.4	1.16	6.82	7.9													On grade Inlet #C8
C2.7	**C9**		3.77	0.61	12.2	2.30	6.43	14.8													On grade Inlet #C9
C2.6-C2.7	**C10**	**5.71**							Additive "Q" (2.6+C2.7-bypass at inlets)			18.0							Pipe Flow		
C1.1, C2.1-C2.7	**C11**	**38.87**							27.5	19.80	4.39	86.9							**Pipe Flow**		
C2.8	**C12**		2.98	0.59	16.3	1.76	5.70	10.0							does not include upstream bypass (11.2cfs)						On grade Inlet #C12
C2.9	**C13**		4.80	0.59	8.4	2.83	7.38	20.9													On grade Inlet #C13
C1.1, C2.1-C2.9	**C14**	**46.65**							27.5	24.39	4.39	107.0							**Pipe Flow**		

CORE ENGINEERING GROUP

Standard Form SF-2. Storm Drainage System Design (Rational Method Procedure)

Calculated By: Leonard Beasley
Date:Feb. 19, 2025
Checked By: Leonard Beasley

Job No: 300.302
Project: Antelope Ridge at Bull Hill Filing No. 1
Design Storm: **100 - Year Event (Proposed)**

Street or Basin	Design Point	Direct Runoff							Total Runoff				Street		Pipe			Travel Time			Remarks
		Area Design	Area (A)	Runoff Coeff. (C)	t_c	CA	i	Q	t_c	Σ (CA)	i	Q	Slope	1/2 Street Cap. Flow	Design Flow	Slope	Pipe Size	Length	Velocity	t_t	
			ac.		min.		in/hr	cfs	min		in/hr	cfs	%	cfs	cfs	%	in	ft	ft/sec	min	
C2.10	**C15**		6.32	0.57	22.4	3.60	4.90	17.7													On grade Inlet #C15
C2.11	**C16**		2.93	0.63	11.9	1.85	6.50	12.0													On grade Inlet #C16
C2.10-C2.11	**C17**	**9.25**							Additive "Q" (C2.10+C2.11-bypass at inlets)			19.8							Pipe Flow		
C1.1, C2.1-C2.11	**C18**	**55.90**							Additive "Q" (Des.Pt. C14+Des.Pt. C17)			126.8							**Pipe Flow**		
C2.12			3.36	0.61	14.9	2.05	5.93	12.1													
C2.13	**C19**		4.52	0.59	16.2	2.67	5.72	15.3							does not include upstream bypass (3.4cfs)						On grade Inlet #C19
C1.1, C2.1-C2.11&C2.13	**C20**	**63.78**							27.6	32.50	4.37	142.1							**Pipe Flow**		
C2.14			3.51	0.59	17.2	2.07	5.56	11.5													
C2.15	**C22**		3.05	0.80	12.4	2.44	6.40	15.6													On grade Inlet #C22
C2.16	**C23**		9.08	0.59	23.4	5.36	4.79	25.6													On grade Inlet #C23
C2.15-C2.16	**C24**	**12.13**							Additive "Q" (C2.15+C2.16-bypass at inlets)			27.9							**Pipe Flow**		
C2.15-C2.16	**C25**	**11.08**							DESIGN POINT NOT USED												
C2.17			2.63	0.62	14.5	1.63	6.00	9.8													
C2.12,14,17	**C21**	**9.50**							17.9	5.75	5.47	31.4	flow does not include upstream bypass (21.7cfs)								
	C26								Additive "Q" (Des.Pt. C21+Des.Pt. C24)			81.0							**Pipe Flow**		
C2.18	**C27**		1.40	0.96	8.7	1.34	7.29	9.8													Sump Inlet #C27
	C28								Additive "Q" (Des.Pt. C26+Des.Pt. C27)			90.8							**Pipe Flow**		
C1.1, C2.1-C2.18	**C29**	**82.40**							27.7	47.40	4.37	207.1							**Pipe Flow**		
C2.19			0.60	0.96	3.7	0.58	9.43	5.4													

CORE ENGINEERING GROUP

Standard Form SF-2. Storm Drainage System Design (Rational Method Procedure)

Calculated By: Leonard Beasley
Date:Feb. 19, 2025
Checked By: Leonard Beasley

Job No: 300.302
Project: Antelope Ridge at Bull Hill Filing No. 1
Design Storm: **100 - Year Event (Proposed)**

Street or Basin	Design Point	Direct Runoff							Total Runoff				Street		Pipe			Travel Time			Remarks
		Area Design	Area (A)	Runoff Coeff. (C)	t_c	CA	i	Q	t_c	Σ (CA)	i	Q	Slope	1/2 Street Cap. Flow	Design Flow	Slope	Pipe Size	Length	Velocity	t_t	
			ac.		min.		in/hr	cfs	min		in/hr	cfs	%	cfs	cfs	%	in	ft	ft/sec	min	
C3.1	**C31**		3.19	0.59	17.9	1.88	5.47	10.3													On grade Inlet #C31
C3.2			4.86	0.59	17.5	2.87	5.53	15.9													
C3.3			0.63	0.59	10.1	0.37	6.91	2.6													
C3.2-C3.3	**C32**	**5.49**							17.5	3.24	5.52	17.9			does not include upstream bypass (4.0cfs)						Sump Inlet #C32
C3.4	**C33**		0.57	0.59	10.9	0.34	6.72	2.3													Sump Inlet #C33
C3.1-C3.4	**C34**	**9.25**							17.5	5.46	5.52	30.1							Pipe Flow		
Des.Pt C34, Des.Pt.C29	**C35**	**91.65**							27.7	52.85	4.36	230.7									
ET31a	**D21a**		10.53	0.53	20.9	5.58	5.07	28.3													On Grade Inlet #21a
ET31b			10.66	0.51	19.9	5.44	5.20	28.3													
ET31c			6.97	0.51	22.7	3.55	4.87	17.3													FES Pipe Inlet
	D21b								THIS DESIGN POINT IS A FUTURE STUB AND IS SAME FLOW AS DESIGN POINT D21c												

CORE ENGINEERING GROUP

Standard Form SF-2. Storm Drainage System Design (Rational Method Procedure)

Calculated By: Leonard Beasley
Date:Feb. 19, 2025
Checked By: Leonard Beasley

Job No: 300.302
Project: Antelope Ridge at Bull Hill Filing No. 1
Design Storm: **100 - Year Event (Proposed)**

Street or Basin	Design Point	Direct Runoff							Total Runoff				Street		Pipe			Travel Time			Remarks
		Area Design	Area (A)	Runoff Coeff. (C)	t_c	CA	i	Q	t_c	Σ (CA)	i	Q	Slope	1/2 Street Cap. Flow	Design Flow	Slope	Pipe Size	Length	Velocity	t_t	
			ac.		min.		in/hr	cfs	min		in/hr	cfs	%	cfs	cfs	%	in	ft	ft/sec	min	
ET31b-ET31c	**D21c**	**17.63**							22.7	8.99	4.87	43.8			does not include upstream bypass (7.2cfs)						Sump Inlet #21c
ET31a-ET31c	**D21d**	**28.16**							22.7	14.57	4.87	70.9									
D1.1	**D21e**		1.87	0.96	9.2	1.80	7.13	12.8													Sump Inlet #21d
ET31a-D1.1	**D21f**	**30.03**							22.7	16.37	4.87	79.7									Pipe outlet
D1.2			65.76	0.57	24.9	37.48	4.63	173.7													
D1.1 & D1.2		**67.63**																			
E31a-D1.2	**D21**	**95.79**							32.8	53.85	3.94	212.2									
D3.1			3.03	0.36	19.3	1.09	5.27	5.8													
ET31a - D3.1		**98.82**							36.3	54.94	3.69	202.6									
D3.2	**D22**		3.07	0.96	18.4	2.95	5.39	15.9													On grade Inlet #D22
ET31a - D3.2	**D22a**	**101.89**							36.3	57.89	3.69	213.4							**Pipe Flow**		2-48" RCP's
D3.3	**D23**		4.52	0.96	20.4	4.34	5.13	22.3													Sump Inlet #24(future
D3.4	**D24**		1.42	0.96	8.7	1.36	7.29	9.9													Sump Inlet #25(future
D3.3&D3.4	**D25**	**5.94**							20.4	5.70	5.13	29.3									
D3.5			0.72	0.36	9.2	0.26	7.15	1.9													
D3.1-D3.5	**D26**	**12.76**							20.4	10.00	5.14	51.4									FES pipe inlet
	D26a											208.6									
	D27		see design point later in this table																		

CORE ENGINEERING GROUP

Standard Form SF-2. Storm Drainage System Design (Rational Method Procedure)

Calculated By: Leonard Beasley
Date:Feb. 19, 2025
Checked By: Leonard Beasley

Job No: 300.302
Project: Antelope Ridge at Bull Hill Filing No. 1
Design Storm: **100 - Year Event (Proposed)**

Street or Basin	Design Point	Direct Runoff							Total Runoff				Street		Pipe			Travel Time			Remarks
		Area Design	Area (A)	Runoff Coeff. (C)	t_c	CA	i	Q	t_c	$\sum$ (CA)	i	Q	Slope	1/2 Street Cap. Flow	Design Flow	Slope	Pipe Size	Length	Velocity	t_t	
			ac.		min.		in/hr	cfs	min		in/hr	cfs	%	cfs	cfs	%	in	ft	ft/sec	min	
D2.1			4.48	0.36	14.4	1.61	6.01	9.7													
D2.2			7.15	0.36	13.9	2.57	6.11	15.7													
D2.3	**D2**		1.09	0.36	11.4	0.39	6.60	2.6				.									Area Inlet
D2.1-D2.3	**D1**	**12.72**							18.1	4.58	5.44	24.9									M.H. & pipe
D2.4	**D4**		3.35	0.59	15.2	1.98	5.88	11.6													On Grade Inlet #D4
D2.5	**D5**		4.37	0.59	15.0	2.58	5.91	15.2													On Grade Inlet #D5
D2.1-D2.5	**D6**	**20.44**							20.4	9.13	5.13	46.9							**Pipe Flow**		
D2.6	**D7**		1.85	0.60	10.6	1.11	6.79	7.5													On Grade Inlet #D7
D2.7	**D8**		4.52	0.56	15.5	2.53	5.83	14.8													On Grade Inlet #D8
D2.6-D2.7	**D9**	**6.37**							Additive "Q" (Des.Pt.7+Des.Pt.8 - bypass at inlets)			18.1							**Pipe Flow**		
D2.1-D2.7	**D10**	**26.81**							26.8	12.78	4.45	56.8							**Pipe Flow**		
D2.8	**D11**		3.77	0.65	30.8	2.45	4.10	10.0			flow does not include upstream bypass (5.8cfs)										On Grade Inlet #D11
D2.9	**D12**		5.49	0.65	15.4	3.57	5.85	20.9													Pipe inlet
	D11a	9.26							Additive "Q" (Des.Pt. D11+Des.Pt.D12 and bypasses)			33.3							**Pipe Flow**		
D2.1-D2.9	**D13**	**36.07**							30.8	18.79	4.10	77.1							**Pipe Flow**		
D2.10	**D14**		1.26	0.65	9.6	0.82	7.05	5.8													Sump Inlet #D14
D2.11	**D15**		2.29	0.65	11.9	1.49	6.49	9.7					does not include upstream bypass (4.5cfs)								Sump Inlet #D15

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Standard Form SF-2. Storm Drainage System Design (Rational Method Procedure)

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Date:Feb. 19, 2025
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Job No: 300.302
Project: Antelope Ridge at Bull Hill Filing No. 1
Design Storm: **100 - Year Event (Proposed)**

Street or Basin	Design Point	Direct Runoff							Total Runoff				Street		Pipe			Travel Time			Remarks
		Area Design	Area (A)	Runoff Coeff. (C)	t_c	CA	i	Q	t_c	$\sum$ (CA)	i	Q	Slope	1/2 Street Cap. Flow	Design Flow	Slope	Pipe Size	Length	Velocity	t_t	
			ac.		min.		in/hr	cfs	min		in/hr	cfs	%	cfs	cfs	%	in	ft	ft/sec	min	
D2.1-D2.11	**D16**	**39.62**							31.7	21.10	4.03	85.0							**Pipe Flow**		
D2.12	**D17**		10.40	0.88	16.6	9.15	5.65	51.7					A portion of this flow allocated to Des.Pt. 27						**Pipe Flow**		
D2.13	**D18**		2.18	0.88	12.4	1.92	6.39	12.3													Sump Inlet #D18
	D18a								Additive "Q" (Des.Pt. D17+Des.Pt.D18-Des.Pt. 27)			42.3							**Pipe Flow**		
D2.14	**D19**		0.28	0.65	7.0	0.18	7.85	1.4													Sump Inlet #D19
D2.1-D2.14	**D20**	**52.48**							34.3	32.35	3.83	123.8							**Pipe Flow**		
	D27											21.7	THIS DES. PT. IS A MANHOLE NW OF CALF CREEK/ECHOING GRASS. EXCESS FLOW FROM DES.PT. 17 ROUTED HERE VIA FUTURE STM SWR								
Des. Pts. D20 & D26	**D28**	**65.24**							34.3	42.35	3.83	162.0							**Pipe Flow**		
D2.15			3.04	0.65	14.6	1.98	5.98	11.8													
D2.16			1.99	0.65	12.2	1.29	6.43	8.3													
D2.15&D2.16	**D29**	**5.03**							14.6	3.27	5.98	19.6									Sump Inlet #D29
D2.17	**D30**		3.09	0.65	14.5	2.01	5.99	12.0					does not include upstream bypass (0.5cfs)								Sump Inlet #D30
D2.15-D2.17	**D31**	**8.12**							14.6	5.28	5.98	31.6							**Pipe Flow**		
Des. Pts. D28 & D31	**D32**	**73.36**							34.3	47.63	3.83	182.2							**Pipe Flow**		
D2.18			15.58	0.40	19.8	6.23	5.21	32.5													
Basin D2.18,Des. Pts. C35 & D32	**D33**	**180.59**							34.3	106.72	3.83	415.3									
D2.19			27.89	0.37	26.2	10.32	4.51	46.5													

CORE
ENGINEERING GROUP
15004 1st Avenue South
Burnsville, MN 55306

PROJECT NAME: *Antelope Ridge at Bull Hill Filing No. 1*
PROJECT NUMBER: *100.302*
ENGINEER: *LAB*
DATE: *Feb.19, 2025*

Preliminary & Final Drainage Plan
PROPOSED CONDITIONS COEFFICIENT "C" CALCULATIONS

BASIN	Soil No.	Hydro Group	Area	Cover (%)	C5	Wtd. C5	C100	Wtd. C100	CN	Wtd. CN	Impervious	Type of Cover
ET28a	89	D	1.80	81.45%	0.15	0.12	0.50	0.40	84	68.42	0%	Pasture/Meadow
	89	D	0.41	18.55%	0.90	0.17	0.96	0.18	93	17.25	95%	Street/Road
			2.21	100.00%		0.29		0.58		85.67		
C1.1	78	B	10.44	73.06%	0.09	0.07	0.36	0.26	50	36.53	0%	Historic
	89	D	3.85	26.94%	0.16	0.04	0.51	0.14	80	21.55	0%	Historic
			14.29	100.00%		0.11		0.40		58.08		
C2.1	78	B	0.32	4.22%	0.08	0.00	0.35	0.01	69	2.91	0%	Pasture/Meadow
	89	D	7.26	95.78%	0.15	0.14	0.50	0.48	84	80.45	0%	Pasture/Meadow
			7.58	100.00%		0.15		0.49		83.37		
C2.2	78	B	0.73	18.02%	0.45	0.08	0.59	0.11	85	15.32	65%	1/8 ac. Single Family
	89	D	1.19	29.38%	0.49	0.14	0.65	0.19	92	27.03	65%	1/8 ac. Single Family
	89	D	2.13	52.59%	0.15	0.08	0.50	0.26	84	44.18	0%	Pasture/Meadow
			4.05	100.00%		0.30		0.56		86.53		
C2.3	78	B	3.78	98.95%	0.45	0.45	0.59	0.58	85	84.11	65%	1/8 ac. Single Family
	89	D	0.04	1.05%	0.49	0.01	0.65	0.01	92	0.96	65%	1/8 ac. Single Family
			3.82	100.00%		0.46		0.59		85.07		
C2.4	78	B	1.37	51.70%	0.45	0.23	0.59	0.31	85	43.94	65%	1/8 ac. Single Family
	89	D	1.28	48.30%	0.49	0.24	0.65	0.31	92	44.44	65%	1/8 ac. Single Family
			2.65	100.00%		0.47		0.62		88.38		
C2.5	78	B	0.78	100.00%	0.90		0.96		89		95%	Street/Road
C2.6	78	B	1.76	90.72%	0.45	0.41	0.59	0.54	85	77.11	65%	1/8 ac. Single Family
	89	D	0.18	9.28%	0.49	0.05	0.65	0.06	92	8.54	65%	1/8 ac. Single Family
			1.94	100.00%		0.45		0.60		85.65		
C2.7	78	B	2.30	61.01%	0.45	0.27	0.59	0.36	85	51.86	65%	1/8 ac. Single Family
	89	D	1.47	38.99%	0.49	0.19	0.65	0.25	92	35.87	65%	1/8 ac. Single Family
			3.77	100.00%		0.92		1.21		87.73		
C2.8	78	B	2.98	100.00%	0.45		0.59		85	100%	65%	1/8 ac. Single Family
C2.9	78	B	4.80	100.00%	0.45		0.59		85	100%	65%	1/8 ac. Single Family
C2.10	78	B	0.34	5.38%	0.45	0.02	0.59	0.03	85	4.57	65%	1/8 ac. Single Family
	89	D	2.86	45.25%	0.49	0.22	0.65	0.29	92	41.63	65%	1/8 ac. Single Family
	89	D	3.12	49.37%	0.15	0.07	0.50	0.25	69	34.06	0%	Pasture/Meadow
			6.32	100.00%		0.32		0.57		80.27		
C2.11	78	B	1.04	35.49%	0.45	0.16	0.59	0.21	85	30.17	65%	1/8 ac. Single Family
	89	D	1.89	64.51%	0.49	0.32	0.65	0.42	92	59.34	65%	1/8 ac. Single Family
			2.93	100.00%		0.48		0.63		89.52		

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DATE: *Feb.19, 2025*

Preliminary & Final Drainage Plan
PROPOSED CONDITIONS COEFFICIENT "C" CALCULATIONS

BASIN	Soil No.	Hydro Group	Area	Cover (%)	C5	Wtd. C5	C100	Wtd. C100	CN	Wtd. CN	Impervious	Type of Cover
C2.12	78	B	2.41	71.73%	0.45	0.32	0.59	0.42	85	60.97	65%	1/8 ac. Single Family
	89	D	0.95	28.27%	0.49	0.14	0.65	0.18	92	26.01	65%	1/8 ac. Single Family
			3.36	100.00%		0.46		0.61		86.98		
C2.13	78	B	4.52		0.45		0.59		85		65%	1/8 ac. Single Family
C2.14	78	B	3.51		0.45		0.59		85		65%	1/8 ac. Single Family
C2.15	89	D	1.96	64.26%	0.90	0.58	0.96	0.62	93	59.76	95%	Street/Road
			1.09	35.74%	0.15	0.05	0.50	0.18	85	30.38	0%	Pasture/Meadow
			3.05	100.00%		0.63		0.80		90.14		
C2.16	89	D	5.56	61.23%	0.49	0.30	0.65	0.40	92	56.33	65%	1/8 ac. Single Family
	89	D	3.52	38.77%	0.15	0.06	0.50	0.19	69	26.75	0%	Pasture/Meadow
			9.08	100.00%		0.36		0.59		83.08		
C2.17	78	B	1.46	55.51%	0.45	0.25	0.59	0.33	85	47.19	65%	1/8 ac. Single Family
	89	D	1.17	44.49%	0.49	0.22	0.65	0.29	92	40.93	65%	1/8 ac. Single Family
			2.63	100.00%		0.47		0.62		88.11		
C2.18	78	B	0.58	41.43%	0.90	0.37	0.96	0.40	85	35.21	65%	Street/Road
	89	D	0.82	58.57%	0.90	0.53	0.96	0.56	92	53.89	65%	Street/Road
			1.40	100.00%		0.90		0.96		89.10		
C2.19	89	D	0.60	100.00%	0.90	0.90	0.96	0.96	93	100%	95%	Street/Road
C3.1	78	B	3.19		0.45		0.59		85		65%	1/8 ac. Single Family
C3.2	78	B	4.86		0.45		0.59		85		65%	1/8 ac. Single Family
C3.2	78	B	0.63		0.45		0.59		85		65%	1/8 ac. Single Family
ET31a	89	D	9.80	93.07%	0.15	0.14	0.50	0.46	84	78.18	0%	Pasture/Meadow
	89	D	0.73	6.93%	0.90	0.06	0.96	0.07	93	6.45	95%	Street/Road
			10.53	100.00%		0.20		0.53		84.62		
ET31b	89	D	10.52	98.69%	0.15	0.15	0.50	0.49	84	82.90	0%	Pasture/Meadow
	89	D	0.14	1.31%	0.90	0.01	0.96	0.01	93	1.22	95%	Street/Road
			10.66	100.00%		0.16		0.51		84.12		
ET31c	89	D	6.84	98.13%	0.15	0.15	0.50	0.49	84	82.43	0%	Pasture/Meadow
	89	D	0.13	1.87%	0.90	0.02	0.96	0.02	93	1.73	0%	Street/Road
			6.97	100.00%		0.16		0.51		84.17		
E31	89	D	10.53	37.39%	0.20	0.07	0.53	0.20	29	10.84	0%	Pasture/Meadow
	89	D	10.66	37.86%	0.16	0.06	0.51	0.19	48	18.17	0%	Pasture/Meadow
	89	D	6.97	24.75%	0.16	0.04	0.51	0.13	69	17.08	0%	Pasture/Meadow
			28.16	100.00%		0.17		0.52		46.09		

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Preliminary & Final Drainage Plan
PROPOSED CONDITIONS COEFFICIENT "C" CALCULATIONS

BASIN	Soil No.	Hydro Group	Area	Cover (%)	C5	Wtd. C5	C100	Wtd. C100	CN	Wtd. CN	Impervious	Type of Cover
D1.1	89	D	1.87		0.90		0.96		93		95%	Street/Road
D1.2	78	B	22.83	34.72%	0.32	0.11	0.51	0.18	48	16.66	45%	Offsite, undefined
	89	D	41.59	63.25%	0.37	0.23	0.59	0.37	69	43.64	45%	Offsite flow analysis, undefined landuse
	78/89	B/D	1.34	2.04%	0.90	0.02	0.96	0.02	95	1.94	95%	Street/Road
			65.76	100.00%		0.36		0.57		154.43		
D1.1 & D1.2	78	B	22.83	33.76%	0.32	0.11	0.51	0.17	48	16.20	45%	Offsite, undefined
	89	D	41.59	61.50%	0.37	0.23	0.59	0.36	69	42.43	45%	Offsite flow analysis, undefined landuse
	78/89	B/D	3.21	4.75%	0.90	0.04	0.96	0.05	95	4.51	95%	Street/Road
			67.63	100.00%		0.38		0.58		279.81		
D3.1	78	B	3.03		0.09		0.36		69		2%	Greenbelt
D3.2	78	B	4.86		0.90		0.96		89		95%	Street/Road
D3.3	78	B	0.63		0.90		0.96		89		95%	Street/Road
D3.4	78	B	4.86		0.90		0.96		89		95%	Street/Road
D3.5	78	B	0.63		0.09		0.36		69		2%	Greenbelt
D2.1	78	B	4.48		0.09		0.36		85		65%	Undeveloped Historic
D2.2	78	B	7.15		0.09		0.36		85		65%	Undeveloped Historic
D2.3	78	B	1.09		0.09		0.36		85		65%	Undeveloped Historic
D2.4	78	B	3.35		0.45		0.59		85		65%	1/8 ac. Single Family
D2.5	78	B	4.37		0.45		0.59		85		65%	1/8 ac. Single Family
D2.6	78	B	1.47	79.46%	0.45	0.36	0.59	0.47	85	67.54	65%	1/8 ac. Single Family
	89	D	0.38	20.54%	0.49	0.10	0.65	0.13	92	18.90	65%	1/8 ac. Single Family
			1.85	100.00%		0.46		0.60		86.44		
D2.7	78	B	1.04	23.01%	0.08	0.02	0.35	0.08	48	11.04	0%	Pasture/Meadow
	89	D	0.63	13.94%	0.15	0.02	0.50	0.07	84	11.71	0%	Pasture/Meadow
	89	D	2.85	63.05%	0.49	0.31	0.65	0.41	92	58.01	65%	1/8 ac. Single Family
			4.52	100.00%		0.35		0.56		80.76		
D2.8	78	B	2.88	76.39%	0.45	0.34	0.59	0.45	85	64.93	65%	1/8 ac. Single Family
	89	D	0.89	23.61%	0.49	0.12	0.65	0.15	92	21.72	65%	1/8 ac. Single Family
			3.77	100.00%		0.46		0.60		86.65		
D2.9	78	B	5.49		0.45		0.65		69		65%	1/8 ac. Single Family
D2.10	78	B	1.26		0.45		0.65		69		65%	1/8 ac. Single Family
D2.11	78	B	2.29		0.45		0.65		69		65%	1/8 ac. Single Family
D2.12	78	B	10.40		0.81		0.88		89		95%	Commercial
D2.13	78	B	0.28		0.81		0.88		89		95%	Commercial
D2.14	78	B	2.18		0.81		0.88		89		95%	Commercial

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Preliminary & Final Drainage Plan
PROPOSED CONDITIONS COEFFICIENT "C" CALCULATIONS

BASIN	Soil No.	Hydro Group	Area	Cover (%)	C5	Wtd. C5	C100	Wtd. C100	CN	Wtd. CN	Impervious	Type of Cover
D2.15	78	B	3.04		0.45		0.65		69		65%	1/8 ac. Single Family
D2.16	78	B	1.99		0.45		0.65		69		65%	1/8 ac. Single Family
D2.17	78	B	3.09		0.45		0.65		69		65%	1/8 ac. Single Family
D2.18	78	B	11.63	74.65%	0.08	0.06	0.35	0.26	48	35.83	0%	Pasture/Meadow
	78	B	1.56	10.01%	0.45	0.05	0.65	0.07	69	6.91	65%	1/8 ac. Single Family
	89	D	2.39	15.34%	0.15	0.02	0.50	0.08	84	12.89	0%	Pasture/Meadow
			15.58	100.00%		0.13		0.40		55.63		
D2.19	78	B	25.62	91.86%	0.09	0.08	0.36	0.33	69	63.38	2%	Historic/Greenbelt
	56	D	2.27	8.14%	0.16	0.01	0.51	0.04	84	6.84	2%	Historic/Greenbelt
			27.89	100.00%		0.10		0.37		70.22		

CORE ENGINEERING GROUP

Standard Form SF-1. Time of Concentration-Proposed

Calculated By: Leonard Beasley
Date: Feb. 19, 2025
Checked By: Leonard Beasley

Job No: 100.065
Project: Antelope Ridge at Bull Hill Filing No. 1

Sub-Basin Data				Initial Overland Time (t_i)				Travel Time (t_t)					t_c Check (urbanized Basins)		Final t_c
BASIN or DESIGN	C_5	AREA (A) acres	NRCS Convey.	LENGTH (L) feet	SLOPE (S) %	VELOCITY (V) ft/sec	τ_i minutes	LENGTH (L) feet	SLOPE (S) %	VELOCITY (V) ft/sec	τ_t minutes	Computed t_c Minutes	TOTAL LENGTH (L) feet	Regional tc tc=(L/180)+10 minutes	USDCM Recommended $t_c=\tau_i+\tau_t$ (min)
ET28a	0.29	10.53	5.0	100.00	5.10%	0.19	8.57	466.00	4.35%	1.04	7.45				
			20.0					670.00	3.64%	3.82	2.93	18.94			18.94
C1.1	0.11	14.29	5.0	100.00	7.20%	0.18	9.34	893.00	3.00%	0.87	17.19	26.53			26.53
C2.1	0.15	7.58	5.0	100.00	4.66%	0.16	10.35	1090.00	4.44%	1.05	17.24				
			15.0					100.00	0.50%	1.06	1.57	29.17			29.17
C2.2	0.30	4.05	15.0	86.00	4.57%	0.18	8.14	93.00	2.01%	2.13	0.73				
			20.0					460.00	0.72%	1.70	4.52	13.38	639.00	13.55	13.38
C2.3	0.46	3.82	15.0	100.00	5.69%	0.26	6.53	129.00	2.35%	2.30	0.94				
			20.0					676.00	3.05%	3.49	3.23	10.69	905.00	15.03	10.69
C2.4	0.47	2.65	15.0	72.00	2.00%	0.16	7.71	56.00	2.00%	2.12	0.44				
			20.0					1570.00	1.86%	2.73	9.59	17.74	1698.00	19.43	17.74
C2.5	0.90	0.78	20.0	20.00	2.00%	0.26	1.29	926.00	0.95%	1.95	7.92	9.21	946.00	15.26	9.21
C1.1, C2.1-C2.5	0.49	33.16	5.0	100.00	4.66%	0.25	6.62	1090.00	4.44%	1.05	17.24				
			15.0					100.00	0.50%	1.06	1.57				
			20.0					1271.00	3.15%	12.78	1.66	27.09	2561.00	24.23	27.09
C2.6	0.45	1.94	20.0	30.00	2.00%	0.10	5.13	1090.00	2.93%	3.42	5.31	10.44	1120.00	16.22	10.44
C2.7	0.47	3.77	15.0	71.00	4.28%	0.20	5.95	103.00	2.19%	2.22	0.77				
			20.0					1105.00	2.84%	3.37	5.46	12.19	1279.00	17.11	12.19
C2.8	0.45	2.98	7.0	100.00	1.10%	0.15	11.42	391.00	0.80%	0.63	10.41				
			15.0					53.00	2.00%	2.12	0.42				

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Sub-Basin Data				Initial Overland Time (t_i)				Travel Time (t_t)					t_c Check (urbanized Basins)		Final t_c
BASIN or DESIGN	C_5	AREA (A) acres	NRCS Convey.	LENGTH (L) feet	SLOPE (S) %	VELOCITY (V) ft/sec	t_i minutes	LENGTH (L) feet	SLOPE (S) %	VELOCITY (V) ft/sec	t_t minutes	Computed t_c Minutes	TOTAL LENGTH (L) feet	Regional tc tc=(L/180)+10 minutes	USDCM Recommended $t_c=t_i+t_t$ (min)
			20.0					595.00	1.13%	12.78	0.78	23.02	1139.00	16.33	16.33
C2.9	0.45	4.80	20.0	70.00	1.70%	0.14	8.28	10.12	1.02%	2.02	0.08	8.36	80.12	10.45	8.36
C2.10	0.32	6.32	5.0	100.00	4.50%	0.19	8.60	640.00	4.53%	1.06	10.02				
			20.0					1487.00	2.91%	3.41	7.26	25.89	2227.00	22.37	22.37
C2.11	0.48	2.93	20.0	30.00	2.00%	0.10	4.90	1400.00	2.78%	3.33	7.00	11.89	1430.00	17.94	11.89
C2.12	0.46	3.36	15.0	68.00	2.76%	0.17	6.84	67.00	2.81%	2.51	0.44				
			20.0					963.00	1.11%	2.11	7.62	14.90	1098.00	16.10	14.90
C2.13	0.45	4.52	7.0	52.00	2.12%	0.13	6.63	95.00	2.16%	1.03	1.54				
			20.0					965.00	0.93%	1.93	8.34	16.51	1112.00	16.18	16.18
C2.14	0.45	3.51	7.0	27.00	2.00%	0.09	4.87	87.00	2.61%	1.13	1.28				
			20.0					1190.00	0.72%	1.70	11.69	17.84	1304.00	17.24	17.24
C2.15	0.90	3.05	20.0	31.00	2.00%	0.32	1.61	2102.00	2.50%	3.16	11.08	12.68	2133.00	21.85	12.68
C2.16	0.36	9.08	5.0	100.00	4.40%	0.20	8.22	646.00	4.49%	1.06	10.16				
			20.0					1671.00	2.52%	3.17	8.77	27.15	2417.00	23.43	23.43
C2.17	0.47	2.63	7.0	100.00	2.42%	0.20	8.53	147.00	2.07%	1.01	2.43				
			20.0					558.00	1.36%	2.33	3.99	14.95	805.00	14.47	14.47
Des. Pt. C21	0.46	9.50	15.0	68.00	2.76%	0.17	6.85	67.00	2.81%	2.51	0.44				
			20.0					963.00	1.11%	2.11	7.62				
			20.0					360.00	1.00%	2.00	3.00	17.91	1458.00	18.10	17.91

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Sub-Basin Data				Initial Overland Time (t_i)				Travel Time (t_t)					t_c Check (urbanized Basins)		Final t_c
BASIN or DESIGN	C_5	AREA (A) acres	NRCS Convey.	LENGTH (L) feet	SLOPE (S) %	VELOCITY (V) ft/sec	τ_i minutes	LENGTH (L) feet	SLOPE (S) %	VELOCITY (V) ft/sec	τ_t minutes	Computed t_c Minutes	TOTAL LENGTH (L) feet	Regional tc tc=(L/180)+10 minutes	USDCM Recommended $t_c=\tau_i+\tau_t$ (min)
C2.18	0.90	1.40	20.0	25.00	2.00%	0.29	1.44	950.00	1.20%	2.19	7.23	8.67	975.00	15.42	8.67
	0.45	1.98	15.0	99.00	9.09%	0.29	5.65	91.00	2.20%	2.22	0.68				
			20.0					340.00	1.03%	2.03	2.79	9.12	530.00	12.94	9.12
C2.19	0.90	1.40	15.0	50.00	2.00%	0.41	2.04	150.00	1.00%	1.50	1.67	3.71	200.00	11.11	3.71
C3.1	0.45	3.19	20.0	50.00	1.64%	0.12	7.08	1364.00	0.62%	1.57	14.44	21.51	1414.00	17.86	17.86
C3.2	0.45	4.86	20.0	50.26	1.64%	0.12	7.10	1291.00	0.80%	1.79	12.03	19.12	1341.26	17.45	17.45
C3.3	0.45	0.63	20.0	50.00	1.64%	0.12	7.08	360.00	1.00%	2.00	3.00	10.08	410.00	12.28	10.08
C3.4	0.45	0.57	20.0	43.00	1.50%	0.11	6.76	440.00	0.80%	1.79	4.10	10.86	483.00	12.68	10.86
ET31a	0.20	10.53	5.0	100.00	6.00%	0.18	9.02	536.00	7.71%	1.39	6.43				
			20.0					633.00	0.93%	1.93	5.47	20.93			20.93
ET31b	0.16	10.66	5.0	100.00	6.60%	0.18	9.13	730.00	7.88%	1.40	8.67				
			20.0					412.00	2.66%	3.26	2.11	19.90			19.90
ET31c	0.16	6.97	5.0	100.00	6.50%	0.18	9.18	1064.00	6.91%	1.31	13.49	22.67			22.67
ET31	0.17	28.16	5.0	100.00	6.00%	0.18	9.32	536.00	7.71%	1.39	6.43				
			20.0					633.00	0.93%	1.92	5.50				
			20.0					412.00	2.99%	3.45	1.99	23.24			23.24
D1.1	0.90	1.87	20.0	43.00	2.00%	0.38	1.89	1115.00	1.60%	2.53	7.35	9.24			9.24
D1.2	0.36	65.76	5.0	100.00	4.46%	0.20	8.18	1580.00	3.51%	0.94	28.11				

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Sub-Basin Data				Initial Overland Time (t_i)				Travel Time (t_t)					t_c Check (urbanized Basins)		Final t_c
BASIN or DESIGN	C_5	AREA (A) acres	NRCS Convey.	LENGTH (L) feet	SLOPE (S) %	VELOCITY (V) ft/sec	t_i minutes	LENGTH (L) feet	SLOPE (S) %	VELOCITY (V) ft/sec	t_t minutes	Computed t_c Minutes	TOTAL LENGTH (L) feet	Regional tc tc=(L/180)+10 minutes	USDCM Recommended $t_c=t_i+t_t$ (min)
			20.0					1000.00	0.63%	1.59	10.50	46.79	2680.00	24.89	24.89
D1.1 & D1.2	0.38	67.63	20.0	43.00	2.00%	0.11	6.81	1115.00	1.60%	2.53	7.35				
			7.0					1420.00	3.74%	1.35	17.48				
			15.0					1000.00	0.63%	1.19	14.00	45.63	5159.00	38.66	38.66
D21 ET31a-D2.2	0.32	95.79	5.0	100.00	6.00%	0.21	7.82	536.00	7.71%	1.39	6.43				
			20.0					1045.00	2.40%	1.74	10.01				
			15.0					2420.00	0.80%	1.34	30.06	54.33	4101.00	32.78	32.78
D3.1	0.09	3.03	7.0	100.00	3.70%	0.14	11.88	203.00	4.48%	1.48	2.28				
			15.0					1376.00	0.45%	1.01	22.79	36.96	1679.00	19.33	19.33
D3.2	0.90	3.07	20.0	30.00	3.33%	0.37	1.33	1715.00	0.70%	1.67	17.08	18.42	1745.00	19.69	18.42
D3.3	0.90	4.52	20.0	27.00	3.22%	0.35	1.28	1853.00	0.60%	1.55	19.94	21.22	1880.00	20.44	20.44
D3.4	0.90	1.42	20.0	22.00	1.80%	0.26	1.40	676.00	0.60%	1.55	7.27	8.67	698.00	13.88	8.67
D3.5	0.09	0.72	15.0	66.00	12.00%	0.17	6.54	183.00	0.60%	1.16	2.63	9.16	249.00	11.38	9.16
D26 ET31a-D3.5	0.32	95.79	5.0	100.00	6.00%	0.21	7.82	536.00	7.71%	1.39	6.43				
			20.0					1045.00	2.40%	3.10	5.62				
			15.0					2420.00	0.80%	1.34	30.06				
			15.0					1650.00	0.50%	1.06	25.93	61.61	5751.00	41.95	41.95
D2.1	0.09	4.48	15.0	82.00	1.83%	0.10	13.58	537.00	1.12%	1.59	5.64				
			15.0					175.00	0.60%	1.16	2.51	21.73	794.00	14.41	14.41
D2.2	0.09	7.15	7.0	100.00	3.30%	0.14	12.34	595.00	1.55%	0.87	11.38	23.72	695.00	13.86	13.86
D1 D2.1-D2.2	0.09	11.63	15.0	82.00	1.83%	0.10	13.58	537.00	1.12%	1.59	5.64				

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Sub-Basin Data				Initial Overland Time (t_i)				Travel Time (t_t)					t_c Check (urbanized Basins)		Final t_c
BASIN or DESIGN	C_5	AREA (A) acres	NRCS Convey.	LENGTH (L) feet	SLOPE (S) %	VELOCITY (V) ft/sec	t_i minutes	LENGTH (L) feet	SLOPE (S) %	VELOCITY (V) ft/sec	t_t minutes	Computed t_c Minutes	TOTAL LENGTH (L) feet	Regional tc tc=(L/180)+10 minutes	USDCM Recommended $t_c=t_i+t_t$ (min)
			15.0					175.00	0.60%	1.16	2.51				
			10.0					92.00	0.50%	0.71	2.17	23.90	886.00	14.92	14.92
D2.3	0.09	1.09	7.0	95.00	1.05%	0.09	17.57	158.00	1.00%	0.70	3.76	21.33	253.00	11.41	11.41
D3 D2.1-D2.3	0.36	12.72	15.0	82.00	1.83%	0.14	9.95	537.00	1.12%	1.59	5.64				
			15.0					175.00	0.60%	1.16	2.51				
			10.0					92.00	0.50%	0.71	2.17				
			24" RCP					640.00	0.50%	2.10	5.09	25.36	1459.00	18.11	18.11
D2.4	0.45	3.35	15.0	60.00	3.33%	0.16	6.13	64.00	2.81%	2.51	0.42				
			20.0					947.00	0.84%	1.83	8.61	15.17	1071.00	15.95	15.17
D2.5	0.45	4.37	20.0	92.00	2.72%	0.19	8.12	814.00	0.92%	1.92	7.07	15.19	906.00	15.03	15.03
D6 D2.1-D2.5	0.45	20.44	15.0	82.00	1.83%	0.16	8.79	537.00	1.12%	1.59	5.64				
			15.0					175.00	0.60%	1.16	2.51				
			10.0					92.00	0.50%	0.71	2.17				
			24" RCP					640.00	0.50%	2.10	5.09				
			30" RCP					397.00	1.40%	9.89	0.67	24.86	1923.00	20.68	20.68
D2.6	0.46	1.85	15.0	38.00	2.37%	0.12	5.38	80.00	2.08%	2.16	0.62				
			20.0					551.00	1.00%	2.00	4.59	10.59	669.00	13.72	10.59
D2.7	0.35	4.52	20.0	84.00	2.00%	0.14	9.91	902.00	1.20%	2.19	6.86	16.77	986.00	15.48	15.48
D10 D2.1-D2.7	0.45	26.81	15.0	82.00	1.83%	0.16	8.79	537.00	1.12%	1.59	5.64				

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Sub-Basin Data				Initial Overland Time (t_i)				Travel Time (t_t)					t_c Check (urbanized Basins)		Final t_c
BASIN or DESIGN	C_5	AREA (A) acres	NRCS Convey.	LENGTH (L) feet	SLOPE (S) %	VELOCITY (V) ft/sec	τ_i minutes	LENGTH (L) feet	SLOPE (S) %	VELOCITY (V) ft/sec	τ_t minutes	Computed t_c Minutes	TOTAL LENGTH (L) feet	Regional tc tc=(L/180)+10 minutes	USDCM Recommended $t_c=\tau_i+\tau_t$ (min)
			15.0					175.00	0.60%	1.16	2.51				
			10.0					92.00	0.50%	0.71	2.17				
			24" RCP					640.00	0.50%	2.10	5.09				
			30" RCP					397.00	1.40%	9.89	0.67				
			42" RCP					185.00	0.70%	8.75	0.35	25.21	2108.00	21.71	25.21
D2.8	0.46	3.77	20.0	17.00	2.00%	0.07	3.81	3719.00	0.50%	1.41	43.83	47.63	3736.00	30.76	30.76
D2.9	0.45	5.49	7.0	100.00	2.90%	0.20	8.29	46.00	2.61%	1.13	0.68				
			15.0					824.00	1.00%	1.50	9.16	18.12	970.00	15.39	18.12
D2.10	0.45	1.26	20.0	42.00	2.00%	0.12	6.07	426.00	1.04%	2.04	3.48	9.56	468.00	12.60	9.56
D2.11	0.45	2.29	20.0	25.00	2.00%	0.09	4.69	1042.00	1.45%	2.41	7.21	11.90	1067.00	15.93	11.90
D16 D2.1-D2.11	0.46	39.62	20.0	17.00	2.00%	0.07	3.81	3719.00	0.50%	1.41	43.83	47.63			
			42" RCP					169.00	1.05%	10.72	0.26	47.90	3905.00	31.69	31.69
D2.12	0.81	10.40	7.0	100.00	2.00%	0.40	4.18	400.00	1.72%	0.92	7.26				
			15.0					610.00	1.15%	1.61	6.32				
			7.0					25.00	25.00%	3.50	0.12				
			7.0					55.00	0.50%	0.49	1.85	19.73	1190.00	16.61	16.61
D2.13	0.81	2.18	20.0	20.00	2.00%	0.18	1.87	1423.00	1.27%	2.25	10.52	12.39	1443.00	18.02	12.39
D2.14	0.45	0.28	20.0	56.00	3.80%	0.16	5.67	121.00	0.62%	1.57	1.28	6.95	177.00	10.98	6.95
D20 D2.1-D2.14	0.44	39.62	20.0	17.00	2.00%	0.07	3.92	3719.00	0.50%	1.41	43.83	47.74			
			42" RCP					169.00	1.05%	10.72	0.26	48.01			
			48" RCP					470.00	0.50%	8.08	0.97	48.98	4375.00	34.31	34.31

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Sub-Basin Data				Initial Overland Time (t_i)				Travel Time (t_t)					t_c Check (urbanized Basins)		Final t_c
BASIN or DESIGN	C_5	AREA (A) acres	NRCS Convey.	LENGTH (L) feet	SLOPE (S) %	VELOCITY (V) ft/sec	τ_i minutes	LENGTH (L) feet	SLOPE (S) %	VELOCITY (V) ft/sec	τ_t minutes	Computed t_c Minutes	TOTAL LENGTH (L) feet	Regional tc tc=(L/180)+10 minutes	USDCM Recommended $t_c=\tau_i+\tau_t$ (min)
D27 D2.1-D2.14	0.44	39.62	20.0	17.00	2.00%	0.07	3.92	3719.00	0.50%	1.41	43.83	47.74			
			42" RCP					169.00	1.05%	10.72	0.26	48.01			
			48" RCP					708.00	0.50%	8.08	1.46	49.47	4613.00	35.63	35.63
D28 D26 & D27	0.32	161.03	5.0	100.00	6.00%	0.21	7.82	536.00	7.71%	1.39	6.43				
			20.0					1045.00	2.40%	3.10	5.62				
			15.0					2420.00	0.80%	1.34	30.06				
			15.0					1650.00	0.50%	1.06	25.93				
			54" RCP					1211.00	0.68%	12.36	1.63	63.24	6962.00	48.68	48.68
D2.15	0.45	3.04	7.0	22.00	1.05%	0.07	5.44	143.00	2.05%	1.00	2.38				
			15.0					657.00	1.14%	1.60	6.84	14.66	822.00	14.57	14.57
D2.16	0.45	1.99	7.0	12.00	1.67%	0.06	3.45	67.00	2.33%	1.07	1.05				
			15.0					539.00	0.60%	1.16	7.73	12.22	618.00	13.43	12.22
D2.17	0.45	3.09	7.0	76.00	1.40%	0.14	9.19	84.00	1.96%	0.98	1.43				
			15.0					657.00	1.13%	1.59	6.87	17.49	817.00	14.54	14.54
D2.18	0.13	15.58	7.0	100.00	1.86%	0.12	14.33	601.00	1.80%	0.94	10.67				
			10.0					60.00	12.85%	3.58	0.28				
			20.0					1005.00	0.50%	1.41	11.84	37.12	1766.00	19.81	19.81
D2.19	0.32	95.79	7.0	51.00	4.69%	0.14	6.06	94.00	0.66%	0.57	2.75				
			12.0					36.00	12.17%	4.19	0.14				
			12.0					100.00	1.00%	1.20	1.39				
			12.0					25.00	14.40%	4.55	0.09				

CORE ENGINEERING GROUP

Standard Form SF-1. Time of Concentration-Proposed

Calculated By: Leonard Beasley
Date: Feb. 19, 2025
Checked By: Leonard Beasley

Job No: 100.065
Project: Antelope Ridge at Bull Hill Filing No. 1

Sub-Basin Data				Initial Overland Time (t_i)				Travel Time (t_t)					t_c Check (urbanized Basins)		Final t_c
BASIN or DESIGN	C_5	AREA (A) acres	NRCS Convey.	LENGTH (L) feet	SLOPE (S) %	VELOCITY (V) ft/sec	τ_i minutes	LENGTH (L) feet	SLOPE (S) %	VELOCITY (V) ft/sec	τ_t minutes	Computed t_c Minutes	TOTAL LENGTH (L) feet	Regional tc tc=(L/180)+10 minutes	USDCM Recommended $\tau_c=\tau_i+\tau_t$ (min)
			15.0					2603.00	1.02%	1.51	28.64	39.07	2909.00	26.16	26.16

APPENDIX C – HYDRAULIC CALCULATIONS

Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Monday, Jan 19 2026

DIVERSION SWALE BY FILL - DES.PT D21

Trapezoidal

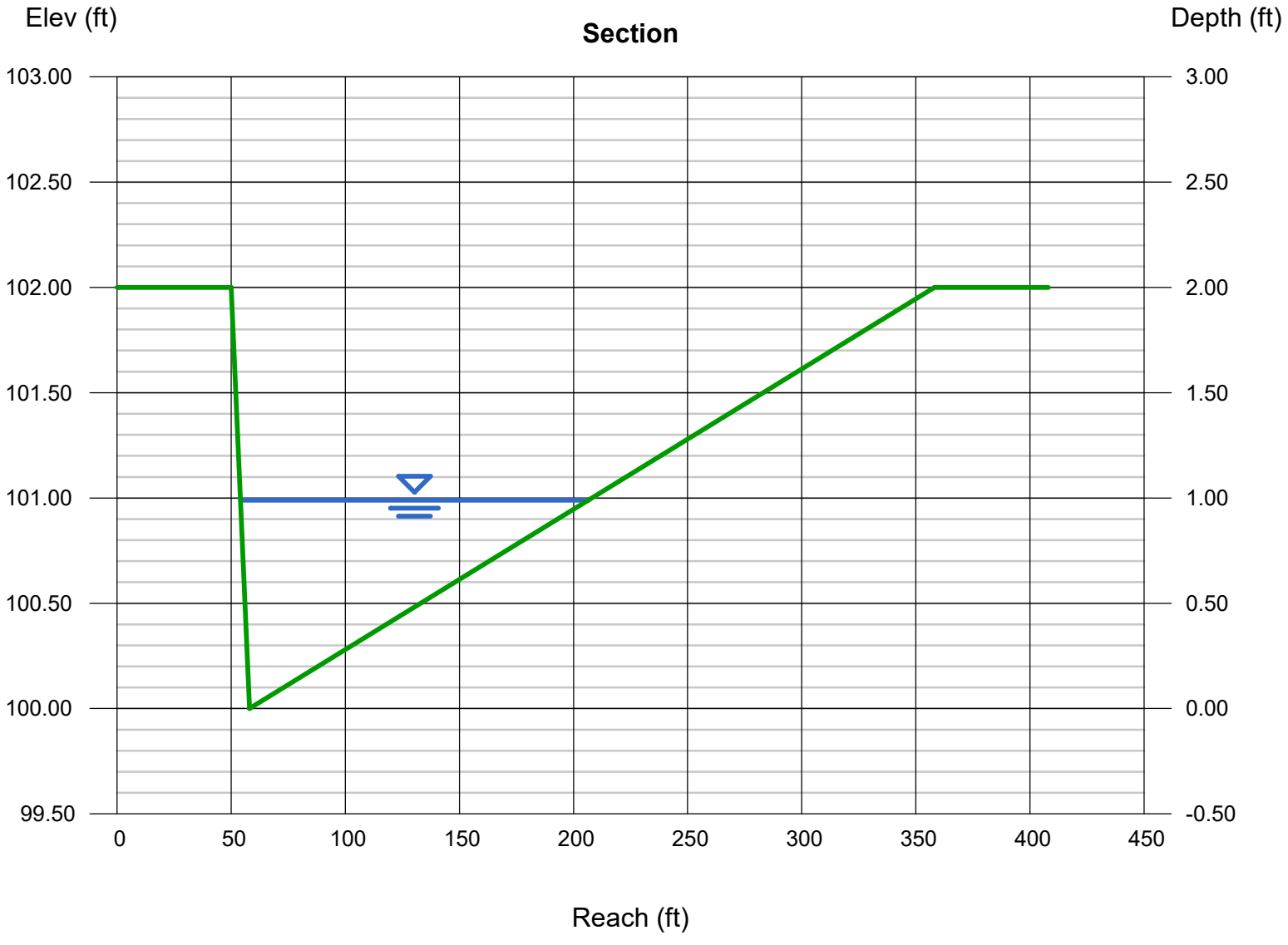
Bottom Width (ft)	= 0.10
Side Slopes (z:1)	= 4.00, 150.00
Total Depth (ft)	= 2.00
Invert Elev (ft)	= 100.00
Slope (%)	= 0.30
N-Value	= 0.018

Calculations

Compute by:	Known Q
Known Q (cfs)	= 212.20

Highlighted

Depth (ft)	= 0.99
Q (cfs)	= 212.20
Area (sqft)	= 75.57
Velocity (ft/s)	= 2.81
Wetted Perim (ft)	= 152.69
Crit Depth, Yc (ft)	= 0.87
Top Width (ft)	= 152.56
EGL (ft)	= 1.11



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Friday, Oct 24 2025

BASIN D2.9 SWALE

Triangular

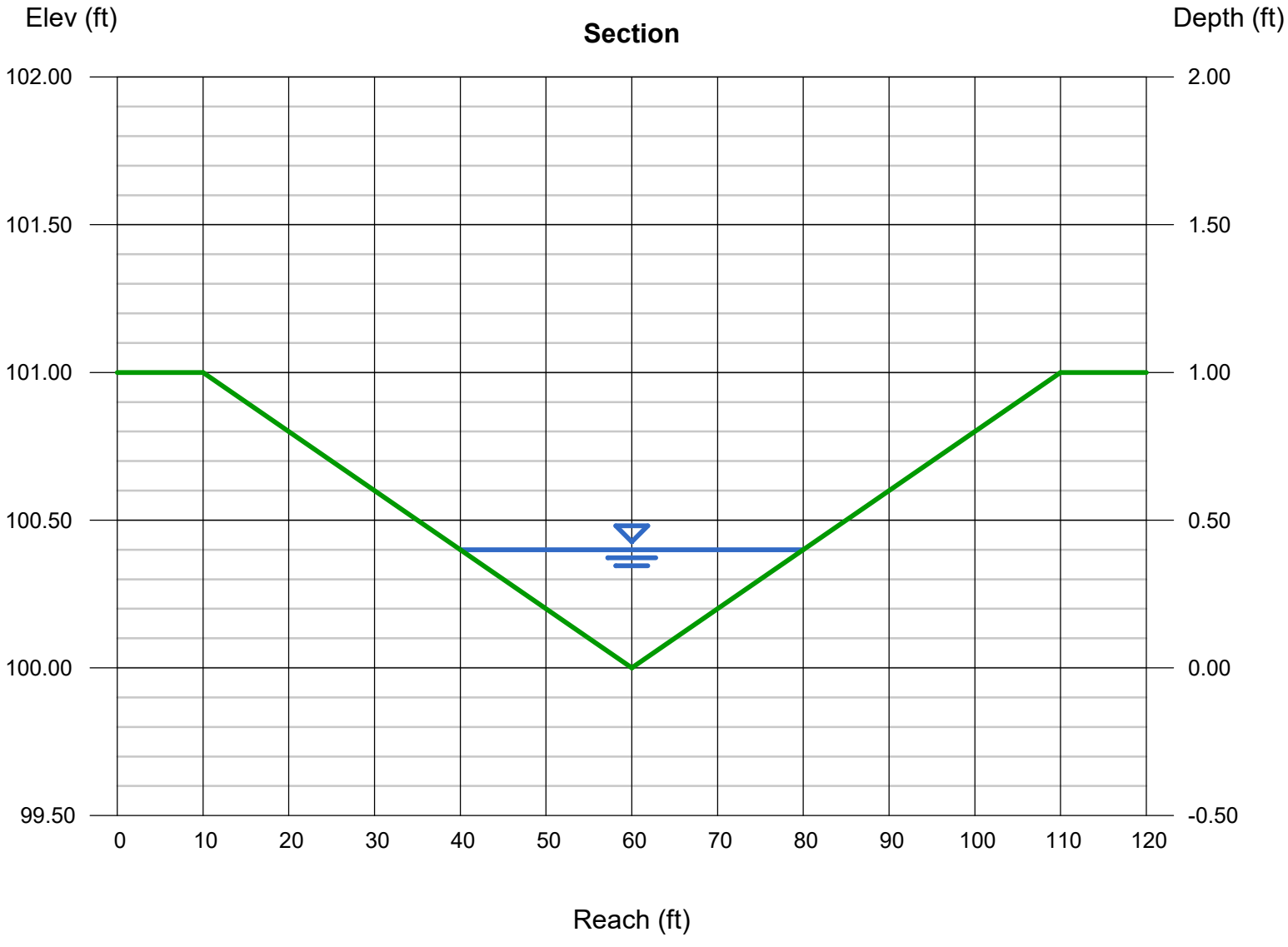
Side Slopes (z:1)	= 50.00, 50.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 100.00
Slope (%)	= 1.20
N-Value	= 0.020

Calculations

Compute by:	Known Q
Known Q (cfs)	= 20.90

Highlighted

Depth (ft)	= 0.40
Q (cfs)	= 20.90
Area (sqft)	= 8.00
Velocity (ft/s)	= 2.61
Wetted Perim (ft)	= 40.01
Crit Depth, Yc (ft)	= 0.41
Top Width (ft)	= 40.00
EGL (ft)	= 0.51



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, Apr 29 2025

Swale 'D1' at 0.5% - 260cfs

Trapezoidal

Bottom Width (ft)	= 6.00
Side Slopes (z:1)	= 4.00, 4.00
Total Depth (ft)	= 4.00
Invert Elev (ft)	= 100.00
Slope (%)	= 0.50
N-Value	= 0.020

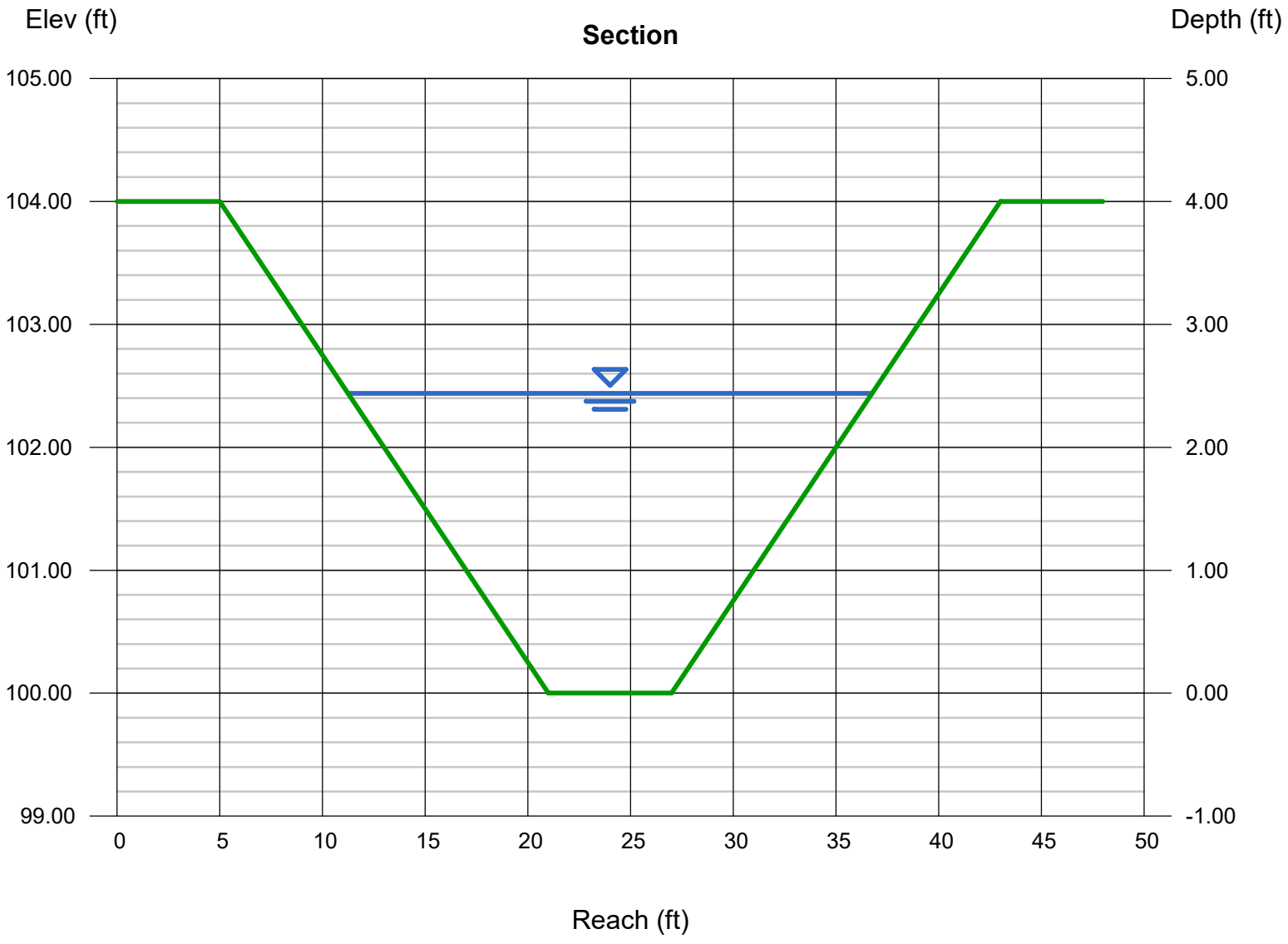
Calculations

Compute by:	Known Q
Known Q (cfs)	= 260.50

Highlighted

Depth (ft)	= 2.44
Q (cfs)	= 260.50
Area (sqft)	= 38.45
Velocity (ft/s)	= 6.77
Wetted Perim (ft)	= 26.12
Crit Depth, Yc (ft)	= 2.41
Top Width (ft)	= 25.52
EGL (ft)	= 3.15

see design pt. D22a for
design flow value explaination



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, Apr 29 2025

Swale 'D2' at 0.3% - 260cfs

Trapezoidal

Bottom Width (ft)	= 6.00
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 4.00
Invert Elev (ft)	= 100.00
Slope (%)	= 0.30
N-Value	= 0.020

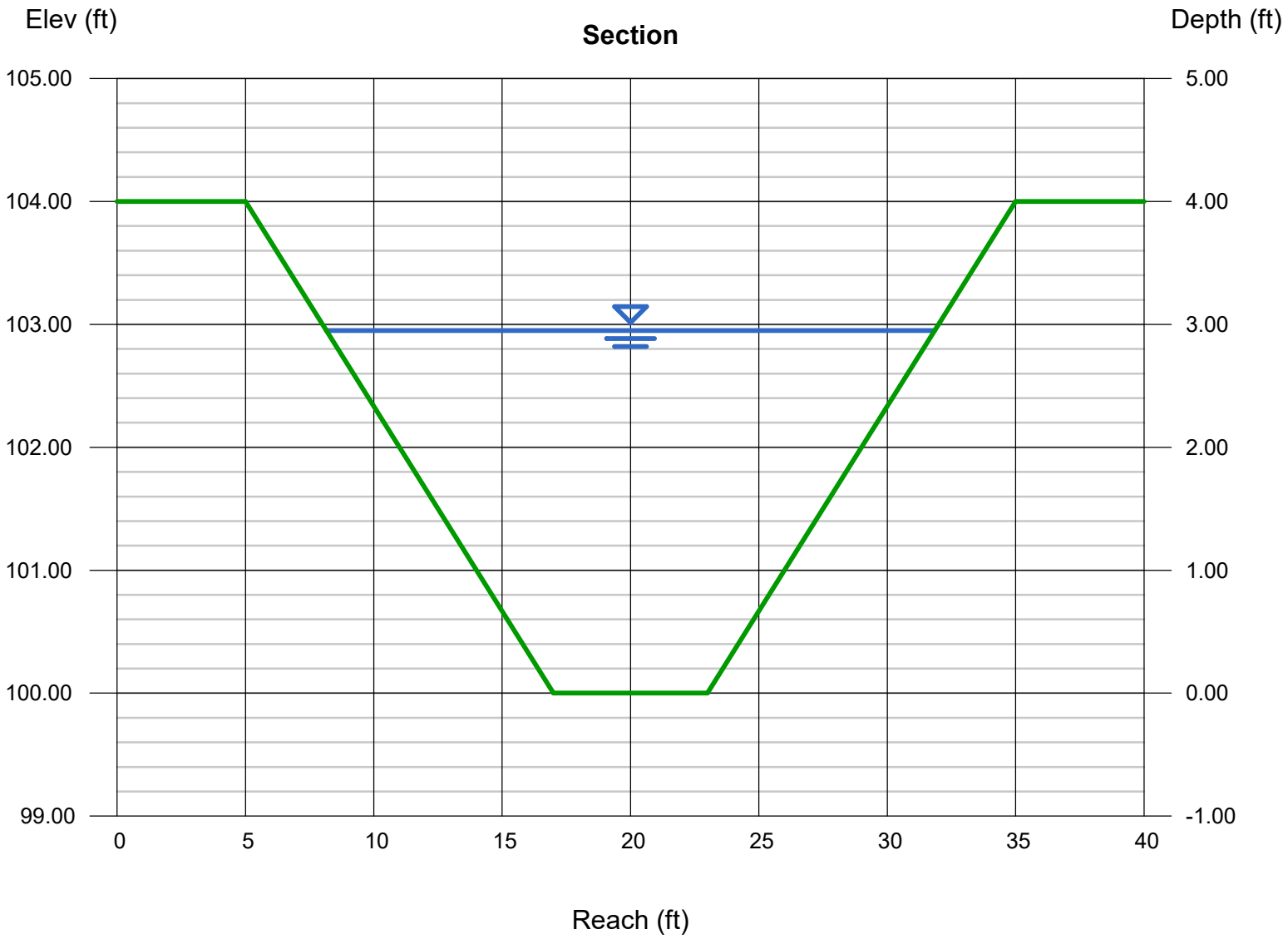
Calculations

Compute by:	Known Q
Known Q (cfs)	= 260.50

Highlighted

Depth (ft)	= 2.95
Q (cfs)	= 260.50
Area (sqft)	= 43.81
Velocity (ft/s)	= 5.95
Wetted Perim (ft)	= 24.66
Crit Depth, Yc (ft)	= 2.60
Top Width (ft)	= 23.70
EGL (ft)	= 3.50

see design pt. D22a for
design flow value explaination



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, Apr 29 2025

Swale 'D2' at 2.0% - 260cfs

Trapezoidal

Bottom Width (ft)	= 6.00
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 4.00
Invert Elev (ft)	= 100.00
Slope (%)	= 2.00
N-Value	= 0.020

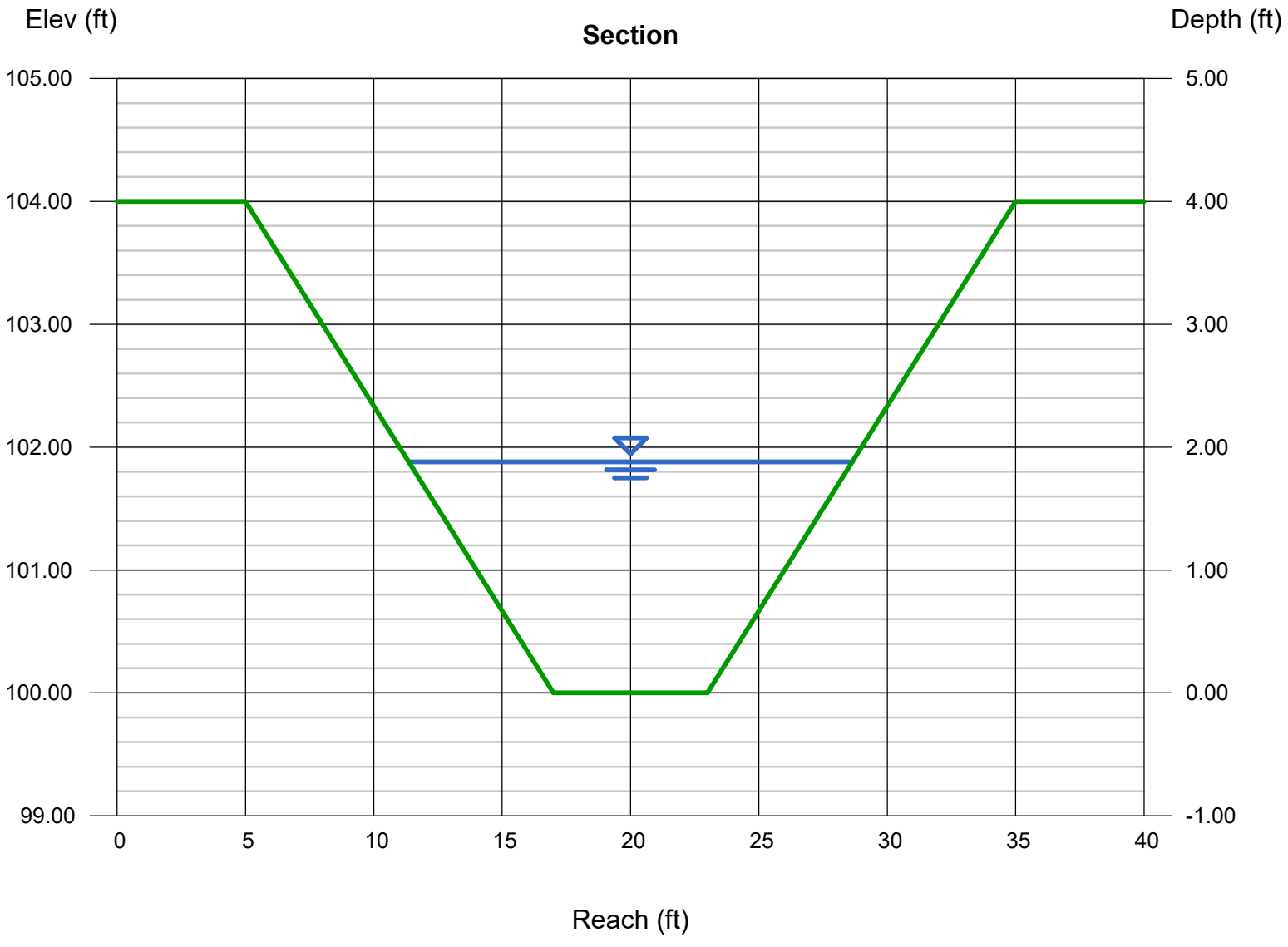
Calculations

Compute by:	Known Q
Known Q (cfs)	= 260.50

Highlighted

Depth (ft)	= 1.88
Q (cfs)	= 260.50
Area (sqft)	= 21.88
Velocity (ft/s)	= 11.90
Wetted Perim (ft)	= 17.89
Crit Depth, Yc (ft)	= 2.60
Top Width (ft)	= 17.28
EGL (ft)	= 4.08

see design pt. D22a for
design flow value explaination



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, Apr 29 2025

Swale 'D3' at 0.3% - 260cfs

Trapezoidal

Bottom Width (ft)	= 6.00
Side Slopes (z:1)	= 4.00, 4.00
Total Depth (ft)	= 4.00
Invert Elev (ft)	= 100.00
Slope (%)	= 0.30
N-Value	= 0.020

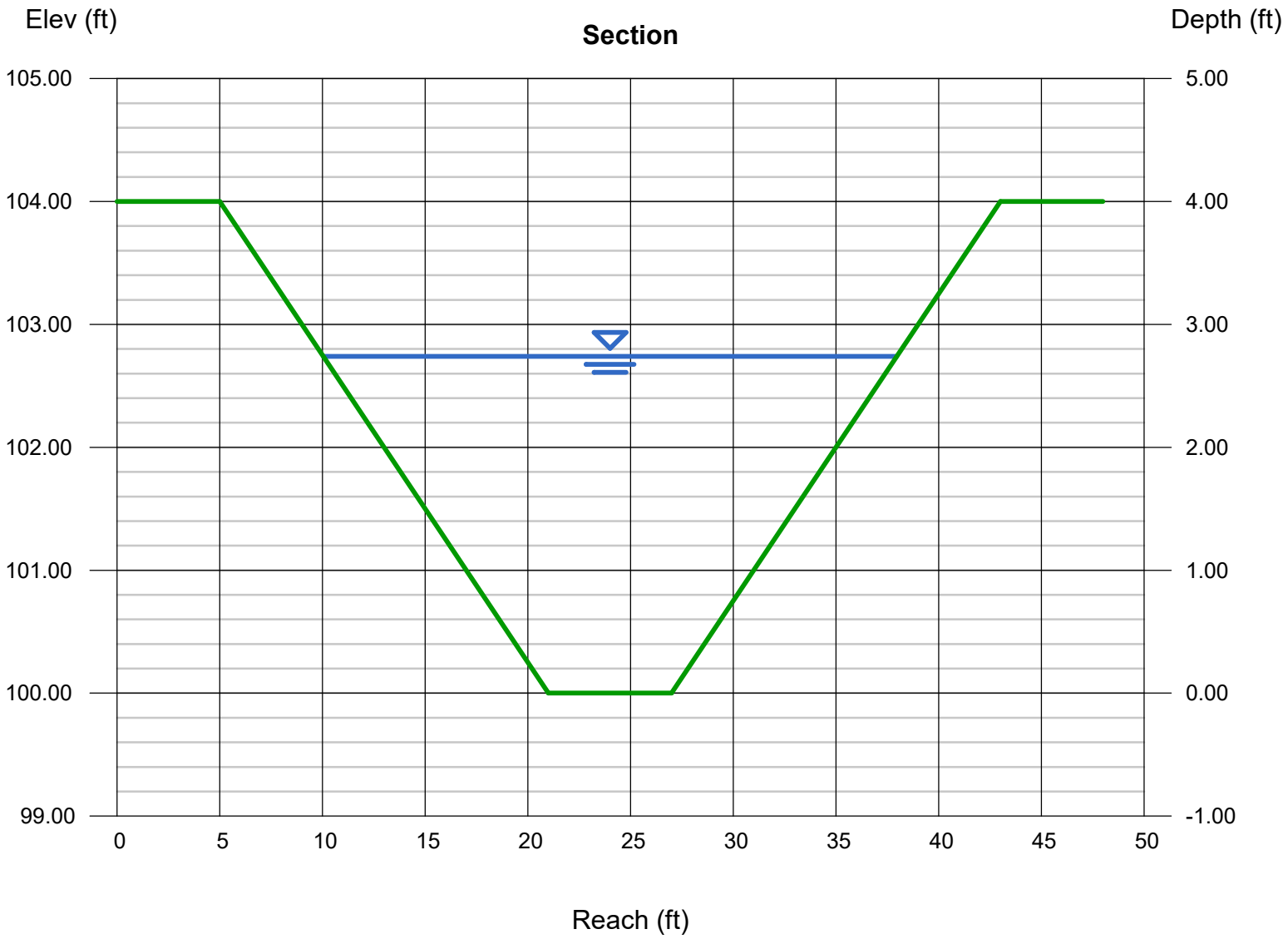
Calculations

Compute by:	Known Q
Known Q (cfs)	= 260.50

Highlighted

Depth (ft)	= 2.74
Q (cfs)	= 260.50
Area (sqft)	= 46.47
Velocity (ft/s)	= 5.61
Wetted Perim (ft)	= 28.59
Crit Depth, Yc (ft)	= 2.41
Top Width (ft)	= 27.92
EGL (ft)	= 3.23

see design pt. D22a for
design flow value explaination



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, Apr 3 2025

Culverts at Des.Pt. D22a

twin 48" culverts

Invert Elev Dn (ft)	=	5804.70
Pipe Length (ft)	=	92.00
Slope (%)	=	0.50
Invert Elev Up (ft)	=	5805.16
Rise (in)	=	48.0
Shape	=	Circular
Span (in)	=	48.0
No. Barrels	=	2
n-Value	=	0.013
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

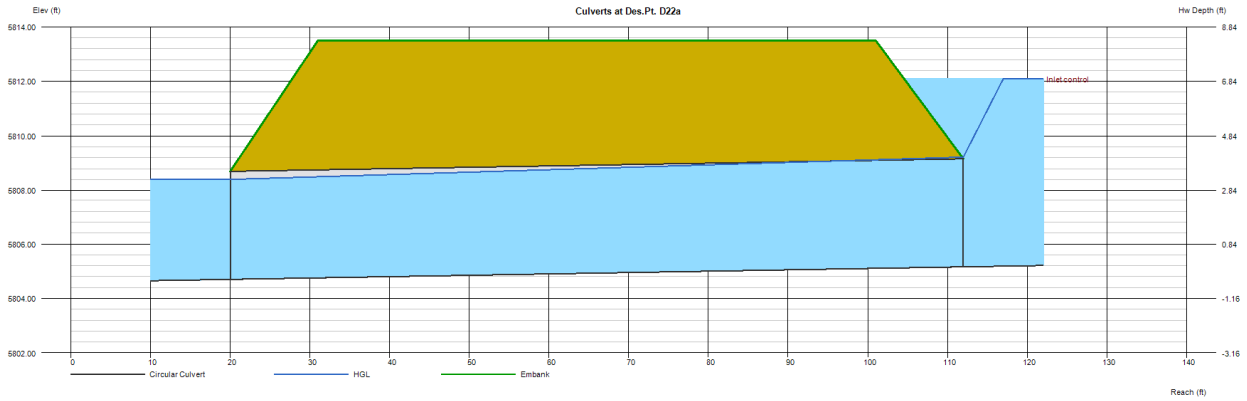
Top Elevation (ft)	=	5813.50
Top Width (ft)	=	70.00
Crest Width (ft)	=	30.00

Calculations

Qmin (cfs)	=	250.00
Qmax (cfs)	=	260.50
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	260.00
Qpipe (cfs)	=	260.00
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	10.70
Veloc Up (ft/s)	=	10.35
HGL Dn (ft)	=	5808.41
HGL Up (ft)	=	5809.22
Hw Elev (ft)	=	5812.09
Hw/D (ft)	=	1.73
Flow Regime	=	Inlet Control



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Friday, Apr 25 2025

see design pt. C1 for location

SWALE 'A'

Triangular

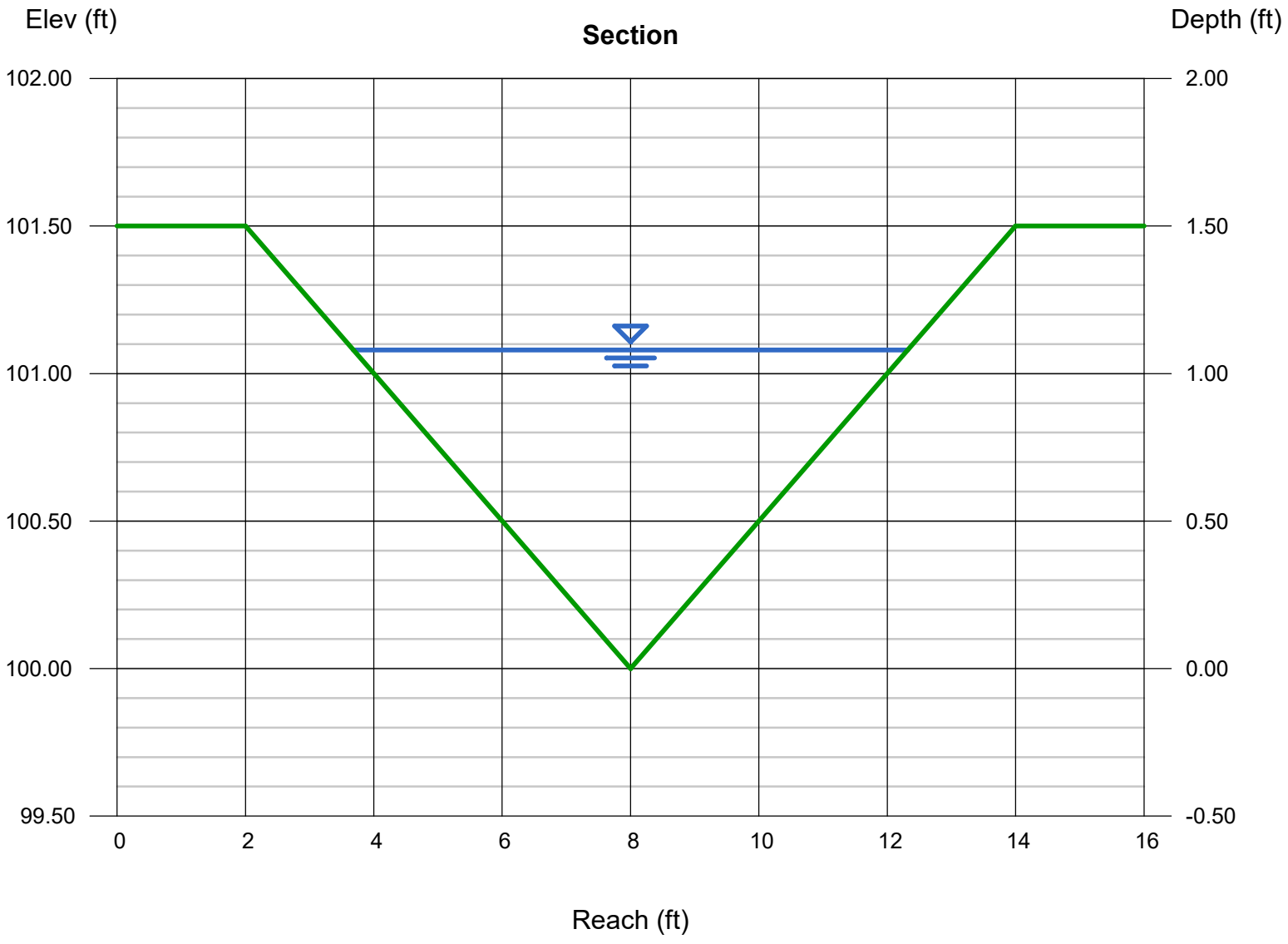
Side Slopes (z:1)	= 4.00, 4.00
Total Depth (ft)	= 1.50
Invert Elev (ft)	= 100.00
Slope (%)	= 0.50
N-Value	= 0.020

Calculations

Compute by:	Known Q
Known Q (cfs)	= 15.70

Highlighted

Depth (ft)	= 1.08
Q (cfs)	= 15.70
Area (sqft)	= 4.67
Velocity (ft/s)	= 3.37
Wetted Perim (ft)	= 8.91
Crit Depth, Yc (ft)	= 1.00
Top Width (ft)	= 8.64
EGL (ft)	= 1.26



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Friday, Apr 25 2025

OVERFLOW 'A'

see design pt. D31 for location

Trapezoidal

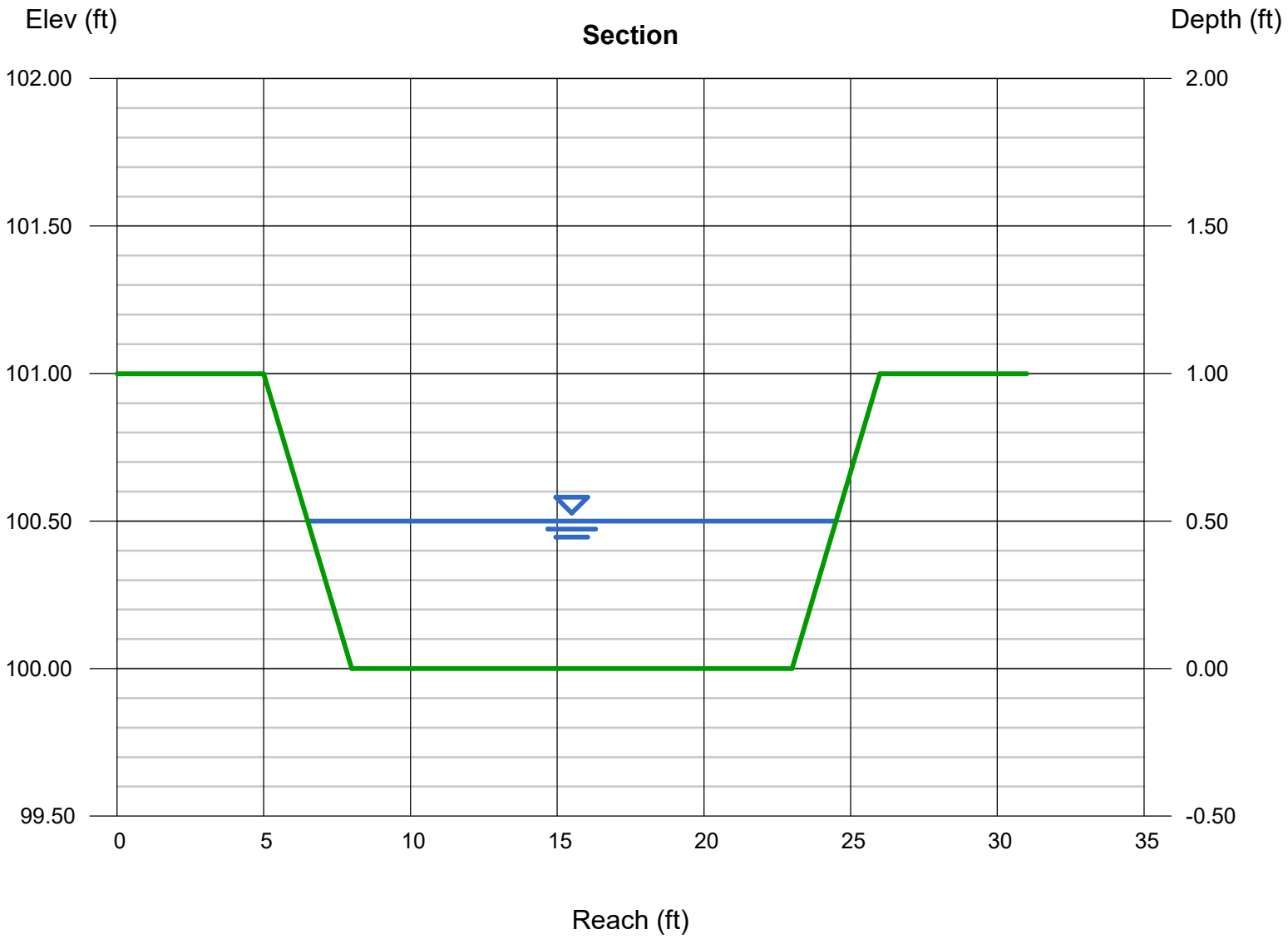
Bottom Width (ft)	= 15.00
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 100.00
Slope (%)	= 0.80
N-Value	= 0.020

Calculations

Compute by:	Known Q
Known Q (cfs)	= 31.60

Highlighted

Depth (ft)	= 0.50
Q (cfs)	= 31.60
Area (sqft)	= 8.25
Velocity (ft/s)	= 3.83
Wetted Perim (ft)	= 18.16
Crit Depth, Yc (ft)	= 0.50
Top Width (ft)	= 18.00
EGL (ft)	= 0.73



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Monday, Sep 8 2025

SWALE AT DES.PT D21f

Trapezoidal

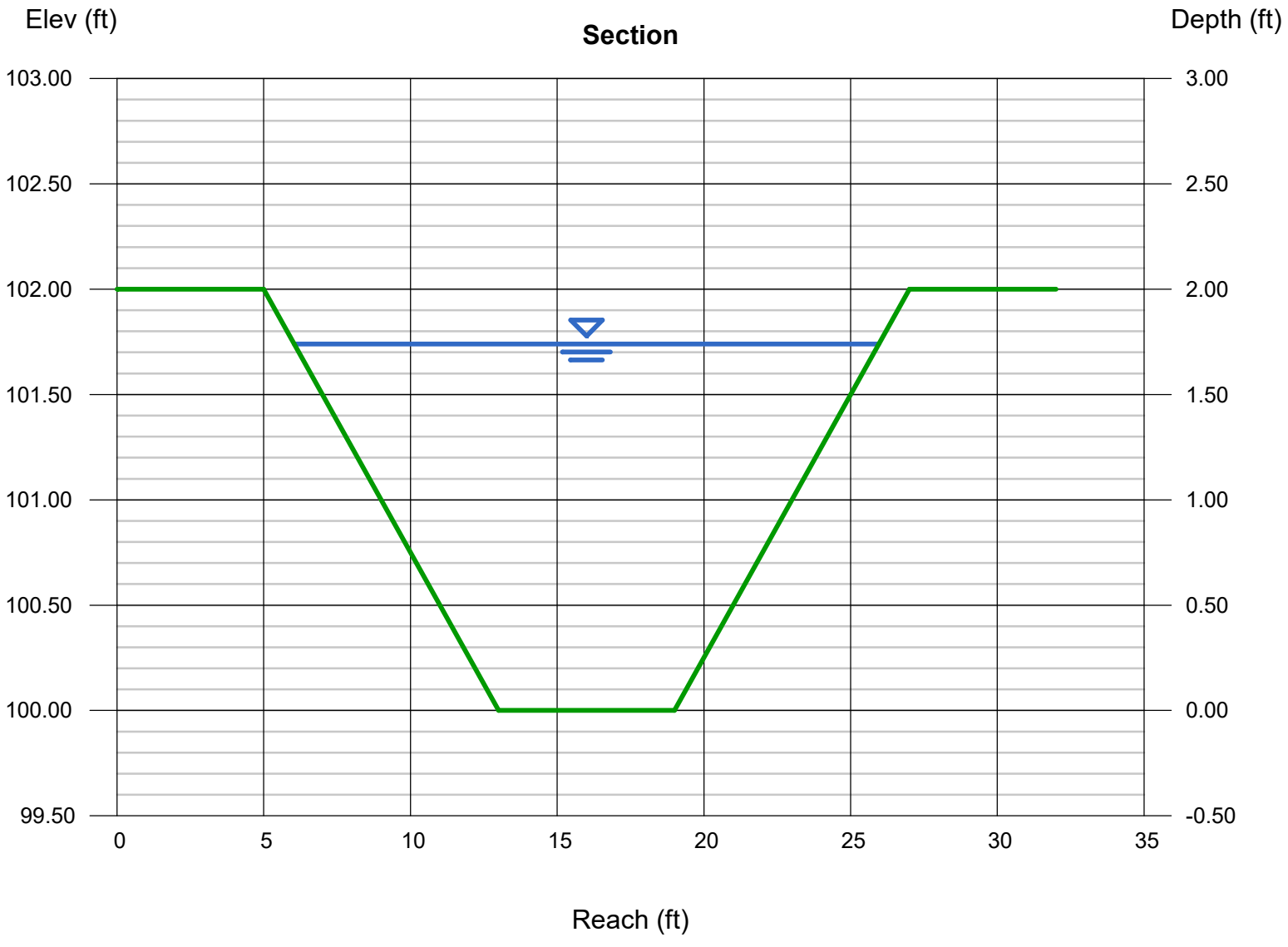
Bottom Width (ft)	= 6.00
Side Slopes (z:1)	= 4.00, 4.00
Total Depth (ft)	= 2.00
Invert Elev (ft)	= 100.00
Slope (%)	= 0.20
N-Value	= 0.020

Calculations

Compute by:	Known Q
Known Q (cfs)	= 79.70

Highlighted

Depth (ft)	= 1.74
Q (cfs)	= 79.70
Area (sqft)	= 22.55
Velocity (ft/s)	= 3.53
Wetted Perim (ft)	= 20.35
Crit Depth, Yc (ft)	= 1.32
Top Width (ft)	= 19.92
EGL (ft)	= 1.93



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Jan 14 2026

Pond Outflow Swale (Des.Pt. 34)

Trapezoidal

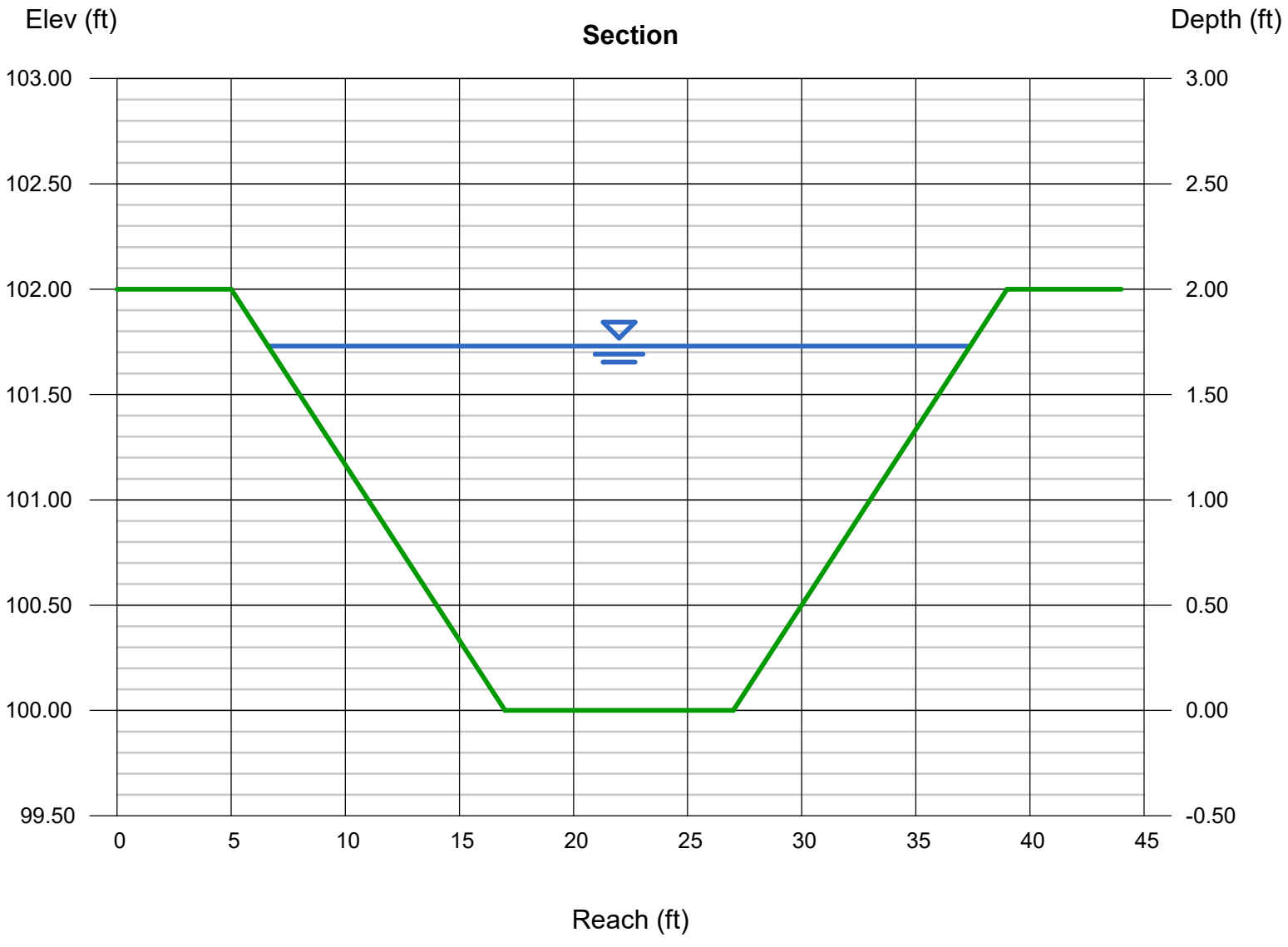
Bottom Width (ft)	= 10.00
Side Slopes (z:1)	= 6.00, 6.00
Total Depth (ft)	= 2.00
Invert Elev (ft)	= 100.00
Slope (%)	= 0.60
N-Value	= 0.020

Calculations

Compute by:	Known Q
Known Q (cfs)	= 219.70

Highlighted

Depth (ft)	= 1.73
Q (cfs)	= 219.70
Area (sqft)	= 35.26
Velocity (ft/s)	= 6.23
Wetted Perim (ft)	= 31.05
Crit Depth, Yc (ft)	= 1.76
Top Width (ft)	= 30.76
EGL (ft)	= 2.33



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Jan 14 2026

Pond Outflow Swale (Des.Pt. 34)

Trapezoidal

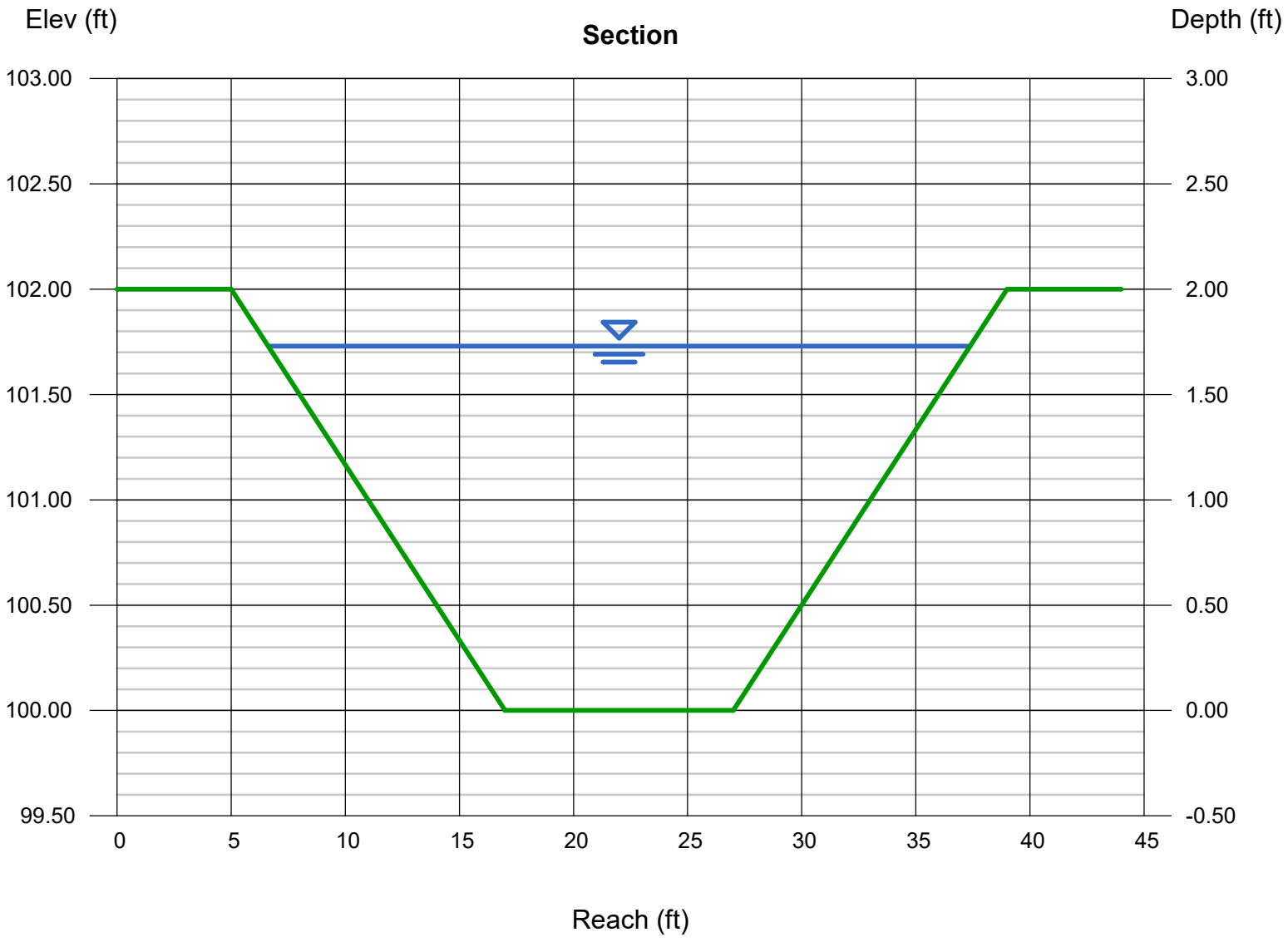
Bottom Width (ft)	= 10.00
Side Slopes (z:1)	= 6.00, 6.00
Total Depth (ft)	= 2.00
Invert Elev (ft)	= 100.00
Slope (%)	= 0.60
N-Value	= 0.020

Calculations

Compute by:	Known Q
Known Q (cfs)	= 219.70

Highlighted

Depth (ft)	= 1.73
Q (cfs)	= 219.70
Area (sqft)	= 35.26
Velocity (ft/s)	= 6.23
Wetted Perim (ft)	= 31.05
Crit Depth, Yc (ft)	= 1.76
Top Width (ft)	= 30.76
EGL (ft)	= 2.33



$$H_a = \frac{(H + Y_n)}{2}$$ Equation 9

Where the maximum value of H_a shall not exceed H, and:

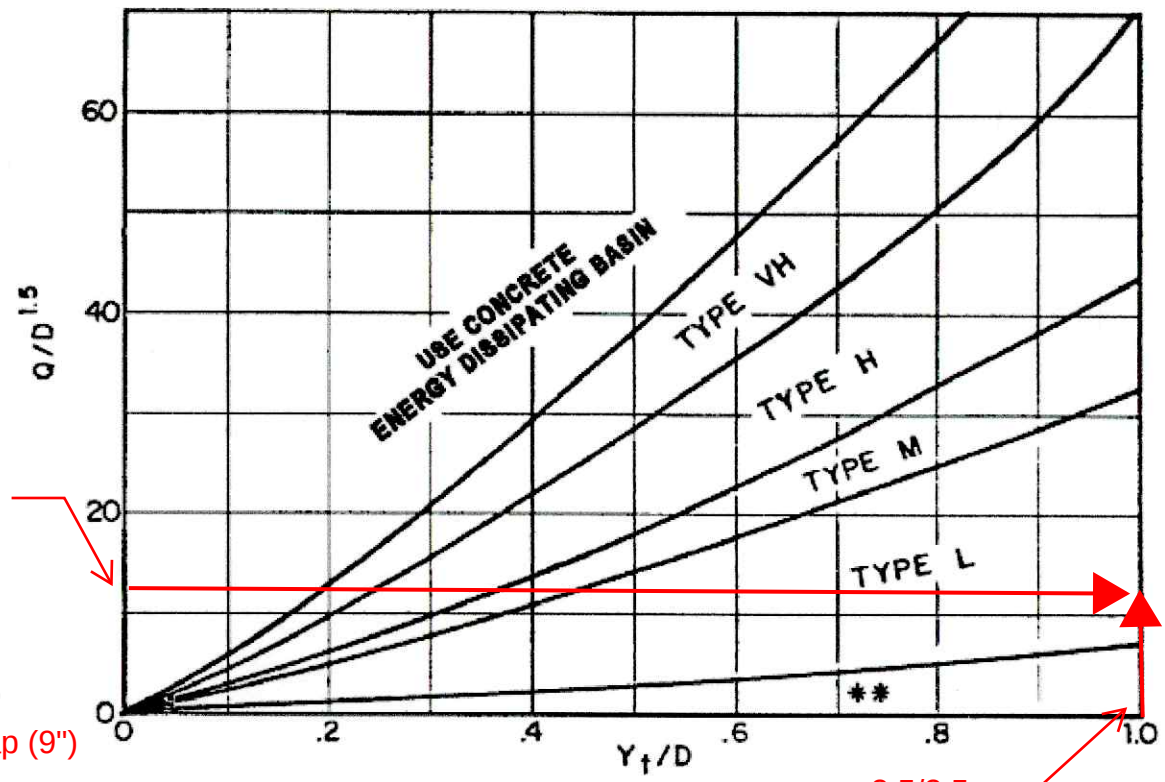
D_a = parameter to use in place of D in Figure 9-38 when flow is supercritical (ft)

D_c = diameter of circular culvert (ft)

H_a = parameter to use in place of H in Figure 9-39 when flow is supercritical (ft)

H = height of rectangular culvert (ft)

Y_n = normal depth of supercritical flow in the culvert (ft)



79.7/(3.5^1.5)

Q=79.7cfs
Yt=3.5'
D=3.5'
use Type L rip rap (9")

3.5/3.5

D = Dia. in Ft,

Yt = Tailwater Depth in Ft.

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

Fig 9-38. RipRap Protection @ Circular outlet (valid For $\frac{Q}{D^{2.5}} \leq 6.0$

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Sect. 3.2.3

RIP RAP SIZING AT DES. PT. D22a

Close ×

Print-Friendly View Accessible Transcript View

$$H_a = \frac{(H + Y_n)}{2}$$ Equation 9

Where the maximum value of H_a shall not exceed H, and:

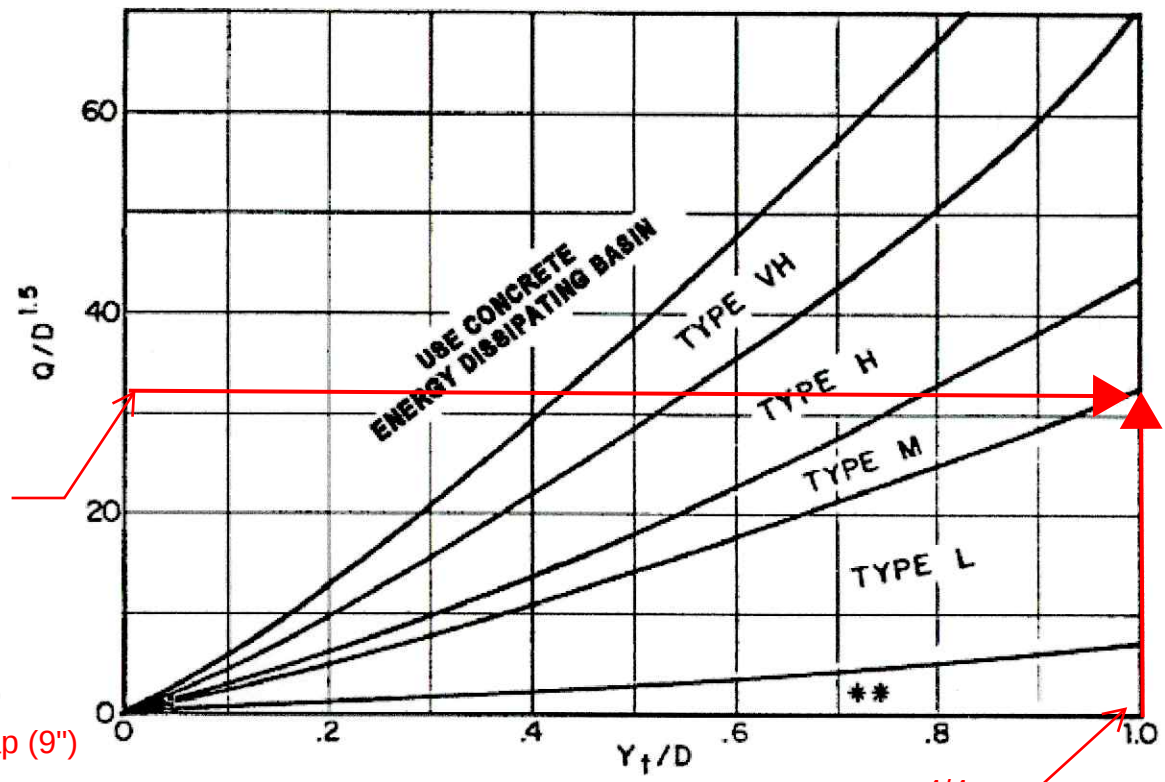
D_a = parameter to use in place of D in Figure 9-38 when flow is supercritical (ft)

D_c = diameter of circular culvert (ft)

H_a = parameter to use in place of H in Figure 9-39 when flow is supercritical (ft)

H = height of rectangular culvert (ft)

Y_n = normal depth of supercritical flow in the culvert (ft)



260/(4^1.5)

Q=260cfs
Yt=4.0'
D=4.0'
use Type L rip rap (9")

4/4

D = Dia. in Ft,

Yt = Tailwater Depth in Ft.

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

Fig 9-38. RipRap Protection @ Circular outlet (valid For $\frac{Q}{D^{2.5}} \leq 6.0$

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Sect. 3.2.3

RIP RAP SIZING AT DES. PT. D34

$$H_a = \frac{(H + Y_n)}{2}$$ Equation 9

Where the maximum value of H_a shall not exceed H, and:

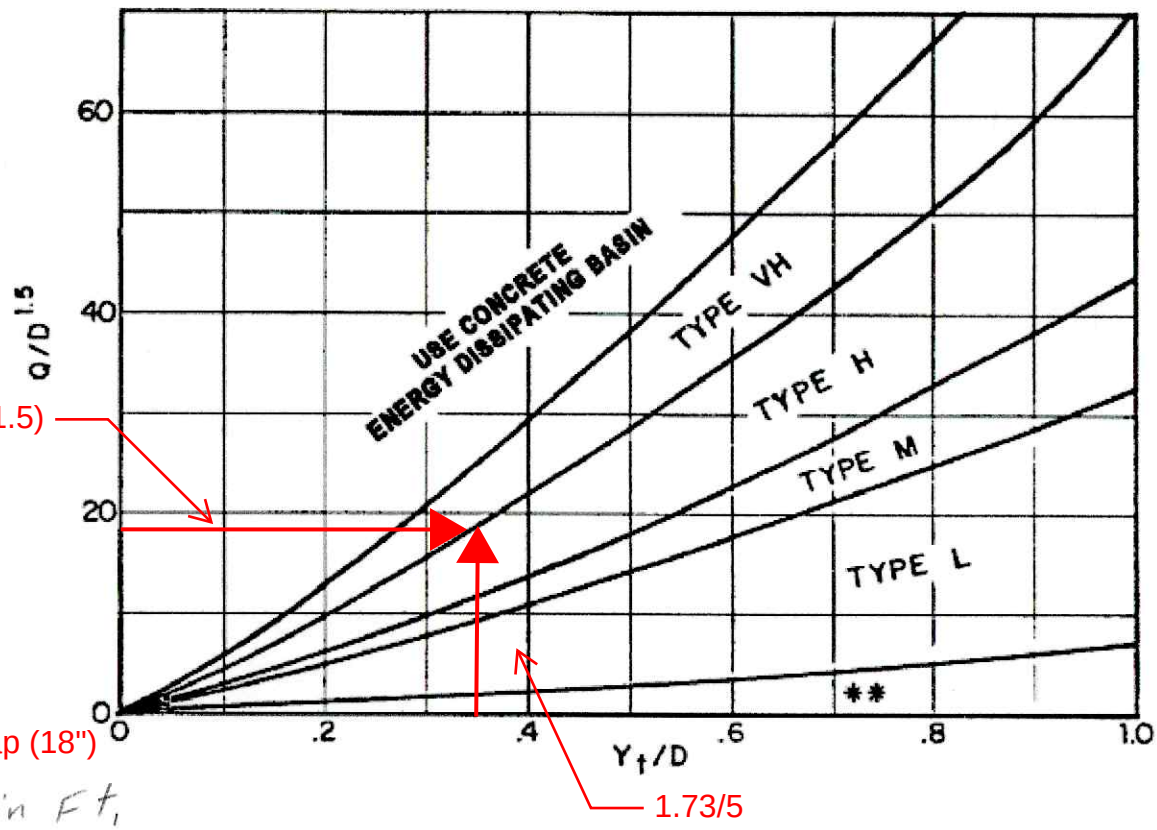
D_a = parameter to use in place of D in Figure 9-38 when flow is supercritical (ft)

D_c = diameter of circular culvert (ft)

H_a = parameter to use in place of H in Figure 9-39 when flow is supercritical (ft)

H = height of rectangular culvert (ft)

Y_n = normal depth of supercritical flow in the culvert (ft)



219.7/(5^1.5)

Q=219.7cfs
Yt=1.73'
D=5.0'
use Type H rip rap (18")

1.73/5

D = Dia. in Ft,

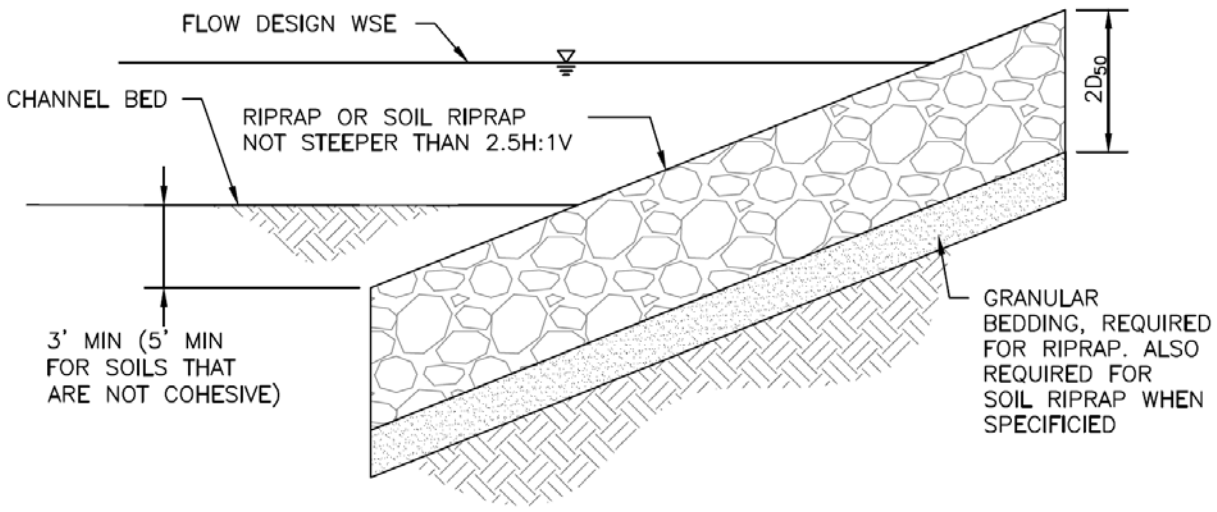
Yt = Tailwater Depth in Ft.

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

Fig 9-38. RipRap Protection @ Circular outlet (valid For $\frac{Q}{D^{2.5}} \leq 6.0$

This app uses experimental AI and may produce errors. By using it, you agree to our Terms and Privacy Policy.

Sect. 3.2.3



RIPRAP DESIGNATION	% SMALLER THAN GIVEN SIZE BY WEIGHT	INTERMEDIATE ROCK DIMENSION (INCHES)	D_{50}* (INCHES)
TYPE VL	70 – 100 50 – 70 35 – 50 2 – 10	12 9 6 2	6
TYPE L	70 – 100 50 – 70 35 – 50 2 – 10	15 12 9 3	9
TYPE M	70 – 100 50 – 70 35 – 50 2 – 10	21 18 12 4	12
TYPE H	70 – 100 50 – 70 35 – 50 2 – 10	30 24 18 6	18
*D_{50} = MEAN ROCK SIZE			

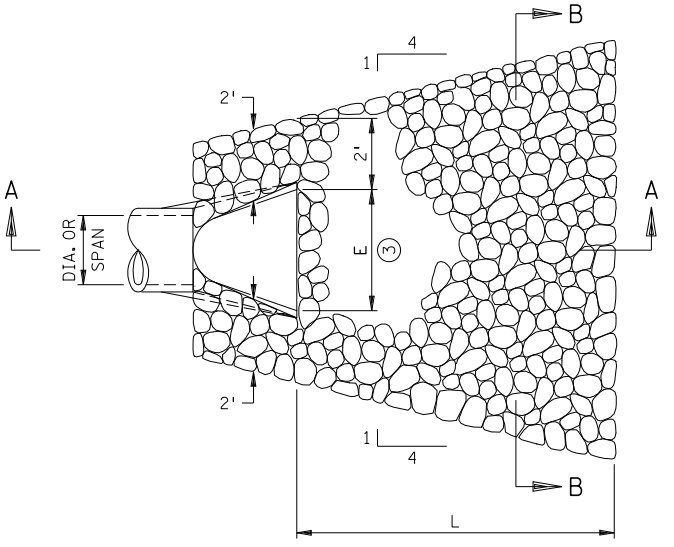
Figure 8-34. Riprap and soil riprap placement and gradation (part 1 of 3)

TABLE OF QUANTITIES
RIPRAP AT RCP OUTLETS

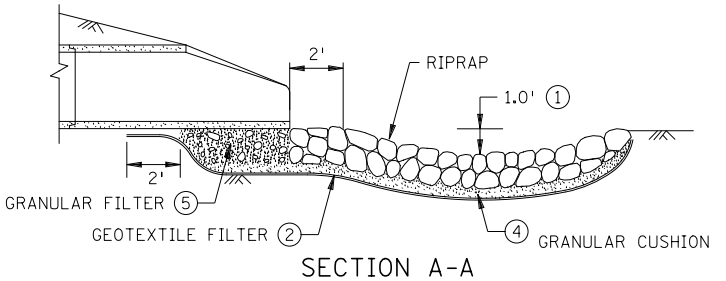
		CLASS II d_{50} = 6"			CLASS III d_{50} = 9"			CLASS IV d_{50} = 12"		
DIA. OF ROUND PIPE (IN.)	L (FT.)	GEO-TEXTILE FILTER (SQ.YD.)	GRANULAR FILTER UNDER APRON (CU.YD.)	12" DEPTH RIPRAP (CU.YD.)	GEO-TEXTILE FILTER (SQ.YD.)	GRANULAR FILTER UNDER APRON (CU.YD.)	18" DEPTH RIPRAP (CU.YD.)	GEO-TEXTILE FILTER (SQ.YD.)	GRANULAR FILTER UNDER APRON (CU.YD.)	24" DEPTH RIPRAP (CU.YD.)
12	8	16.9	0.2	3.0	19.6	0.3	4.4	22.6	0.3	5.9
15	8	18.0	0.2	3.2	20.8	0.3	4.8	23.9	0.4	6.4
18	10	22.4	0.3	4.3	25.6	0.4	6.4	29.0	0.5	8.5
21	10	24.1	0.4	4.7	27.4	0.6	7.1	30.9	0.7	9.4
24	12	29.7	0.5	6.2	33.4	0.8	9.2	37.3	1.0	12.3
27	12	31.4	0.6	6.6	35.2	0.9	9.9	39.2	1.2	13.2
30	14	37.4	0.8	8.2	41.6	1.1	12.3	46.0	1.5	16.4
36	16	45.9	1.1	10.6	50.5	1.6	15.8	55.4	2.1	21.1
42	18	52.8	1.2	12.5	57.8	1.7	18.7	63.0	2.3	24.9
48	20	61.1	1.5	14.8	66.5	2.2	22.2	72.0	2.9	29.6

TABLE OF QUANTITIES
RIPRAP AT RCP-A OUTLETS

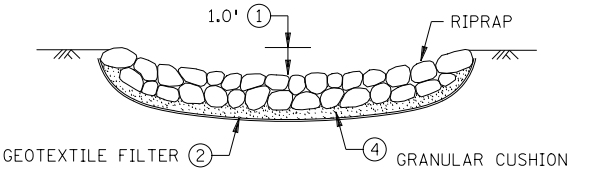
		CLASS II d_{50} = 6"			CLASS III d_{50} = 9"			CLASS IV d_{50} = 12"		
SPAN OF PIPE ARCH (IN.)	L (FT.)	GEO-TEXTILE FILTER (SQ.YD.)	GRANUL FILTER UNDER APRON (CU.YD.)	12" DEPTH RIPRAP (CU.YD.)	GEO-TEXTILE FILTER (SQ.YD.)	GRANUL FILTER UNDER APRON (CU.YD.)	18" DEPTH RIPRAP (CU.YD.)	GEO-TEXTILE FILTER (SQ.YD.)	GRANUL FILTER UNDER APRON (CU.YD.)	24" DEPTH RIPRAP (CU.YD.)
22	10	22.4	0.3	4.1	25.6	0.4	6.1	29.0	0.5	8.1
28	12	29.5	0.5	5.7	33.2	0.7	8.5	37.1	0.9	11.3
36	14	37.3	0.8	7.5	41.5	1.1	11.2	45.8	1.5	14.9
43	16	45.9	1.1	9.5	50.5	1.6	14.3	55.3	2.1	19.0
51	18	52.5	1.2	11.3	57.5	1.7	16.9	62.7	2.3	22.5
58	20	59.9	1.3	13.2	65.2	1.9	19.8	70.7	2.5	26.4



PLAN



SECTION A-A



SECTION B-B

NOTES:

REQUIREMENTS FOR GEOTEXTILE TYPE, RIPRAP SIZE AND THICKNESS WILL BE DESIGNATED IN THE PLANS.

PIPE SIZES LARGER THAN THOSE SHOWN REQUIRE A SPECIAL DESIGN.

1. FOR PIPES GREATER THAN OR EQUAL TO 30", USE 1.5'.
2. GEOTEXTILE FILTER, SPEC. 3733, SHALL COVER THE BOTTOM AND SIDES OF THE AREA EXCAVATED FOR THE RIPRAP, GRANULAR FILTER MATERIALS.
3. DIMENSION E IS GIVEN ON STANDARD PLATES 3100 AND 3110.
4. GRANULAR FILTER, SPEC. 3601, MAY BE USED AS A CUSHION LAYER. PLACE FILTER PER SPEC. 2511. THE CUSHION LAYER IS INCIDENTAL.
5. GRANULAR FILTER OR RIPRAP, SPEC. 3601, TO EXTEND UNDER ENTIRE OPEN PORTION OF PIPE APRON. DEPTH OF MATERIAL UNDER APRON SHALL MATCH RIPRAP DEPTH. WHEN USING RIPRAP INCREASE RIPRAP QUANTITY ACCORDINGLY AND PLACE A 3" LAYER OF 1.5" CRUSHED ROCK UNDER THE APRON TO AID IN GRADING FOR APRON PLACEMENT. CRUSHED ROCK IS INCIDENTAL.

APPROVED DECEMBER 9, 2013

STATE DESIGN ENGINEER

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

RIPRAP AT RCP OUTLETS

SPECIFICATION REFERENCE
3100
3110
3601
3733
2511

STANDARD PLATE NO. 3133D

Culvert Report

End Section DP26

inlet calculations for 36" end section located at Design Point DP26.

Invert Elev Dn (ft)	=	5797.42
Pipe Length (ft)	=	437.60
Slope (%)	=	1.30
Invert Elev Up (ft)	=	5803.11
Rise (in)	=	36.0
Shape	=	Circular
Span (in)	=	36.0
No. Barrels	=	1
n-Value	=	0.013
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Groove end projecting (C)
Coeff. K,M,c,Y,k	=	0.0045, 2, 0.0317, 0.69, 0.2

Embankment

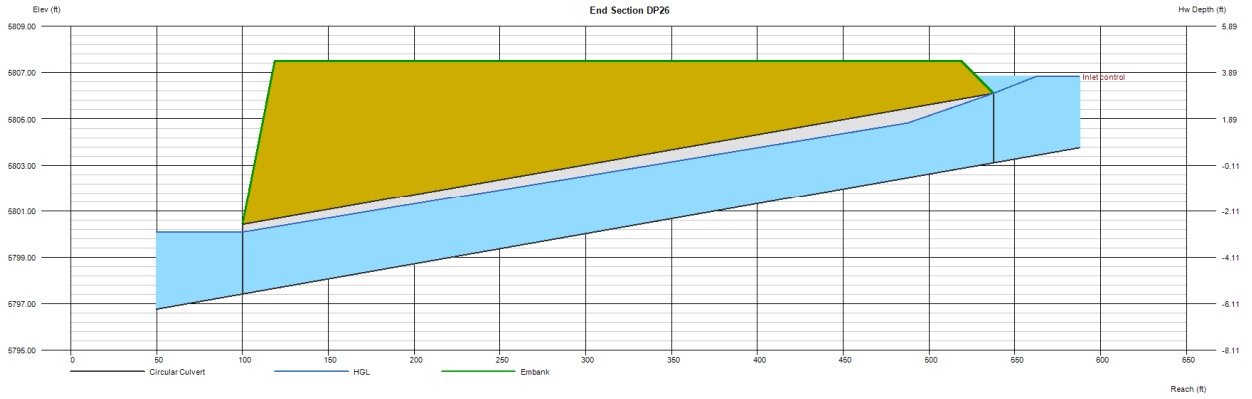
Top Elevation (ft)	=	5807.50
Top Width (ft)	=	400.00
Crest Width (ft)	=	100.00

Calculations

Qmin (cfs)	=	51.40
Qmax (cfs)	=	51.40
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	51.40
Qpipe (cfs)	=	51.40
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	7.75
Veloc Up (ft/s)	=	8.73
HGL Dn (ft)	=	5800.09
HGL Up (ft)	=	5805.44
Hw Elev (ft)	=	5806.84
Hw/D (ft)	=	1.24
Flow Regime	=	Inlet Control



MHFD-Inlet, Version 5.03 (August 2023)

INLET MANAGEMENT

Worksheet Protected

INLET NAME	Inlet C2	Inlet C4	Inlet C6
Site Type (Urban or Rural)			
Inlet Application (Street or Area)	STREET	STREET	STREET
Hydraulic Condition	In Sump	On Grade	In Sump
Inlet Type	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{Known} (cfs)	4.5	7.1	7.0
Major Q_{Known} (cfs)	14.1	15.2	14.3

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

Receive Bypass Flow from:	No Bypass Flow Received	No Bypass Flow Received	User-Defined
Minor Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.0
Major Bypass Flow Received, Q_b (cfs)	0.0	0.0	2.8

Watershed Characteristics

Subcatchment Area (acres)			
Percent Impervious			
NRCS Soil Type			

Watershed Profile

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

Minor Storm Rainfall Input

Design Storm Return Period, T_r (years)			
One-Hour Precipitation, P_1 (inches)			

Major Storm Rainfall Input

Design Storm Return Period, T_r (years)			
One-Hour Precipitation, P_1 (inches)			

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	**4.5**	**7.1**	**7.0**
Major Total Design Peak Flow, Q (cfs)	**14.1**	**15.2**	**17.1**
Minor Flow Bypassed Downstream, Q_b (cfs)	N/A	1.2	N/A
Major Flow Bypassed Downstream, Q_b (cfs)	N/A	6.5	N/A

MHFD-Inlet, Version 5.03 (August 2023)

INLET MANAGEMENT

Worksheet Protected

INLET NAME	Inlet C8	Inlet C9	Inlet D8
Site Type (Urban or Rural)			
Inlet Application (Street or Area)	STREET	STREET	STREET
Hydraulic Condition	On Grade	On Grade	On Grade
Inlet Type	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{Known} (cfs)	3.5	6.8	5.5
Major Q_{Known} (cfs)	7.9	14.8	14.8

Bypass (Carry-Over) Flow from Upstream

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

Watershed Characteristics

Subcatchment Area (acres)			
Percent Impervious			
NRCS Soil Type			

Watershed Profile

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

Minor Storm Rainfall Input

Design Storm Return Period, T_r (years)			
One-Hour Precipitation, P_1 (inches)			

Major Storm Rainfall Input

Design Storm Return Period, T_r (years)			
One-Hour Precipitation, P_1 (inches)			

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	**3.5**	**6.8**	**5.5**
Major Total Design Peak Flow, Q (cfs)	**7.9**	**14.8**	**14.8**
Minor Flow Bypassed Downstream, Q_b (cfs)	0.0	0.0	0.0
Major Flow Bypassed Downstream, Q_b (cfs)	1.7	3.0	2.8

MHFD-Inlet, Version 5.03 (August 2023)

INLET MANAGEMENT

Worksheet Protected

INLET NAME	Inlet C12	Inlet C13	Inlet C16
Site Type (Urban or Rural)			
Inlet Application (Street or Area)	STREET	STREET	STREET
Hydraulic Condition	On Grade	On Grade	On Grade
Inlet Type	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{Known} (cfs)	4.6	9.9	5.4
Major Q_{Known} (cfs)	10.0	20.9	12.0

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	User-Defined	No Bypass Flow Received	No Bypass Flow Received
Minor Bypass Flow Received, Q_b (cfs)	1.2	0.0	0.0
Major Bypass Flow Received, Q_b (cfs)	11.2	0.0	0.0

Watershed Characteristics

Subcatchment Area (acres)			
Percent Impervious			
NRCS Soil Type			

Watershed Profile

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

Minor Storm Rainfall Input

Design Storm Return Period, T_r (years)			
One-Hour Precipitation, P_1 (inches)			

Major Storm Rainfall Input

Design Storm Return Period, T_r (years)			
One-Hour Precipitation, P_1 (inches)			

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	**5.8**	**9.9**	**5.4**
Major Total Design Peak Flow, Q (cfs)	**21.2**	**20.9**	**12.0**
Minor Flow Bypassed Downstream, Q_b (cfs)	0.0	0.0	0.0
Major Flow Bypassed Downstream, Q_b (cfs)	1.3	3.4	1.6

MHFD-Inlet, Version 5.03 (August 2023)

INLET MANAGEMENT

Worksheet Protected

INLET NAME	Inlet C15	Inlet C19	Inlet C23
Site Type (Urban or Rural)			
Inlet Application (Street or Area)	STREET	STREET	STREET
Hydraulic Condition	On Grade	On Grade	On Grade
Inlet Type	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{Known} (cfs)	5.9	6.9	9.3
Major Q_{Known} (cfs)	17.7	15.3	25.6

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	No Bypass Flow Received	User-Defined	No Bypass Flow Received
Minor Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.0
Major Bypass Flow Received, Q_b (cfs)	0.0	3.4	0.0

Watershed Characteristics

Subcatchment Area (acres)			
Percent Impervious			
NRCS Soil Type			

Watershed Profile

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

Minor Storm Rainfall Input

Design Storm Return Period, T_r (years)			
One-Hour Precipitation, P_1 (inches)			

Major Storm Rainfall Input

Design Storm Return Period, T_r (years)			
One-Hour Precipitation, P_1 (inches)			

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	**5.9**	**6.9**	**9.3**
Major Total Design Peak Flow, Q (cfs)	**17.7**	**18.7**	**25.6**
Minor Flow Bypassed Downstream, Q_b (cfs)	0.6	0.0	0.5
Major Flow Bypassed Downstream, Q_b (cfs)	8.3	0.6	9.9

MHFD-Inlet, Version 5.03 (August 2023)

INLET MANAGEMENT

Worksheet Protected

INLET NAME	Inlet C22	Inlet C21	Inlet C27
Site Type (Urban or Rural)			
Inlet Application (Street or Area)	STREET	STREET	STREET
Hydraulic Condition	On Grade	In Sump	In Sump
Inlet Type	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{Known} (cfs)	7.2	14.2	5.5
Major Q_{Known} (cfs)	15.6	31.4	9.8

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	No Bypass Flow Received	User-Defined	User-Defined
Minor Bypass Flow Received, Q_b (cfs)	0.0	1.1	0.0
Major Bypass Flow Received, Q_b (cfs)	0.0	21.7	0.0

Watershed Characteristics

Subcatchment Area (acres)			
Percent Impervious			
NRCS Soil Type			

Watershed Profile

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

Minor Storm Rainfall Input

Design Storm Return Period, T_r (years)			
One-Hour Precipitation, P_1 (inches)			

Major Storm Rainfall Input

Design Storm Return Period, T_r (years)			
One-Hour Precipitation, P_1 (inches)			

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	**7.2**	**15.3**	**5.5**
Major Total Design Peak Flow, Q (cfs)	**15.6**	**53.1**	**9.8**
Minor Flow Bypassed Downstream, Q_b (cfs)	0.0	N/A	N/A
Major Flow Bypassed Downstream, Q_b (cfs)	3.4	N/A	N/A

MHFD-Inlet, Version 5.03 (August 2023)

INLET MANAGEMENT

Worksheet Protected

INLET NAME	Inlet C31	Inlet C32	Inlet C33
Site Type (Urban or Rural)			
Inlet Application (Street or Area)	STREET	STREET	STREET
Hydraulic Condition	On Grade	In Sump	In Sump
Inlet Type	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{Known} (cfs)	4.7	8.1	1.0
Major Q_{Known} (cfs)	10.3	17.9	2.3

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	No Bypass Flow Received	User-Defined	No Bypass Flow Received
Minor Bypass Flow Received, Q_b (cfs)	0.0	0.6	0.0
Major Bypass Flow Received, Q_b (cfs)	0.0	4.0	0.0

Watershed Characteristics

Subcatchment Area (acres)			
Percent Impervious			
NRCS Soil Type			

Watershed Profile

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

Minor Storm Rainfall Input

Design Storm Return Period, T_r (years)			
One-Hour Precipitation, P_1 (inches)			

Major Storm Rainfall Input

Design Storm Return Period, T_r (years)			
One-Hour Precipitation, P_1 (inches)			

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	**4.7**	**8.7**	**1.0**
Major Total Design Peak Flow, Q (cfs)	**10.3**	**21.9**	**2.3**
Minor Flow Bypassed Downstream, Q_b (cfs)	0.6	N/A	N/A
Major Flow Bypassed Downstream, Q_b (cfs)	4.0	N/A	N/A

MHFD-Inlet, Version 5.03 (August 2023)

INLET MANAGEMENT

Worksheet Protected

INLET NAME	Inlet C1
Site Type (Urban or Rural)	
Inlet Application (Street or Area)	AREA
Hydraulic Condition	Swale
Inlet Type	CDOT Type D (In Series)

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{Known} (cfs)	2.9
Major Q_{Known} (cfs)	15.7

Bypass (Carry-Over) Flow from Upstream

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

Watershed Characteristics

Subcatchment Area (acres)	
Percent Impervious	
NRCS Soil Type	

Watershed Profile

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

Minor Storm Rainfall Input

Design Storm Return Period, T_r (years)	
One-Hour Precipitation, P_1 (inches)	

Major Storm Rainfall Input

Design Storm Return Period, T_r (years)	
One-Hour Precipitation, P_1 (inches)	

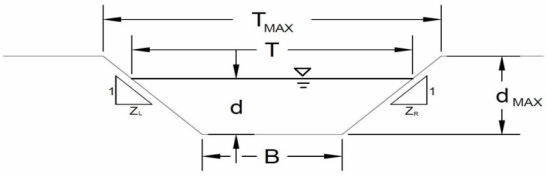
CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	**2.9**
Major Total Design Peak Flow, Q (cfs)	**15.7**
Minor Flow Bypassed Downstream, Q_b (cfs)	0.0
Major Flow Bypassed Downstream, Q_b (cfs)	0.0

AREA INLET IN A SWALE

Antelope Ridge at Bull Hill Filing No. 1 Inlets

Inlet C1



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

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

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

NRCS Vegetal Retardance (A, B, C, D, or E)	A, B, C, D, or E =		
Manning's n (Leave cell D16 blank to manually enter an n value)	n =	0.025	
Channel Invert Slope	S_O =	0.0050	ft/ft
Bottom Width	B =	4.00	ft
Left Side Slope	Z1 =	4.00	ft/ft
Right Side Sloe	Z2 =	4.00	ft/ft

Check one of the following soil types:

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

Choose One:
- ○ Non-Cohesive
- ◉ Cohesive
- ○ Paved

		Minor Storm	Major Storm	
Maximum Allowable Top Width of Channel for Minor & Major Storm	T_{MAX} =	**8.00**	**12.00**	ft
Maximum Allowable Water Depth in Channel for Minor & Major Storm	d_{MAX} =	**0.50**	**1.00**	ft

Allowable Channel Capacity Based On Channel Geometry

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**6.5**	**25.4**	cfs
MAJOR STORM Allowable Capacity is based on Depth Criterion	d_{allow} =	**0.50**	**1.00**	ft

Water Depth in Channel Based On Design Peak Flow

Design Peak Flow	Q_o =	**2.9**	**15.7**	cfs
Water Depth	d =	**0.32**	**0.79**	ft

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

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

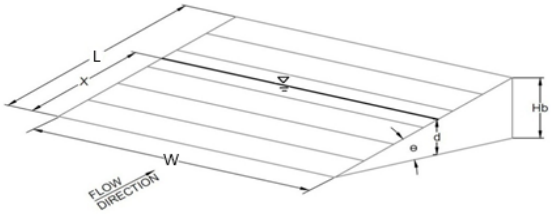
AREA INLET IN A SWALE

Antelope Ridge at Bull Hill Filing No. 1 Inlets

Inlet C1

Inlet Design Information (Input)

Type of Inlet	CDOT Type D (In Series)	Inlet Type =	CDOT Type D (In Series)	
Angle of Inclined Grate (must be <= 30 degrees)		θ =	0.00	degrees
Width of Grate		W =	3.00	ft
Length of Grate		L =	6.00	ft
Open Area Ratio		A_{RATIO} =	0.70	
Height of Inclined Grate		H_B =	0.00	ft
Clogging Factor		C_f =	0.38	
Grate Discharge Coefficient		C_d =	0.78	
Orifice Coefficient		C_o =	0.52	
Weir Coefficient		C_w =	1.67	



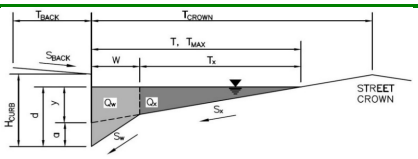
		MINOR	MAJOR	
Water Depth at Inlet (for depressed inlets, 1 foot is added for depression)	d =	0.32	0.79	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**5.4**	**20.8**	**cfs**
Bypassed Flow	**Q_b =**	**0.0**	**0.0**	**cfs**
Capture Percentage = Qa/Qo	**C% =**	**100**	**100**	**%**

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

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

Project: **Antelope Ridge at Bull Hill Filing No. 1 Inlets**

Inlet ID: **Inlet C2**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	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} =	0.017	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.0	7.8	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

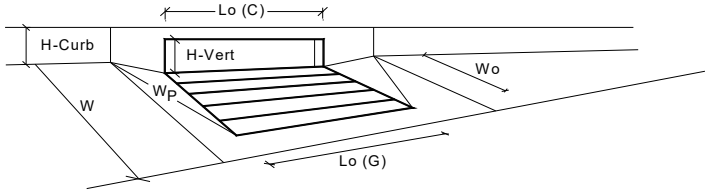
MINOR STORM Allowable Capacity is not applicable to Sump Condition

MAJOR STORM Allowable Capacity is not applicable to Sump Condition

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

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.03 (August 2023)



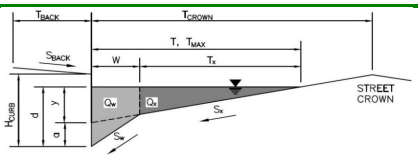
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	4.9	6.9	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	15.00	15.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	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} =	0.24	0.41	ft
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.71	0.84	
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**	**14.1**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)	$Q_{PEAK\ REQUIRED}$ =	4.5	14.1	cfs

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

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

Project: **Antelope Ridge at Bull Hill Filing No. 1 Inlets**

Inlet ID: **Inlet C4**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	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 =	0.013	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.017	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.1	7.8	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☑	

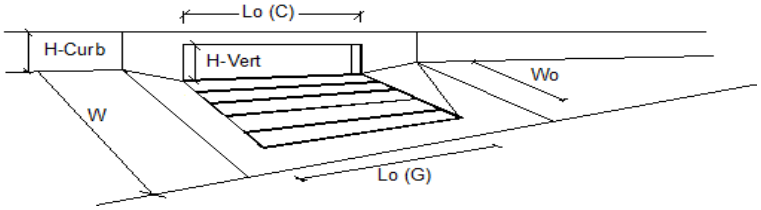
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**8.4**	**33.6**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 7.10 cfs on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design peak flow of 15.20 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)



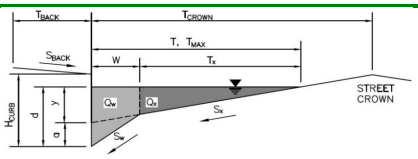
Design Information (Input)	CDOT Type R Curb Opening			
		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Design Discharge for Half of Street (from *Inlet Management*)	Q_o =	7.1	15.2	cfs
Water Spread Width	T =	13.9	17.0	ft
Water Depth at Flowline (outside of local depression)	d =	4.9	6.1	inches
Water Depth at Street Crown (or at T_{MAX})	d_{CROWN} =	0.0	0.5	inches
Ratio of Gutter Flow to Design Flow	E_o =	0.426	0.313	
Discharge outside the Gutter Section W, carried in Section T_x	Q_x =	4.1	10.4	cfs
Discharge within the Gutter Section W	Q_w =	3.0	4.8	cfs
Discharge Behind the Curb Face	Q_{BACK} =	0.0	0.0	cfs
Flow Area within the Gutter Section W	A_W =	0.64	0.85	sq ft
Velocity within the Gutter Section W	V_W =	4.7	5.6	fps
Water Depth for Design Condition	d_{LOCAL} =	7.9	9.1	inches
Grate Analysis (Calculated)		MINOR	MAJOR	
Total Length of Inlet Grate Opening	L =	N/A	N/A	ft
Ratio of Grate Flow to Design Flow	$E_{o\text{-}GRATE}$ =	N/A	N/A	
Under No-Clogging Condition		MINOR	MAJOR	
Minimum Velocity Where Grate Splash-Over Begins	V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow	R_f =	N/A	N/A	
Interception Rate of Side Flow	R_x =	N/A	N/A	
Interception Capacity	Q_i =	N/A	N/A	cfs
Under Clogging Condition		MINOR	MAJOR	
Clogging Coefficient for Multiple-unit Grate Inlet	GrateCoeff =	N/A	N/A	
Clogging Factor for Multiple-unit Grate Inlet	GrateClog =	N/A	N/A	
Effective (unclogged) Length of Multiple-unit Grate Inlet	L_e =	N/A	N/A	ft
Minimum Velocity Where Grate Splash-Over Begins	V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow	R_f =	N/A	N/A	
Interception Rate of Side Flow	R_x =	N/A	N/A	
Actual Interception Capacity	**Q_a =**	**N/A**	**N/A**	**cfs**
Carry-Over Flow = Q_o-Q_a (to be applied to curb opening or next d/s inlet)	**Q_b =**	**N/A**	**N/A**	**cfs**
Curb Opening or Slotted Inlet Analysis (Calculated)		MINOR	MAJOR	
Equivalent Slope S_e	S_e =	0.100	0.079	ft/ft
Required Length L_T to Have 100% Interception	L_T =	15.06	24.79	ft
Under No-Clogging Condition		MINOR	MAJOR	
Effective Length of Curb Opening or Slotted Inlet (minimum of L, L_T)	L =	10.00	10.00	ft
Interception Capacity	Q_i =	6.1	9.2	cfs
Under Clogging Condition		MINOR	MAJOR	
Clogging Coefficient	CurbCoeff =	1.25	1.25	
Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet	CurbClog =	0.06	0.06	
Effective (Unclogged) Length	L_e =	9.38	9.38	ft
Actual Interception Capacity	**Q_a =**	**5.9**	**8.7**	**cfs**
Carry-Over Flow = $Q_{b(GRATE)}$-Q_a	**Q_b =**	**1.2**	**6.5**	**cfs**
Summary		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**5.9**	**8.7**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**1.2**	**6.5**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**83**	**57**	**%**

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

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

Project: **Antelope Ridge at Bull Hill Filing No. 1 Inlets**

Inlet ID: **Inlet C6**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	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} =	0.017	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	13.5	13.5	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.1	7.8	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

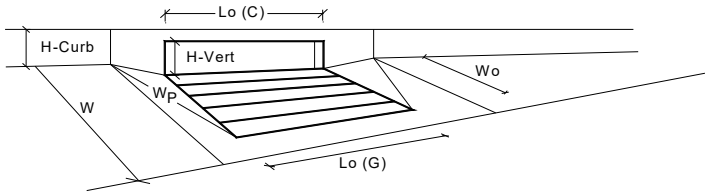
MINOR STORM Allowable Capacity is not applicable to Sump Condition

MAJOR STORM Allowable Capacity is not applicable to Sump Condition

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

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.03 (August 2023)



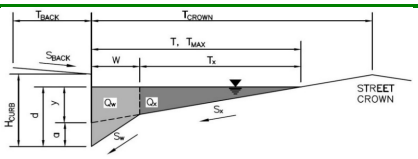
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.6	6.8	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	20.00	20.00	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} =	0.30	0.40	ft
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.76	0.83	
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**10.5**	**17.4**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)	$Q_{PEAK\ REQUIRED}$ =	7.0	17.1	cfs

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

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

Project: **Antelope Ridge at Bull Hill Filing No. 1 Inlets**

Inlet ID: **Inlet C8**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	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 =	0.010	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.017	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.1	7.8	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☑	

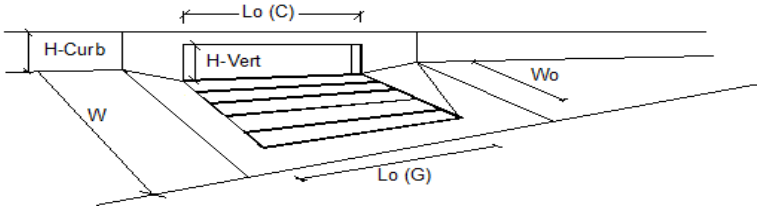
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**7.5**	**29.7**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 3.50 cfs on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design peak flow of 7.90 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	

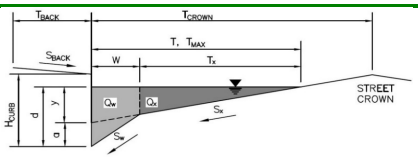
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**3.5**	**6.2**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**1.7**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**100**	**79**	**%**

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

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

Project: **Antelope Ridge at Bull Hill Filing No. 1 Inlets**

Inlet ID: **Inlet C9**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	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 =	0.010	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.017	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.1	7.8	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☑	

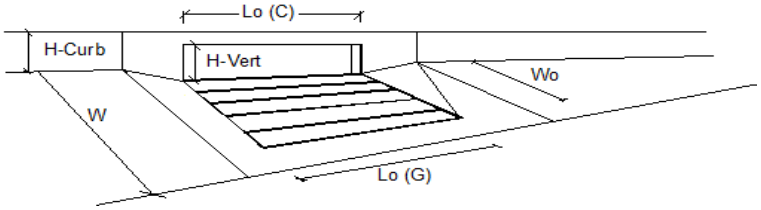
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**7.5**	**29.7**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 6.80 cfs on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design peak flow of 14.80 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	

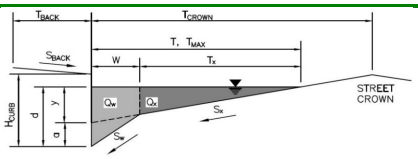
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**6.8**	**11.8**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**3.0**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**100**	**80**	**%**

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

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

Project: **Antelope Ridge at Bull Hill Filing No. 1 Inlets**

Inlet ID: **Inlet C12**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	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 =	0.012	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.017	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.1	7.8	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☑	

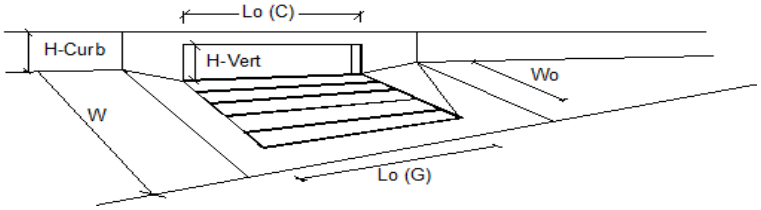
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**8.2**	**32.6**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 5.80 cfs on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design peak flow of 21.20 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	25.00	25.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	

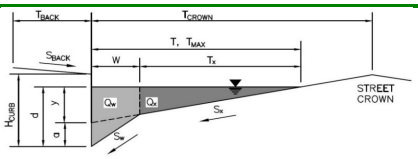
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**5.8**	**19.9**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**1.3**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**100**	**94**	**%**

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

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

Project: Antelope Ridge at Bull Hill Filing No. 1 Inlets

Inlet ID: Inlet C13



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	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 =	0.012	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.017	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.6	7.9	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☑	

MINOR STORM Allowable Capacity is based on Spread Criterion

MAJOR STORM Allowable Capacity is based on Depth Criterion

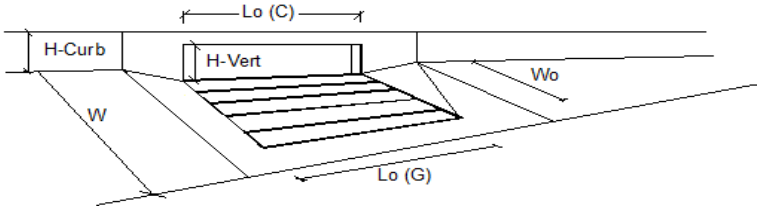
		Minor Storm	Major Storm	
	Q_{allow} =	**11.2**	**34.1**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 9.90 cfs on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design peak flow of 20.90 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	20.00	20.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	

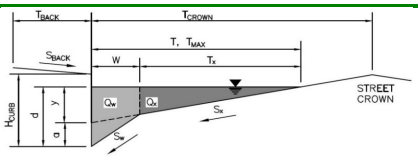
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**9.9**	**17.5**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**3.4**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**100**	**84**	**%**

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

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

Project: **Antelope Ridge at Bull Hill Filing No. 1 Inlets**

Inlet ID: **Inlet C15**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	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 =	0.018	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.017	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.6	7.9	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☑	

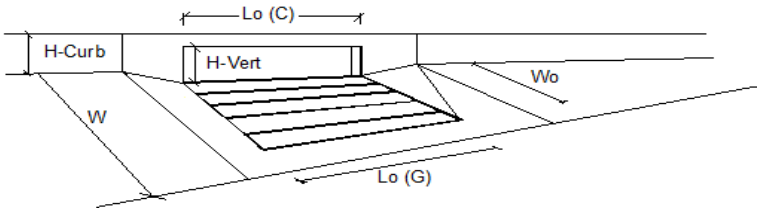
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**13.7**	**37.9**	**cfs**

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

Major storm max. allowable capacity GOOD - greater than the design peak flow of 17.70 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	

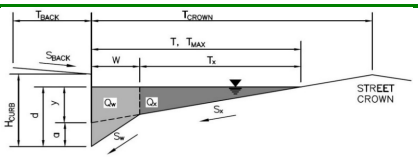
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**5.3**	**9.4**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.6**	**8.3**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**89**	**53**	**%**

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

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

Project: **Antelope Ridge at Bull Hill Filing No. 1 Inlets**

Inlet ID: **Inlet C16**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	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 =	0.010	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.017	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.6	7.9	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☑	

MINOR STORM Allowable Capacity is based on Spread Criterion

MAJOR STORM Allowable Capacity is based on Depth Criterion

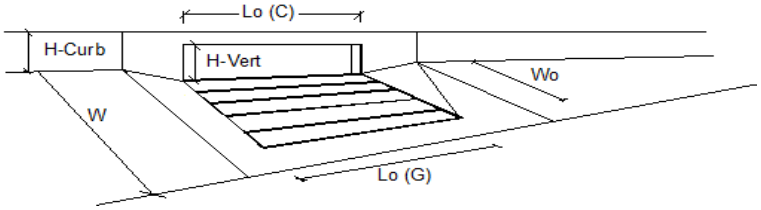
		Minor Storm	Major Storm	
	Q_{allow} =	**10.2**	**31.1**	**cfs**

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

Major storm max. allowable capacity GOOD - greater than the design peak flow of 12.00 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	

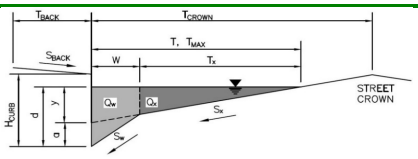
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**5.4**	**10.4**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**1.6**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**100**	**87**	**%**

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

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

Project: Antelope Ridge at Bull Hill Filing No. 1 Inlets

Inlet ID: Inlet C19



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	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 =	0.011	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.017	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.6	7.9	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☑	

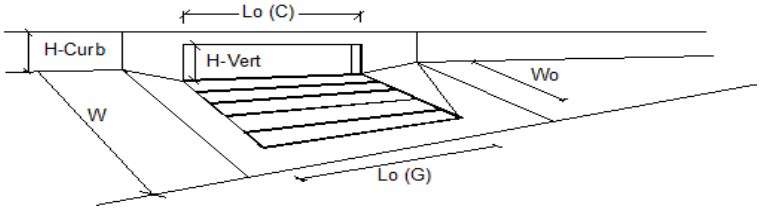
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**10.7**	**32.7**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 6.90 cfs on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design peak flow of 18.70 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	25.00	25.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	

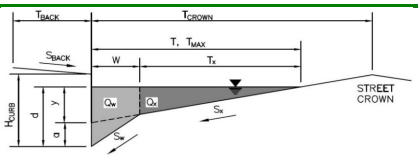
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**6.9**	**18.1**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.6**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**100**	**97**	**%**

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

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

Project: **Antelope Ridge at Bull Hill Filing No. 1 Inlets**

Inlet ID: **Inlet C21**



Gutter Geometry:

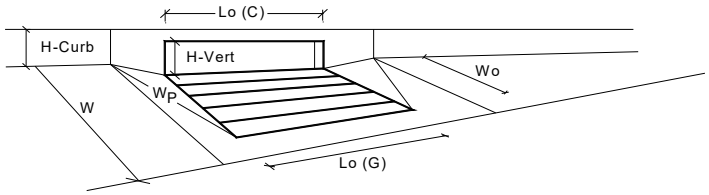
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	13.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	26.0	ft
Gutter Width	W =	2.00	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} =	0.017	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	24.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.6	7.9	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 5.03 (August 2023)



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.6	8.4	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) =	40.00	40.00	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} =	0.30	0.53	ft
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.76	0.91	
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 =**	**19.3**	**54.8**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)	$Q_{PEAK\ REQUIRED}$ =	15.3	53.1	cfs

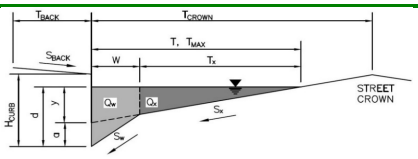
This street is a non-res. collector with a crown to curb face distance of 26'. Therefore, the maximum depth is 26'*2% + 3"/12 = 0.77' or 9.24" is not exceeded. 9.24" does not spread outside ROW

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

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

Project: **Antelope Ridge at Bull Hill Filing No. 1 Inlets**

Inlet ID: **Inlet C22**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	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 =	0.012	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.017	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.6	7.9	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☑	

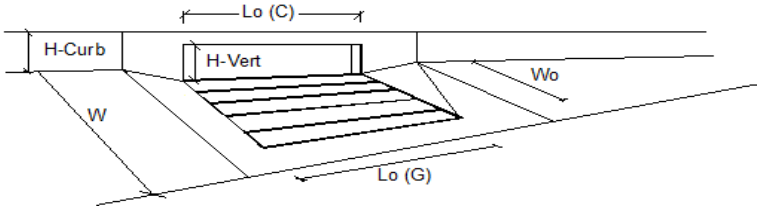
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**11.2**	**34.1**	**cfs**

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

Major storm max. allowable capacity GOOD - greater than the design peak flow of 15.60 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	

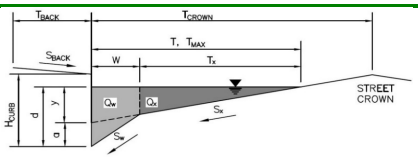
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**7.2**	**12.2**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**3.4**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**99**	**78**	**%**

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

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

Project: **Antelope Ridge at Bull Hill Filing No. 1 Inlets**

Inlet ID: **Inlet C23**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	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 =	0.010	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.017	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.6	7.9	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☑	

MINOR STORM Allowable Capacity is based on Spread Criterion

MAJOR STORM Allowable Capacity is based on Depth Criterion

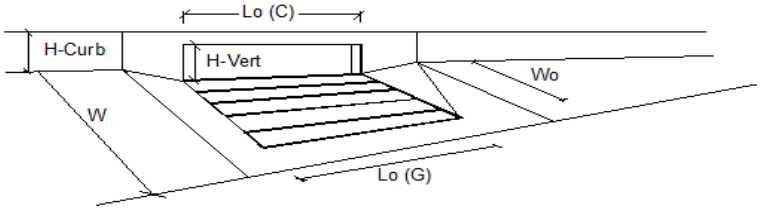
		Minor Storm	Major Storm	
	Q_{allow} =	**10.2**	**31.1**	**cfs**

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

Major storm max. allowable capacity GOOD - greater than the design peak flow of 25.60 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	

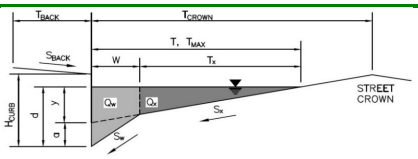
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**8.8**	**15.7**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.5**	**9.9**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**94**	**61**	**%**

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

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

Project: **Antelope Ridge at Bull Hill Filing No. 1 Inlets**

Inlet ID: **Inlet C27**



Gutter Geometry:

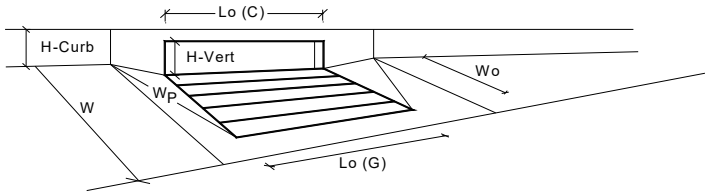
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	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} =	0.017	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.6	7.9	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 5.03 (August 2023)



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.5	6.5	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	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} =	0.29	0.38	ft
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.90	0.96	
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 =**	**6.5**	**10.2**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)	$Q_{PEAK\ REQUIRED}$ =	5.5	9.8	cfs

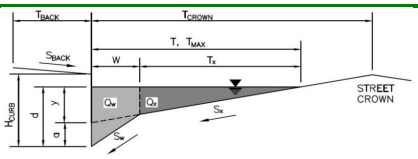
This street is a non-res. collector with a crown to curb face distance of 26'. Therefore, the maximum depth is 26'*2% + 3"/12 = 0.77' or 9.24" is not exceeded. 9.24" does not spread outside ROW

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

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

Project: **Antelope Ridge at Bull Hill Filing No. 1 Inlets**

Inlet ID: **Inlet C31**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.008	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 =	0.020	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.017	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.3	7.9	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☑	☑	

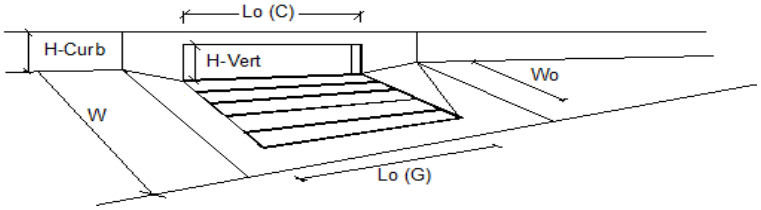
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**19.2**	**48.4**	**cfs**

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

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

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	

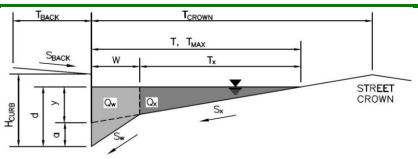
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**4.7**	**8.7**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**1.6**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**100**	**84**	**%**

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

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

Project: **Antelope Ridge at Bull Hill Filing No. 1 Inlets**

Inlet ID: **Inlet C32**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	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} =	0.017	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.6	7.9	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

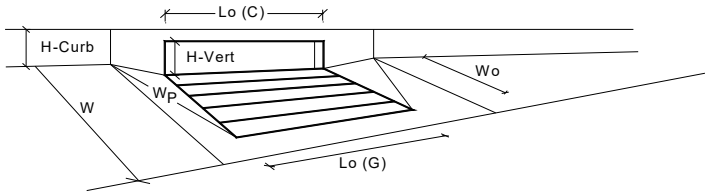
MINOR STORM Allowable Capacity is not applicable to Sump Condition

MAJOR STORM Allowable Capacity is not applicable to Sump Condition

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

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.03 (August 2023)



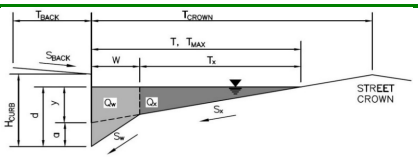
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.7	6.9	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	25.00	25.00	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} =	0.31	0.41	ft
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.77	0.84	
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 =**	**13.2**	**22.0**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)	$Q_{PEAK\ REQUIRED}$ =	8.7	21.9	cfs

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

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

Project: **Antelope Ridge at Bull Hill Filing No. 1 Inlets**

Inlet ID: **Inlet C33**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	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} =	0.017	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.6	7.9	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

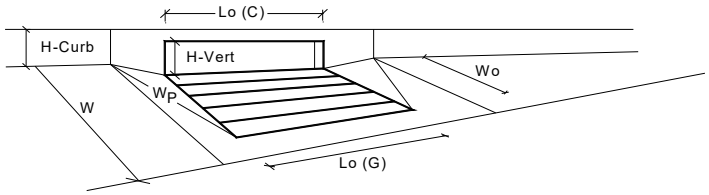
MINOR STORM Allowable Capacity is not applicable to Sump Condition

MAJOR STORM Allowable Capacity is not applicable to Sump Condition

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

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	3.3	4.3	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} =	0.11	0.19	ft
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.97	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 =**	**1.0**	**2.3**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)	$Q_{PEAK\ REQUIRED}$ =	1.0	2.3	cfs

MHFD-Inlet, Version 5.03 (August 2023)

INLET MANAGEMENT

Worksheet Protected

INLET NAME	Inlet D21a	Inlet D21c	Inlet D21e
Site Type (Urban or Rural)			
Inlet Application (Street or Area)	STREET	STREET	STREET
Hydraulic Condition	On Grade	In Sump	In Sump
Inlet Type	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{Known} (cfs)	6.4	8.2	7.1
Major Q_{Known} (cfs)	28.3	43.8	12.8

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

Receive Bypass Flow from:	No Bypass Flow Received	User-Defined	No Bypass Flow Received
Minor Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.0
Major Bypass Flow Received, Q_b (cfs)	0.0	7.2	0.0

Watershed Characteristics

Subcatchment Area (acres)			
Percent Impervious			
NRCS Soil Type			

Watershed Profile

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

Minor Storm Rainfall Input

Design Storm Return Period, T_r (years)			
One-Hour Precipitation, P_1 (inches)			

Major Storm Rainfall Input

Design Storm Return Period, T_r (years)			
One-Hour Precipitation, P_1 (inches)			

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	**6.4**	**8.2**	**7.1**
Major Total Design Peak Flow, Q (cfs)	**28.3**	**51.0**	**12.8**
Minor Flow Bypassed Downstream, Q_b (cfs)	0.0	N/A	N/A
Major Flow Bypassed Downstream, Q_b (cfs)	7.2	N/A	N/A

MHFD-Inlet, Version 5.03 (August 2023)

INLET MANAGEMENT

Worksheet Protected

INLET NAME	Inlet D22	Inlet D4	Inlet D5
Site Type (Urban or Rural)			
Inlet Application (Street or Area)	STREET	STREET	STREET
Hydraulic Condition	On Grade	On Grade	On Grade
Inlet Type	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{Known} (cfs)	8.9	5.3	6.9
Major Q_{Known} (cfs)	15.9	11.6	15.2

Bypass (Carry-Over) Flow from Upstream

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

Watershed Characteristics

Subcatchment Area (acres)			
Percent Impervious			
NRCS Soil Type			

Watershed Profile

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

Minor Storm Rainfall Input

Design Storm Return Period, T_r (years)			
One-Hour Precipitation, P_1 (inches)			

Major Storm Rainfall Input

Design Storm Return Period, T_r (years)			
One-Hour Precipitation, P_1 (inches)			

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	**8.9**	**5.3**	**6.9**
Major Total Design Peak Flow, Q (cfs)	**15.9**	**11.6**	**15.2**
Minor Flow Bypassed Downstream, Q_b (cfs)	0.0	0.0	0.0
Major Flow Bypassed Downstream, Q_b (cfs)	1.1	1.3	3.1

MHFD-Inlet, Version 5.03 (August 2023)

INLET MANAGEMENT

Worksheet Protected

INLET NAME	Inlet D7	Inlet D11	Inlet D14
Site Type (Urban or Rural)			
Inlet Application (Street or Area)	STREET	STREET	STREET
Hydraulic Condition	On Grade	On Grade	In Sump
Inlet Type	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{Known} (cfs)	3.4	4.2	2.4
Major Q_{Known} (cfs)	7.5	10.0	5.8

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	No Bypass Flow Received	User-Defined	No Bypass Flow Received
Minor Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.0
Major Bypass Flow Received, Q_b (cfs)	0.0	5.8	0.0

Watershed Characteristics

Subcatchment Area (acres)			
Percent Impervious			
NRCS Soil Type			

Watershed Profile

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

Minor Storm Rainfall Input

Design Storm Return Period, T_r (years)			
One-Hour Precipitation, P_1 (inches)			

Major Storm Rainfall Input

Design Storm Return Period, T_r (years)			
One-Hour Precipitation, P_1 (inches)			

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	**3.4**	**4.2**	**2.4**
Major Total Design Peak Flow, Q (cfs)	**7.5**	**15.8**	**5.8**
Minor Flow Bypassed Downstream, Q_b (cfs)	0.0	0.0	N/A
Major Flow Bypassed Downstream, Q_b (cfs)	1.4	3.4	N/A

MHFD-Inlet, Version 5.03 (August 2023)

INLET MANAGEMENT

Worksheet Protected

INLET NAME	Inlet D15	Inlet D18	Inlet D29
Site Type (Urban or Rural)			
Inlet Application (Street or Area)	STREET	STREET	STREET
Hydraulic Condition	In Sump	In Sump	In Sump
Inlet Type	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{Known} (cfs)	4.0	6.7	8.1
Major Q_{Known} (cfs)	9.7	12.3	19.6

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	User-Defined	No Bypass Flow Received	No Bypass Flow Received
Minor Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.0
Major Bypass Flow Received, Q_b (cfs)	4.5	0.0	0.0

Watershed Characteristics

Subcatchment Area (acres)			
Percent Impervious			
NRCS Soil Type			

Watershed Profile

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

Minor Storm Rainfall Input

Design Storm Return Period, T_r (years)			
One-Hour Precipitation, P_1 (inches)			

Major Storm Rainfall Input

Design Storm Return Period, T_r (years)			
One-Hour Precipitation, P_1 (inches)			

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	**4.0**	**6.7**	**8.1**
Major Total Design Peak Flow, Q (cfs)	**14.2**	**12.3**	**19.6**
Minor Flow Bypassed Downstream, Q_b (cfs)	N/A	N/A	N/A
Major Flow Bypassed Downstream, Q_b (cfs)	N/A	N/A	N/A

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INLET MANAGEMENT

Worksheet Protected

INLET NAME	Inlet D30	Inlet D19
Site Type (Urban or Rural)		
Inlet Application (Street or Area)	STREET	STREET
Hydraulic Condition	In Sump	In Sump
Inlet Type	CDOT Type R Curb Opening	CDOT Type R Curb Opening

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{Known} (cfs)	5.0	0.6
Major Q_{Known} (cfs)	12.0	1.4

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	User-Defined	No Bypass Flow Received
Minor Bypass Flow Received, Q_b (cfs)	0.0	0.0
Major Bypass Flow Received, Q_b (cfs)	4.5	0.0

Watershed Characteristics

Subcatchment Area (acres)		
Percent Impervious		
NRCS Soil Type		

Watershed Profile

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

Minor Storm Rainfall Input

Design Storm Return Period, T_r (years)		
One-Hour Precipitation, P_1 (inches)		

Major Storm Rainfall Input

Design Storm Return Period, T_r (years)		
One-Hour Precipitation, P_1 (inches)		

CALCULATED OUTPUT

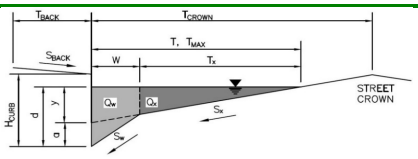
Minor Total Design Peak Flow, Q (cfs)	**5.0**	**0.6**
Major Total Design Peak Flow, Q (cfs)	**16.5**	**1.4**
Minor Flow Bypassed Downstream, Q_b (cfs)	N/A	N/A
Major Flow Bypassed Downstream, Q_b (cfs)	N/A	N/A

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

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

Project: **Antelope Ridge at Bull Hill Filing No. 1**

Inlet ID: **Inlet D4**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	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 =	0.007	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.018	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.6	7.9	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☑	

MINOR STORM Allowable Capacity is based on Spread Criterion

MAJOR STORM Allowable Capacity is based on Depth Criterion

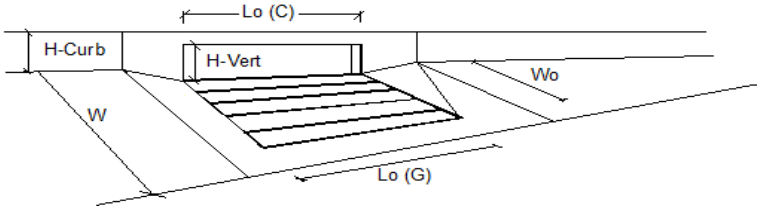
	Minor Storm	Major Storm	
Q_{allow} =	**8.1**	**24.7**	**cfs**

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

Major storm max. allowable capacity GOOD - greater than the design peak flow of 11.60 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	

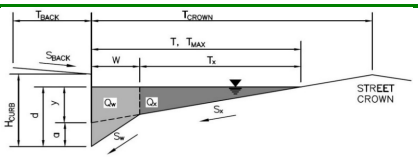
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**5.3**	**10.3**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**1.3**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**100**	**88**	**%**

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

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

Project: **Antelope Ridge at Bull Hill Filing No. 1**

Inlet ID: **Inlet D5**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	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 =	0.007	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.018	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.6	7.9	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☑	

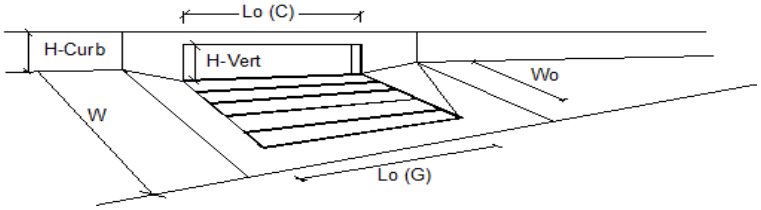
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**8.1**	**24.7**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 6.90 cfs on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design peak flow of 15.20 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)	CDOT Type R Curb Opening	MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	

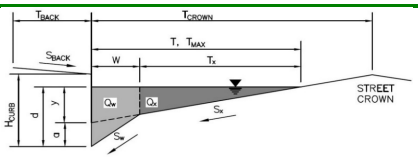
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**6.9**	**12.1**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**3.1**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**100**	**79**	**%**

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

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

Project: **Antelope Ridge at Bull Hill Filing No. 1**

Inlet ID: **Inlet D7**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	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 =	0.005	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.018	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.6	7.9	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☑	

MINOR STORM Allowable Capacity is based on Spread Criterion

MAJOR STORM Allowable Capacity is based on Depth Criterion

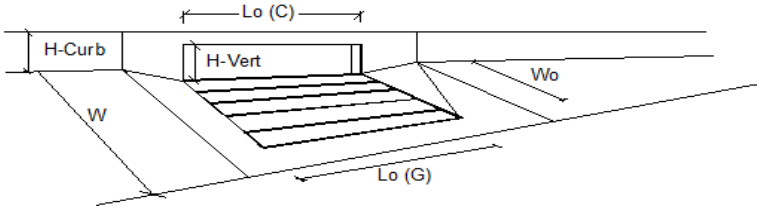
	Minor Storm	Major Storm	
Q_{allow} =	**6.8**	**20.8**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 3.40 cfs on sheet 'Inlet Management'

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

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	

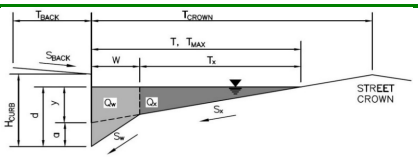
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**3.4**	**6.1**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**1.4**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**100**	**81**	**%**

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

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

Project: Antelope Ridge at Bull Hill Filing No. 1 Inlets

Inlet ID: Inlet D8



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	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 =	0.008	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.017	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.1	7.8	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☑	

MINOR STORM Allowable Capacity is based on Depth Criterion

MAJOR STORM Allowable Capacity is based on Depth Criterion

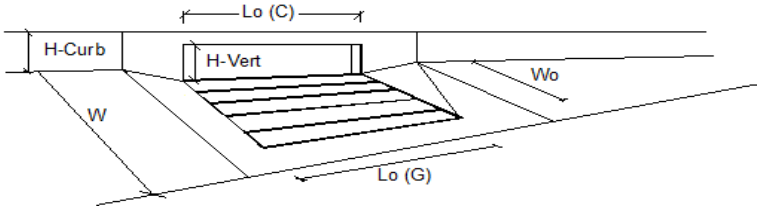
	Minor Storm	Major Storm	
Q_{allow} =	**6.7**	**26.6**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 5.50 cfs on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design peak flow of 14.80 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15	15	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	

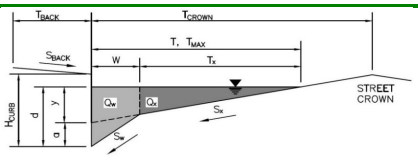
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**5.5**	**12.0**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**2.8**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**100**	**81**	**%**

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

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

Project: **Antelope Ridge at Bull Hill Filing No. 1**

Inlet ID: **Inlet D11**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	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 =	0.010	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.018	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.6	7.9	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☑	

MINOR STORM Allowable Capacity is based on Spread Criterion

MAJOR STORM Allowable Capacity is based on Depth Criterion

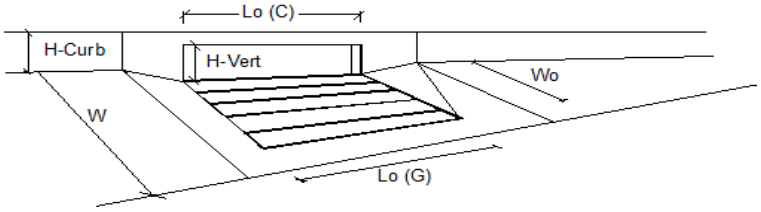
	Minor Storm	Major Storm	
Q_{allow} =	**9.7**	**29.5**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 4.20 cfs on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design peak flow of 15.80 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)		C_f (C) =	0.10	0.10	

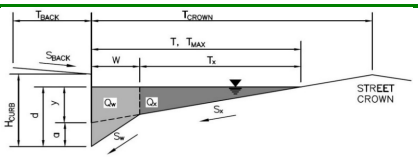
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**4.2**	**12.4**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**3.4**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**100**	**78**	**%**

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

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

Project: **Antelope Ridge at Bull Hill Filing No. 1**

Inlet ID: **Inlet D14**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	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} =	0.018	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.6	7.9	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

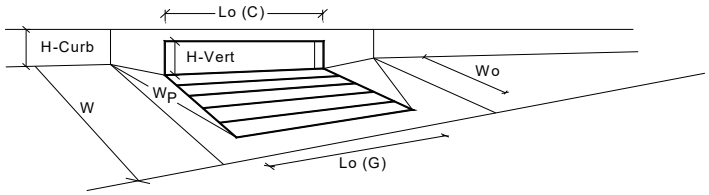
MINOR STORM Allowable Capacity is not applicable to Sump Condition

MAJOR STORM Allowable Capacity is not applicable to Sump Condition

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

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.03 (August 2023)



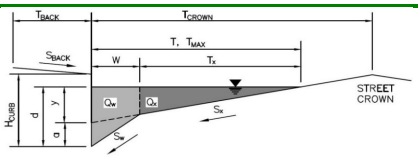
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	4.4	6.2	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} =	0.20	0.35	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 =**	**2.4**	**5.8**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)	$Q_{PEAK\ REQUIRED}$ =	2.4	5.8	cfs

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

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

Project: **Antelope Ridge at Bull Hill Filing No. 1**

Inlet ID: **Inlet D15**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	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} =	0.018	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.6	7.9	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

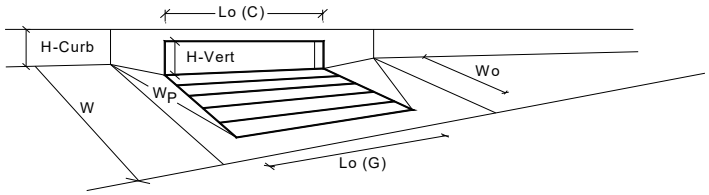
MINOR STORM Allowable Capacity is not applicable to Sump Condition

MAJOR STORM Allowable Capacity is not applicable to Sump Condition

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

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.03 (August 2023)



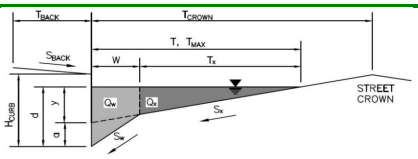
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.3	7.0	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	15.00	15.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.28	0.42	ft
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.74	0.84	
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 =**	**6.9**	**14.6**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)	$Q_{PEAK\ REQUIRED}$ =	4.0	14.2	cfs

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

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

Project: **Antelope Ridge at Bull Hill Filing No. 1**

Inlet ID: **Inlet D18**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	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} =	0.018	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.6	7.9	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

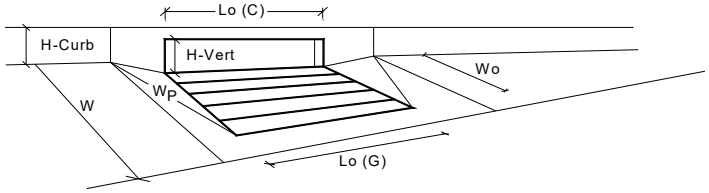
MINOR STORM Allowable Capacity is not applicable to Sump Condition

MAJOR STORM Allowable Capacity is not applicable to Sump Condition

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

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.03 (August 2023)



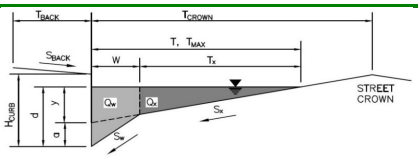
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.6	7.0	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	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} =	0.30	0.42	ft
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.91	0.99	
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 =**	**6.7**	**12.3**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)	$Q_{PEAK\ REQUIRED}$ =	6.7	12.3	cfs

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

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

Project: **Antelope Ridge at Bull Hill Filing No. 1**

Inlet ID: **Inlet D19**



Gutter Geometry:

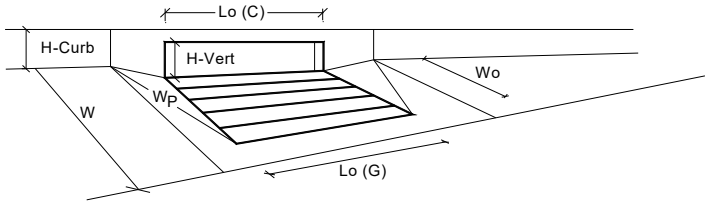
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	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} =	0.018	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.6	7.9	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 5.03 (August 2023)



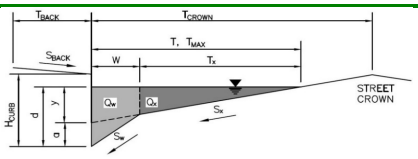
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.6	5.6	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} =	0.30	0.30	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 =**	**4.6**	**4.6**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)	$Q_{PEAK\ REQUIRED}$ =	0.6	1.4	cfs

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

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

Project: **Antelope Ridge at Bull Hill Filing No. 1**

Inlet ID: **Inlet D21a**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	15.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	20.0	ft
Gutter Width	W =	2.00	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 =	0.026	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.018	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	18.5	20.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	7.6	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☑	

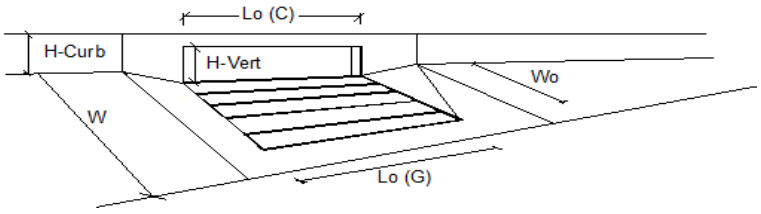
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**16.5**	**29.3**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 6.40 cfs on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design peak flow of 28.30 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	20.00	20.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	

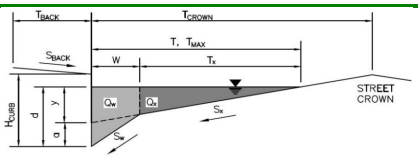
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**6.4**	**21.1**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**7.2**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**100**	**75**	**%**

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

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

Project: **Antelope Ridge at Bull Hill Filing No. 1**

Inlet ID: **Inlet D21c**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	15.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	20.0	ft
Gutter Width	W =	2.00	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} =	0.018	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	18.5	20.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.3	inches
Check boxes are not applicable in SUMP conditions		☐	☐	
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =			inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =			inches

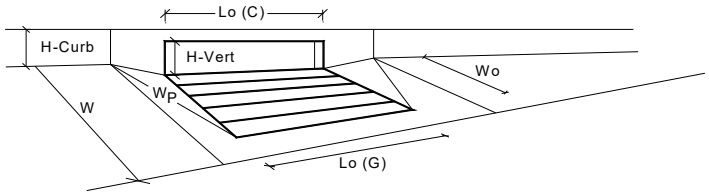
MINOR STORM Allowable Capacity is not applicable to Sump Condition

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 5.03 (August 2023)



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	4.9	7.8	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	45.00	45.00	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} =	0.24	0.48	ft
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.71	0.88	
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 =**	**14.3**	**51.3**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)	$Q_{PEAK\ REQUIRED}$ =	8.2	51.0	cfs

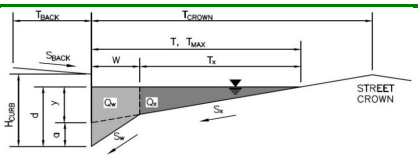
This street is a res. collector with a crown to curb face distance of 20'. Therefore, the maximum depth is 20'*2% + 3"/12 = 0.65' or 7.8". 7.8" does not spread outside of the ROW

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

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

Project: **Antelope Ridge at Bull Hill Filing No. 1**

Inlet ID: **Inlet D21e**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	30.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	20.0	ft
Gutter Width	W =	2.00	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} =	0.018	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	18.5	20.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	13.2	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

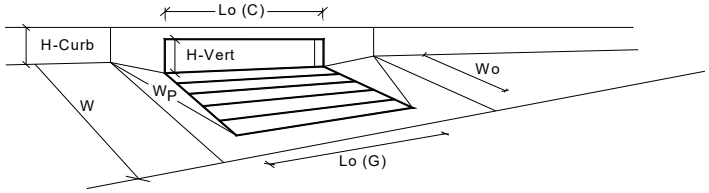
MINOR STORM Allowable Capacity is not applicable to Sump Condition

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 5.03 (August 2023)



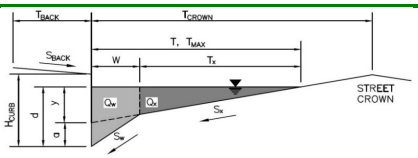
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	6.0	7.1	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	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	0.43	ft
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.93	0.99	
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 =**	**8.1**	**12.8**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)	$Q_{PEAK\ REQUIRED}$ =	7.1	12.8	cfs

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

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

Project: **Antelope Ridge at Bull Hill Filing No. 1**

Inlet ID: **Inlet D22**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	20.0	ft
Gutter Width	W =	2.00	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 =	0.022	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.018	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	26.5	32.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	9.2	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☑	

MINOR STORM Allowable Capacity is based on Depth Criterion

MAJOR STORM Allowable Capacity is based on Depth Criterion

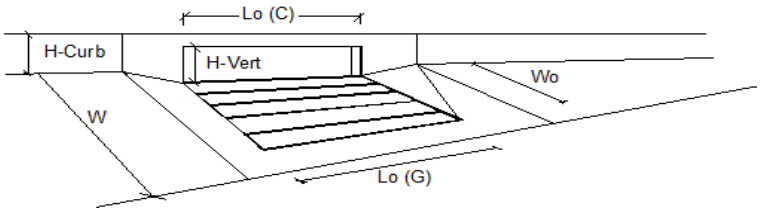
	Minor Storm	Major Storm	
Q_{allow} =	**17.3**	**57.0**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 8.90 cfs on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design peak flow of 15.90 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)	CDOT Type R Curb Opening	MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	20.00	20.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	

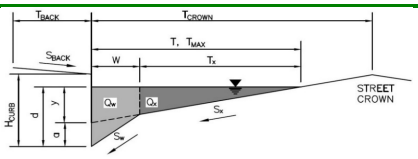
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**8.9**	**14.8**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**1.1**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**100**	**93**	**%**

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

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

Project: **Antelope Ridge at Bull Hill Filing No. 1**

Inlet ID: **Inlet D29**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	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} =	0.018	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.6	7.9	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

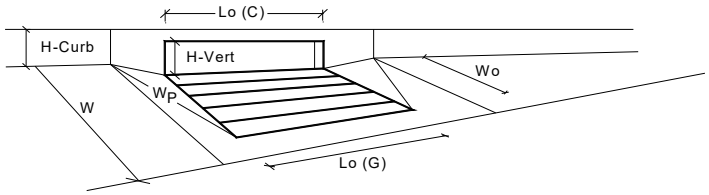
MINOR STORM Allowable Capacity is not applicable to Sump Condition

MAJOR STORM Allowable Capacity is not applicable to Sump Condition

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

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.03 (August 2023)



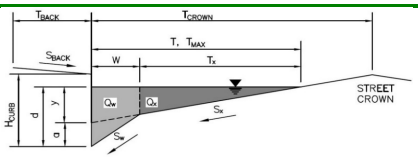
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.6	7.1	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	15.00	15.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.30	0.43	ft
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.76	0.85	
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 =**	**8.1**	**15.1**	**cfs**
WARNING: Inlet Capacity < Q Peak for Major Storm	$Q_{PEAK\ REQUIRED}$ =	8.1	19.6	cfs

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

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

Project: **Antelope Ridge at Bull Hill Filing No. 1**

Inlet ID: **Inlet D30**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	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} =	0.018	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.6	7.9	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

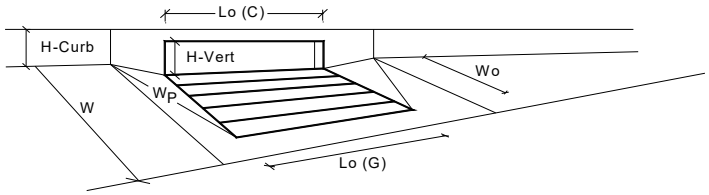
MINOR STORM Allowable Capacity is not applicable to Sump Condition

MAJOR STORM Allowable Capacity is not applicable to Sump Condition

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

INLET IN A SUMP OR SAG LOCATION

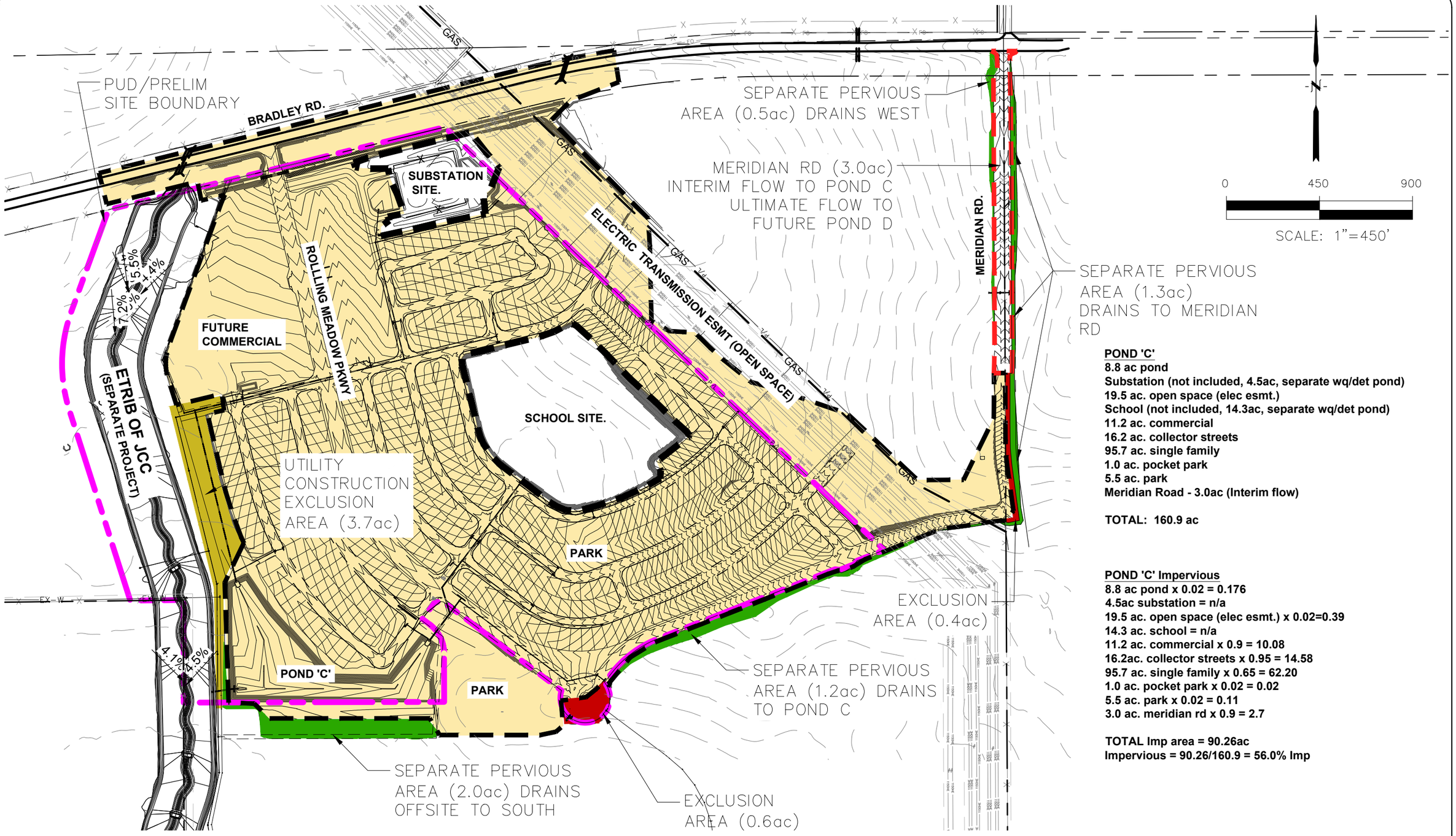
MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.0	7.4	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	15.00	15.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.25	0.45	ft
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.72	0.86	
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 =**	**5.8**	**16.8**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)	$Q_{PEAK\ REQUIRED}$ =	5.0	16.5	cfs

For a local road the water depth in major storm is 7.1" when runoff ponds to the crown. The maximum water depth is allowed to crest to the ROW which is 2" higher than the crown. Therefore, a water depth of 7.4" in the major storm is adequate for a 15' Type R inlet.

APPENDIX D – POND AND ROUTING CALCULATIONS



POND 'C'
8.8 ac pond
Substation (not included, 4.5ac, separate wq/det pond)
19.5 ac. open space (elec esmt.)
School (not included, 14.3ac, separate wq/det pond)
11.2 ac. commercial
16.2 ac. collector streets
95.7 ac. single family
1.0 ac. pocket park
5.5 ac. park
Meridian Road - 3.0ac (Interim flow)

TOTAL: 160.9 ac

POND 'C' Impervious
8.8 ac pond x 0.02 = 0.176
4.5ac substation = n/a
19.5 ac. open space (elec esmt.) x 0.02=0.39
14.3 ac. school = n/a
11.2 ac. commercial x 0.9 = 10.08
16.2ac. collector streets x 0.95 = 14.58
95.7 ac. single family x 0.65 = 62.20
1.0 ac. pocket park x 0.02 = 0.02
5.5 ac. park x 0.02 = 0.11
3.0 ac. meridian rd x 0.9 = 2.7

TOTAL Imp area = 90.26ac
Impervious = 90.26/160.9 = 56.0% Imp

CORE ENGINEERING GROUP
15004 1ST AVENUE S.
BURNSVILLE, MN 55306
PH: 719.570.1100
CONTACT: RICHARD L. SCHINDLER, P.E.
EMAIL: Rich@ceg1.com

POND 'C' DRAINAGE AREA AND WQ AREAS

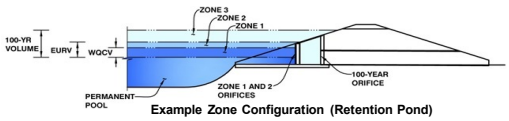
DATE: MAY, 2025
JOB NO: 100.302
SCALE: AS SHOWN N/A
FIGURE NO: 1

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)

Project: Antelope Ridge at Bull Hill Filing No. 1

Basin ID: Pond C



Example Zone Configuration (Retention Pond)

micropool=5774.5

Depth Increment = 0.10 ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft²)	Optional Override Area (ft²)	Area (acre)	Volume (ft³)	Volume (ac-ft)
Top of Micropool	--	0.00	--	--	--	30	0.001		
5775	--	0.50	--	--	--	30	0.001	15	0.000
5776	--	1.50	--	--	--	560	0.013	310	0.007
5777	--	2.50	--	--	--	16,719	0.384	8,949	0.205
5778	--	3.50	--	--	--	57,204	1.313	45,911	1.054
5779	--	4.50	--	--	--	120,334	2.762	134,679	3.092
5780	--	5.50	--	--	--	177,864	4.083	283,778	6.515
5781	--	6.50	--	--	--	210,224	4.826	477,822	10.969
5782	--	7.50	--	--	--	230,470	5.291	698,169	16.028
5783	--	8.50	--	--	--	246,275	5.654	936,542	21.500
5784	--	9.50	--	--	--	259,149	5.949	1,189,254	27.302
5785	--	10.50	--	--	--	272,091	6.246	1,454,874	33.399

Watershed Information

Selected BMP Type =	**EDB**	
Watershed Area =	160.90	acres
Watershed Length =	3,000	ft
Watershed Length to Centroid =	1,350	ft
Watershed Slope =	0.030	ft/ft
Watershed Imperviousness =	56.00%	percent
Percentage Hydrologic Soil Group A =	0.0%	percent
Percentage Hydrologic Soil Group B =	76.0%	percent
Percentage Hydrologic Soil Groups C/D =	24.0%	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) =	2.996	acre-feet	acre-feet
Excess Urban Runoff Volume (EURV) =	9.452	acre-feet	acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	9.252	acre-feet	1.19 inches
5-yr Runoff Volume (P1 = 1.5 in.) =	12.928	acre-feet	1.50 inches
10-yr Runoff Volume (P1 = 1.75 in.) =	16.155	acre-feet	1.75 inches
25-yr Runoff Volume (P1 = 2 in.) =	20.153	acre-feet	2.00 inches
50-yr Runoff Volume (P1 = 2.25 in.) =	23.564	acre-feet	2.25 inches
100-yr Runoff Volume (P1 = 2.52 in.) =	27.762	acre-feet	2.52 inches
500-yr Runoff Volume (P1 = 3.14 in.) =	36.498	acre-feet	inches
Approximate 2-yr Detention Volume =	7.473	acre-feet	
Approximate 5-yr Detention Volume =	10.328	acre-feet	
Approximate 10-yr Detention Volume =	13.014	acre-feet	
Approximate 25-yr Detention Volume =	14.096	acre-feet	
Approximate 50-yr Detention Volume =	14.676	acre-feet	
Approximate 100-yr Detention Volume =	16.216	acre-feet	

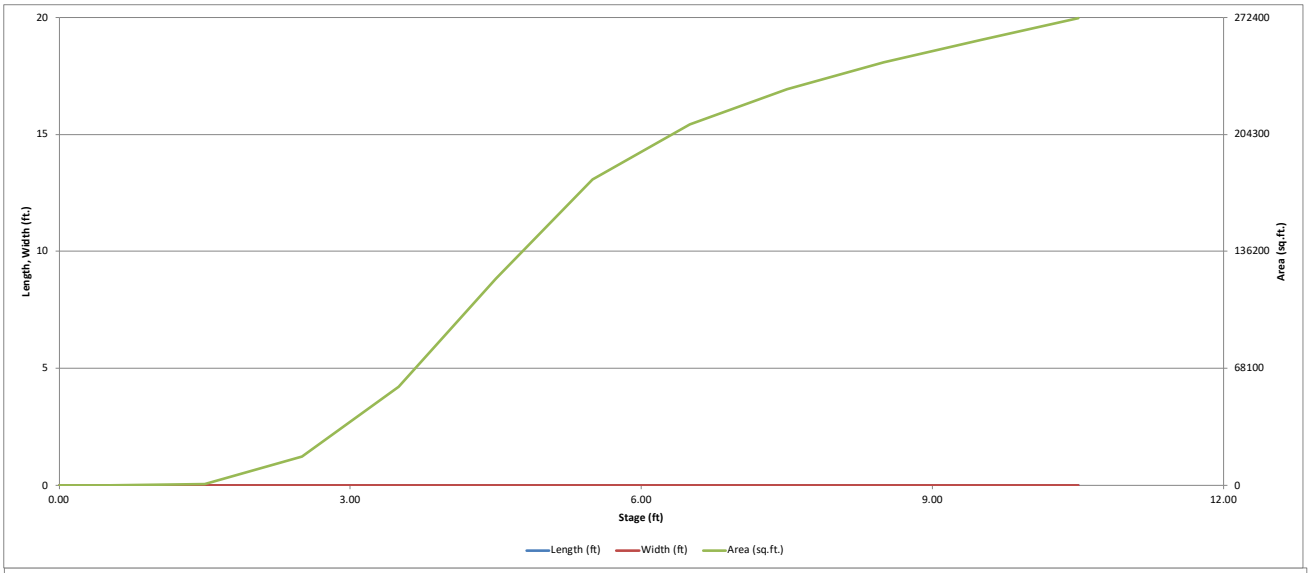
Define Zones and Basin Geometry

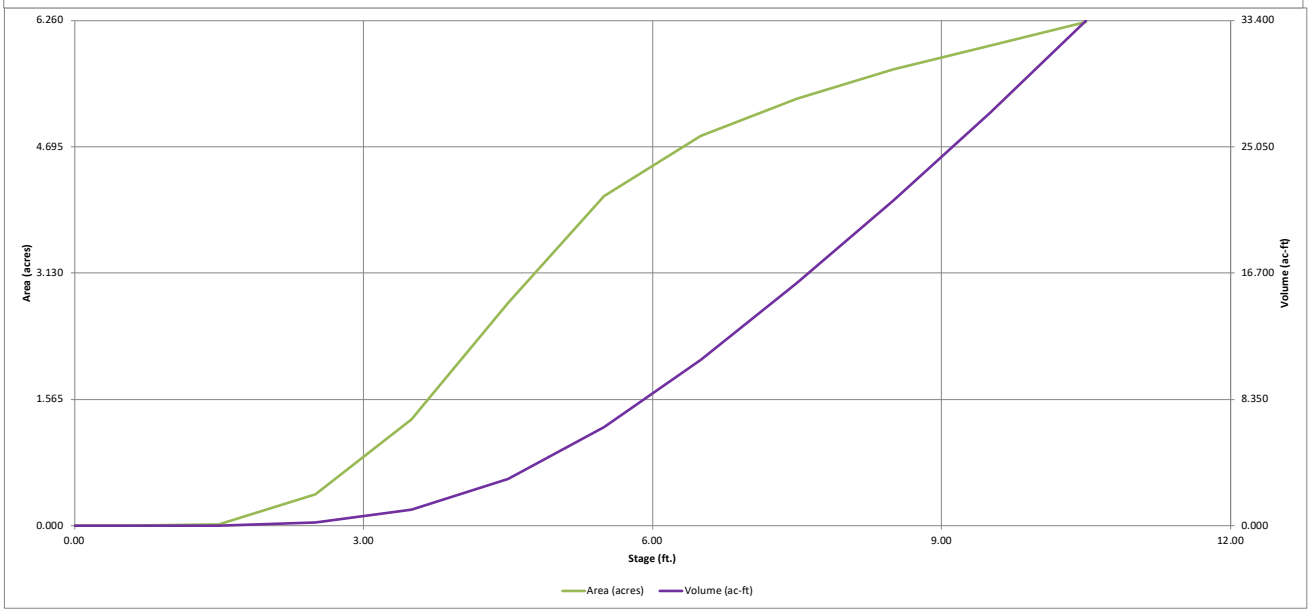
Zone 1 Volume (WQCV) =	2.996	acre-feet
Zone 2 Volume (EURV - Zone 1) =	6.456	acre-feet
Zone 3 (100yr + 1 / 2 WQCV - Zones 1 & 2) =	8.262	acre-feet
Total Detention Basin Volume =	17.714	acre-feet
Initial Surcharge Volume (ISV) =	user	ft^3
Initial Surcharge Depth (ISD) =	user	ft
Total Available Detention Depth (H_{total}) =	user	ft
Depth of Trickle Channel (H_{TC}) =	user	ft
Slope of Trickle Channel (S_{TC}) =	user	ft/ft
Slopes of Main Basin Sides (S_{main}) =	user	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	user	

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

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)



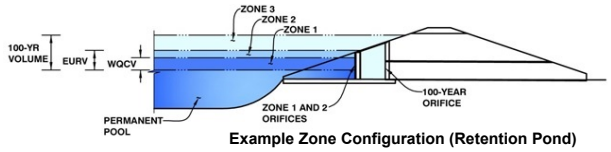


DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)

Project: Antelope Ridge at Bull Hill Filing No. 1

Basin ID: Pond C



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	4.47	2.996	Orifice Plate
Zone 2 (EURV)	6.18	6.456	Rectangular Orifice
Z3 (100+1/2WQCV)	7.82	8.262	Weir&Pipe (Restrict)
Total (all zones)		17.714	

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

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

Calculated Parameters for Underdrain

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

Centroid of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)	WQ Orifice Area per Row =	4.771E-02	ft²
Depth at top of Zone using Orifice Plate =	4.47	ft (relative to basin bottom at Stage = 0 ft)	Elliptical Half-Width =	N/A	feet
Orifice Plate: Orifice Vertical Spacing =	18.00	inches	Elliptical Slot Centroid =	N/A	feet
Orifice Plate: Orifice Area per Row =	6.87	sq. inches (use rectangular openings)	Elliptical Slot Area =	N/A	ft²

Calculated Parameters for Plate

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

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	1.50	3.00					
Orifice Area (sq. inches)	6.87	6.87	6.87					

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

User Input: Vertical Orifice (Circular or Rectangular)

	Zone 2 Rectangular	Not Selected			Calculated Parameters for Vertical Orifi: Zone 2 Rectangular	Not Selected
Invert of Vertical Orifice =	4.47	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Area =	4.20	N/A
Depth at top of Zone using Vertical Orifice =	6.18	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Centroid =	0.58	N/A
Vertical Orifice Height =	14.00	N/A	inches			
Vertical Orifice Width =	43.19		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 We: Zone 3 Weir	Not Selected
Overflow Weir Front Edge Height, Ho =	6.50	N/A	ft (relative to basin bottom at Stage = 0 ft)	Height of Grate Upper Edge, H_t =	6.50	N/A
Overflow Weir Front Edge Length =	30.00	N/A	feet	Overflow Weir Slope Length =	5.83	N/A
Overflow Weir Grate Slope =	0.00	N/A	H:V	Grate Open Area / 100-yr Orifice Area =	6.20	N/A
Horiz. Length of Weir Sides =	5.83	N/A	feet	Overflow Grate Open Area w/o Debris =	121.73	N/A
Overflow Grate Type =	Type C Grate	N/A		Overflow Grate Open Area w/ Debris =	60.87	N/A
Debris Clogging % =	50%	N/A	%			

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

	Zone 3 Restrictor	Not Selected			Calculated Parameters for Outlet Pipe w/ Flow Restriction Pla: Zone 3 Restrictor	Not Selected
Depth to Invert of Outlet Pipe =	0.33	N/A	ft (distance below basin bottom at Stage = 0 ft)	Outlet Orifice Area =	19.63	N/A
Outlet Pipe Diameter =	60.00	N/A	inches	Outlet Orifice Centroid =	2.50	N/A
Restrictor Plate Height Above Pipe Invert =	60.00		inches	Half-Central Angle of Restrictor Plate on Pipe =	3.14	N/A

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	8.00	ft (relative to basin bottom at Stage = 0 ft)	Spillway Design Flow Depth=	1.98	feet
Spillway Crest Length =	55.00	feet	Stage at Top of Freeboard =	10.48	feet
Spillway End Slopes =	6.00	H:V	Basin Area at Top of Freeboard =	6.24	acres
Freeboard above Max Water Surface =	0.50	feet	Basin Volume at Top of Freeboard =	33.27	acre-ft

Calculated Parameters for Spillway

micropool=5774.50

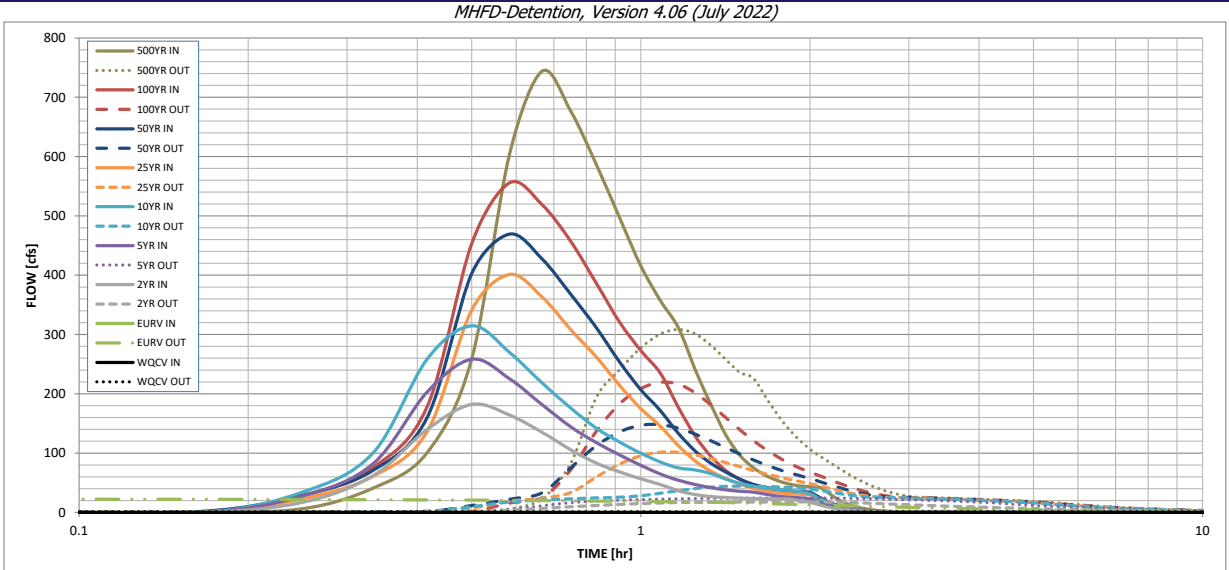
Routed Hydrograph Results

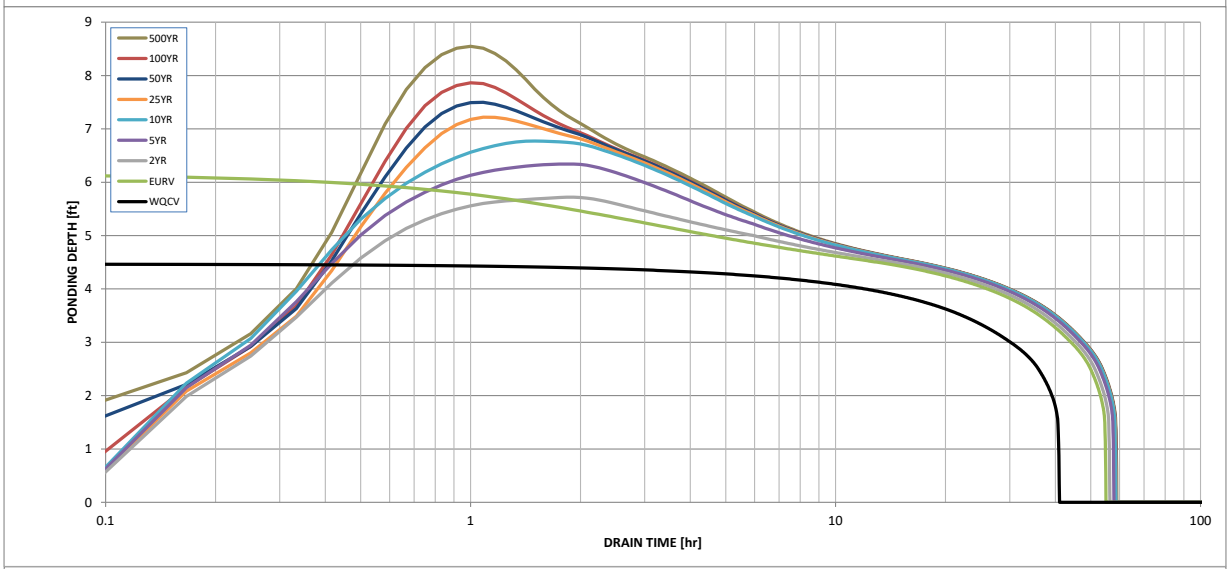
The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF)

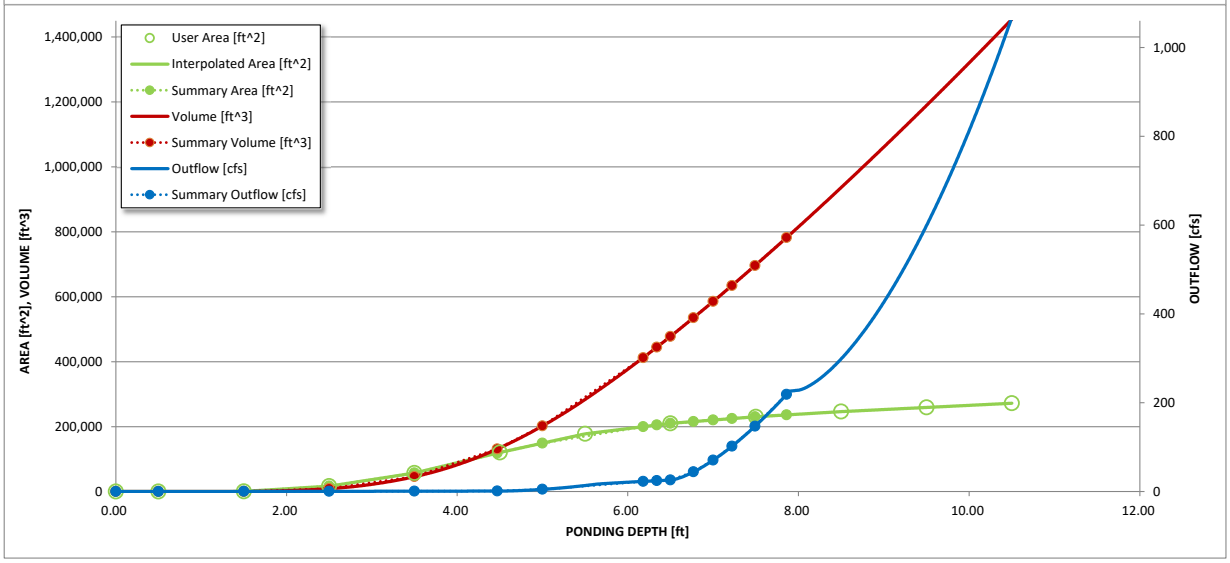
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
One-Hour Rainfall Depth (in) =	N/A	N/A	1.19	1.50	1.75	2.00	2.25	2.52
CUHP Runoff Volume (acre-ft) =	2.996	9.452	9.252	12.928	16.155	20.153	23.564	27.762
User Override Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	9.713	13.529	17.085	21.510	25.305	29.958
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	26.9	65.3	98.3	165.9	206.4	261.0
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A						
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.17	0.41	0.61	1.03	1.28	1.62
Peak Inflow Q (cfs) =	N/A	N/A	182.1	258.1	314.7	401.3	469.3	555.5
Peak Outflow Q (cfs) =	1.2	22.7	17.9	24.4	44.3	101.6	148.0	219.2
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.4	0.5	0.6	0.7	0.8
Structure Controlling Flow =	Vertical Orifice 1	Vertical Orifice 1	Vertical Orifice 1	Vertical Orifice 1	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	N/A	0.1	0.6	0.9	1.5
Max Velocity through Grate 2 (fps) =	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	49	50	49	48	46	44	42
Time to Drain 99% of Inflow Volume (hours) =	**40**	52	54	54	54	54	53	52
Maximum Ponding Depth (ft) =	4.47	6.18	5.72	6.34	6.77	7.22	7.50	7.86
Area at Maximum Ponding Depth (acres) =	2.72	4.59	4.24	4.70	4.95	5.16	5.29	5.42
Maximum Volume Stored (acre-ft) =	3.010	9.463	7.389	10.160	12.289	14.513	15.975	17.956

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)







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

DETENTION BASIN OUTLET STRUCTURE DESIGN

Outflow Hydrograph Workbook Filename: C:\Users\Rich\OneDrive - Core Engineering Group\PROJECTS\100.302\Drainage\pc

Inflow Hydrographs

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

	SOURCE	CUHP	CUHP	USER	USER	USER	USER	USER	USER	USER
Time Interval	TIME	WQCV [cfs]	EURV [cfs]	2 Year [cfs]	5 Year [cfs]	10 Year [cfs]	25 Year [cfs]	50 Year [cfs]	100 Year [cfs]	500 Year [cfs]
5.00 min	0:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.02	0.06
	0:10:00	0.00	0.00	0.07	0.08	0.09	0.08	2.00	0.27	6.25
	0:15:00	0.00	0.00	17.00	27.72	34.31	23.07	28.93	28.12	40.85
	0:20:00	0.00	0.00	61.79	81.75	99.89	60.77	70.68	75.68	100.94
	0:25:00	0.00	0.00	140.08	203.15	258.62	136.63	160.36	178.54	259.04
	0:30:00	0.00	0.00	182.08	258.14	314.68	341.27	402.80	453.17	602.36
	0:35:00	0.00	0.00	164.24	225.65	270.03	401.28	469.29	555.45	743.68
	0:40:00	0.00	0.00	135.25	181.93	218.55	363.42	427.60	519.12	676.55
	0:45:00	0.00	0.00	105.65	144.29	176.03	308.14	367.86	457.01	586.55
	0:50:00	0.00	0.00	83.03	117.72	142.08	262.06	311.38	386.30	496.40
	0:55:00	0.00	0.00	68.36	96.90	118.43	214.00	253.33	320.57	415.60
	1:00:00	0.00	0.00	56.74	79.27	99.73	174.94	206.81	272.65	357.19
	1:05:00	0.00	0.00	46.98	64.79	84.92	145.30	171.63	234.71	311.08
	1:10:00	0.00	0.00	36.57	54.14	74.91	112.26	133.00	176.73	240.53
	1:15:00	0.00	0.00	29.95	47.05	71.63	86.60	103.38	128.51	181.34
	1:20:00	0.00	0.00	26.87	41.68	65.36	69.25	82.60	94.32	130.71
	1:25:00	0.00	0.00	25.09	38.05	56.14	57.36	68.06	70.57	96.55
	1:30:00	0.00	0.00	24.17	35.75	49.12	47.79	56.28	55.99	75.94
	1:35:00	0.00	0.00	23.54	34.27	44.42	40.77	47.61	46.44	62.55
	1:40:00	0.00	0.00	23.08	30.73	41.18	36.47	42.26	40.09	53.77
	1:45:00	0.00	0.00	22.78	27.69	39.00	33.49	38.57	35.91	48.00
	1:50:00	0.00	0.00	22.66	25.83	37.40	31.63	36.25	33.58	44.75
	1:55:00	0.00	0.00	19.84	24.60	35.11	30.57	34.90	32.63	43.34
	2:00:00	0.00	0.00	17.09	23.05	31.38	29.66	33.78	31.87	42.26
	2:05:00	0.00	0.00	12.50	16.99	22.84	22.11	25.12	23.86	31.51
	2:10:00	0.00	0.00	8.48	11.39	15.41	14.89	16.87	16.11	21.15
	2:15:00	0.00	0.00	5.90	7.74	10.49	10.25	11.57	11.07	14.41
	2:20:00	0.00	0.00	4.08	5.23	7.03	6.92	7.77	7.45	9.58
	2:25:00	0.00	0.00	2.85	3.73	4.74	4.76	5.29	5.10	6.45
	2:30:00	0.00	0.00	2.02	2.71	3.19	3.30	3.61	3.50	4.29
	2:35:00	0.00	0.00	1.48	1.97	2.18	2.30	2.45	2.40	2.77
	2:40:00	0.00	0.00	1.21	1.51	1.59	1.66	1.72	1.71	1.86
	2:45:00	0.00	0.00	1.09	1.32	1.36	1.38	1.41	1.41	1.46
	2:50:00	0.00	0.00	1.09	1.32	1.35	1.36	1.38	1.38	1.42
	2:55:00	0.00	0.00	1.08	1.31	1.34	1.34	1.36	1.36	1.39
	3:00:00	0.00	0.00	1.07	1.31	1.34	1.34	1.34	1.34	1.36
	3:05:00	0.00	0.00	1.07	1.30	1.33	1.33	1.34	1.34	1.34
	3:10:00	0.00	0.00	1.06	1.30	1.33	1.33	1.33	1.33	1.33
	3:15:00	0.00	0.00	1.06	1.29	1.32	1.32	1.33	1.33	1.33
	3:20:00	0.00	0.00	1.05	1.29	1.32	1.32	1.32	1.32	1.33
	3:25:00	0.00	0.00	1.04	1.28	1.31	1.31	1.32	1.32	1.32
	3:30:00	0.00	0.00	1.04	1.28	1.31	1.31	1.31	1.31	1.32
	3:35:00	0.00	0.00	1.03	1.27	1.30	1.30	1.31	1.31	1.31
	3:40:00	0.00	0.00	1.03	1.27	1.30	1.30	1.30	1.30	1.31
	3:45:00	0.00	0.00	1.02	1.26	1.29	1.30	1.30	1.30	1.30
	3:50:00	0.00	0.00	1.02	1.26	1.29	1.29	1.29	1.29	1.30
	3:55:00	0.00	0.00	1.01	1.25	1.28	1.29	1.29	1.29	1.29
	4:00:00	0.00	0.00	1.00	1.25	1.28	1.28	1.28	1.28	1.29
	4:05:00	0.00	0.00	1.00	1.24	1.27	1.28	1.28	1.28	1.28
	4:10:00	0.00	0.00	0.99	1.24	1.27	1.27	1.27	1.27	1.28
	4:15:00	0.00	0.00	0.98	1.23	1.26	1.27	1.27	1.27	1.27
	4:20:00	0.00	0.00	0.98	1.23	1.26	1.26	1.26	1.26	1.27
	4:25:00	0.00	0.00	0.97	1.22	1.25	1.26	1.26	1.26	1.26
	4:30:00	0.00	0.00	0.97	1.22	1.25	1.25	1.25	1.25	1.26
	4:35:00	0.00	0.00	0.96	1.21	1.24	1.25	1.25	1.25	1.25
	4:40:00	0.00	0.00	0.95	1.21	1.24	1.24	1.24	1.24	1.25
	4:45:00	0.00	0.00	0.95	1.20	1.23	1.24	1.24	1.24	1.24
	4:50:00	0.00	0.00	0.94	1.20	1.23	1.23	1.23	1.23	1.24
	4:55:00	0.00	0.00	0.93	1.19	1.22	1.22	1.23	1.23	1.23
	5:00:00	0.00	0.00	0.93	1.19	1.22	1.22	1.22	1.22	1.23
	5:05:00	0.00	0.00	0.92	1.18	1.21	1.21	1.22	1.22	1.22
	5:10:00	0.00	0.00	0.92	1.18	1.21	1.21	1.21	1.21	1.22
	5:15:00	0.00	0.00	0.91	1.17	1.20	1.20	1.21	1.21	1.21
	5:20:00	0.00	0.00	0.90	1.17	1.20	1.20	1.20	1.20	1.20
	5:25:00	0.00	0.00	0.90	1.16	1.19	1.19	1.20	1.20	1.20
	5:30:00	0.00	0.00	0.89	1.15	1.19	1.19	1.19	1.19	1.19
	5:35:00	0.00	0.00	0.88	1.15	1.18	1.18	1.19	1.19	1.19
	5:40:00	0.00	0.00	0.88	1.14	1.18	1.18	1.18	1.18	1.18
	5:45:00	0.00	0.00	0.87	1.14	1.17	1.17	1.17	1.17	1.18
	5:50:00	0.00	0.00	0.86	1.13	1.17	1.17	1.17	1.17	1.17
	5:55:00	0.00	0.00	0.86	1.13	1.16	1.16	1.16	1.16	1.17
	6:00:00	0.00	0.00	0.85	1.12	1.16	1.16	1.16	1.16	1.16

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)

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]	Area [ft^2]	Area [acres]	Volume [ft^3]	Volume [ac-ft]	Total Outflow [cfs]
MICROPOOL	0.00	30	0.001	0	0.000	0.00
	0.50	30	0.001	15	0.000	0.16
	1.50	560	0.013	310	0.007	0.28
	2.50	16,719	0.384	8,949	0.205	0.59
	3.50	57,204	1.313	45,911	1.054	0.92
WQ ELEV	4.47	118,440	2.719	131,098	3.010	1.16
	5.00	149,099	3.423	202,038	4.638	4.97
EURV	6.18	199,869	4.588	412,207	9.463	22.94
5-YR	6.34	205,046	4.707	444,601	10.207	24.44
	6.50	210,224	4.826	477,822	10.969	25.85
10-YR	6.77	215,690	4.952	535,321	12.289	44.26
	7.00	220,347	5.058	585,465	13.440	70.63
25-YR	7.22	224,801	5.161	634,431	14.565	101.92
50-YR	7.49	230,268	5.286	695,866	15.975	146.95
100-YR	7.86	236,160	5.421	782,163	17.956	218.69

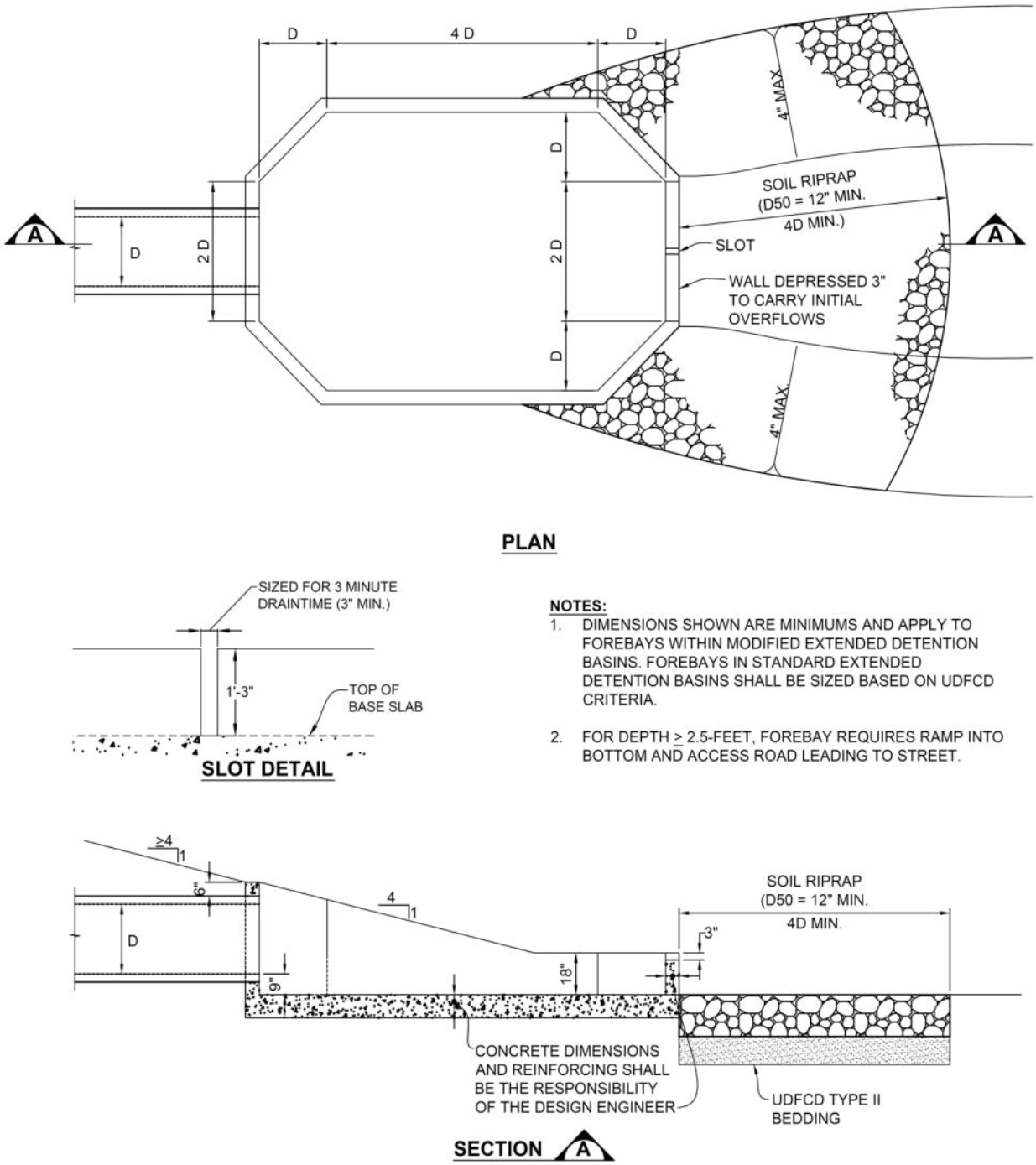
For best results, include the stages of all grade slope changes (e.g. ISV and Floor) from the S-A-V table on Sheet 'Basin'.

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

Pond C User Defined Inflow Hydrograph (Pond C CUHP hydrograph + MVEA Pond Outflow hydrograph + School Pond Outflow hydrograph) for Ponds in Series

	WQCV [cfs]				EURV [cfs]				2-Year [cfs]				5-Year				10-Year				25-Year				50-Year				100-Year				500-Year			
SOURCE	CUHP				CUHP				CUHP				CUHP				CUHP				CUHP				CUHP				CUHP				CUHP			
TIME	Pond C CUHP Hydrograph	MVEA Outflow hydrograph	School Pond C1 Outflow Hydrograph	Combined WQCV Inflow (cfs)	Pond C CUHP Hydrograph	MVEA Outflow hydrograph	School Pond C1 Outflow Hydrograph	Combined EURV Inflow	Pond C CUHP Hydrograph	MVEA Outflow hydrograph	School Pond C1 Outflow Hydrograph	Combined 2-Yr Inflow (cfs)	Pond C CUHP Hydrograph	MVEA Outflow hydrograph	School Pond C1 Outflow Hydrograph	Combined 5-Yr Inflow (cfs)	Pond C CUHP Hydrograph	MVEA Outflow hydrograph	School Pond C1 Outflow Hydrograph	Combined 10-Yr Inflow (cfs)	Pond C CUHP Hydrograph	MVEA Outflow hydrograph	School Pond C1 Outflow Hydrograph	Combined 25-Yr Inflow (cfs)	Pond C CUHP Hydrograph	MVEA Outflow hydrograph	School Pond C1 Outflow Hydrograph	Combined 50-Yr Inflow (cfs)	Pond C CUHP Hydrograph	MVEA Outflow hydrograph	School Pond C1 Outflow Hydrograph	Combined 100-Yr Inflow (cfs)	Pond C CUHP Hydrograph	MVEA Outflow hydrograph	School Pond C1 Outflow Hydrograph	Combined 500-Yr Inflow (cfs)
0:00:00	0.00	0.026593	0.18	0.20	0.00	0.229600	1.08	1.31	0.00	0	0.00	0.00	0.00	0	0.00	0.00	0.00	0	0.00	0.00	0.00	0	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00
0:05:00	0.00	0.026576	0.18	0.20	0.00	0.228346	1.07	1.30	0.00	0	0.00	0.00	0.00	0	0.00	0.00	0.00	0	0.00	0.00	0.00	0	0.00	0.00	0.00	0.04	0.00	0.000894799	0.01	0.02	0.00	0.005536093	0.05	0.06	0.00	0.00
0:10:00	0.00	0.026560	0.18	0.20	0.00	0.227086	1.07	1.30	0.00	0.008600037	0.07	0.07	0.00	0.010846486	0.07	0.08	0.00	0.011722002	0.07	0.09	0.00	0.010089026	0.07	0.08	1.92	0.011459133	0.07	2.00	0.19	0.010965621	0.07	0.27	6.16	0.012926934	0.08	6.25
0:15:00	0.00	0.026543	0.18	0.20	0.00	0.225812	1.07	1.29	16.90	0.013959554	0.09	17.00	27.61	0.014604128	0.10	27.72	34.19	0.01503364	0.10	34.31	22.97	0.014153598	0.09	23.07	28.83	0.014530543	0.09	28.93	28.01	0.014542318	0.09	28.12	40.73	0.015296671	0.10	40.85
0:20:00	0.00	0.026526	0.18	0.20	0.00	0.224537	1.06	1.29	61.64	0.018417961	0.13	61.79	81.58	0.020679212	0.15	81.75	99.71	0.022149533	0.16	99.89	60.62	0.018555989	0.13	60.77	70.52	0.019629839	0.14	70.68	75.52	0.020062454	0.15	75.68	100.75	0.022390042	0.17	100.94
0:25:00	0.00	0.026509	0.18	0.20	0.00	0.223253	1.06	1.28	139.88	0.022665892	0.17	140.08	202.74	0.025076448	0.39	203.15	258.02	0.026665618	0.56	258.62	136.35	0.024548303	0.25	136.63	159.87	0.025647151	0.46	160.36	177.98	0.026339357	0.53	178.54	258.21	0.096408045	0.74	259.04
0:30:00	0.00	0.026492	0.18	0.20	0.00	0.221968	1.05	1.28	181.61	0.025307388	0.45	182.08	257.42	0.054139988	0.68	258.14	313.76	0.131949149	0.79	314.68	340.40	0.114426657	0.76	341.27	401.80	0.153699852	0.85	402.80	452.08	0.17868424	0.92	453.17	601.05	0.230634768	1.08	602.36
0:35:00	0.00	0.026476	0.18	0.20	0.00	0.220673	1.05	1.27	163.59	0.029713354	0.61	164.24	224.71	0.138848338	0.80	225.65	268.95	0.18262508	0.90	270.03	400.14	0.196032783	0.95	401.28	468.02	0.22404019	1.04	469.28	552.81	0.247259753	2.39	555.45	717.37	0.876176129	25.44	743.68
0:40:00	0.00	0.026459	0.18	0.20	0.00	0.219370	1.05	1.27	134.48	0.072530896	0.70	135.25	180.89	0.173467317	0.87	181.93	217.36	0.212146575	0.97	218.55	362.12	0.23853291	1.06	363.42	420.96	0.264504541	6.37	427.60	499.92	0.682955988	18.51	519.12	646.38	3.983970999	26.19	676.55
0:45:00	0.00	0.026442	0.18	0.20	0.00	0.218066	1.04	1.26	104.78	0.119419964	0.75	105.65	143.18	0.195327268	0.92	144.29	174.78	0.232123717	1.02	176.03	302.95	0.266636408	4.92	308.14	351.92	0.861114377	15.08	367.86	429.09	2.569171794	25.35	457.01	553.43	6.468314221	26.66	586.55
0:50:00	0.00	0.026425	0.18	0.20	0.00	0.216748	1.04	1.26	82.11	0.140317224	0.78	83.03	116.56	0.210535262	0.95	117.72	140.79	0.246404001	1.05	142.08	251.58	0.601166272	9.87	262.06	291.97	2.083991435	17.33	311.38	357.25	4.079756189	24.97	386.30	461.02	7.870259025	27.51	496.40
0:55:00	0.00	0.026408	0.18	0.20	0.00	0.215430	1.04	1.25	67.40	0.154523338	0.80	68.36	95.70	0.221720626	0.97	96.90	117.10	0.257304025	1.07	118.43	201.63	1.345467728	11.03	214.00	234.60	2.935474886	15.79	253.33	293.99	4.936804037	21.64	320.67	380.54	8.367693726	26.69	415.60
1:00:00	0.00	0.026391	0.18	0.20	0.00	0.214169	1.03	1.25	55.75	0.165178598	0.82	56.74	78.04	0.230494769	0.99	79.27	98.14	0.290141675	1.32	99.73	162.42	1.918254303	10.59	174.94	189.69	3.396765169	13.72	206.81	248.66	5.324424814	18.66	272.65	322.44	8.350105538	26.40	357.19
1:05:00	0.00	0.026374	0.18	0.20	0.00	0.212766	1.03	1.24	45.96	0.173351895	0.84	46.98	63.54	0.237587737	1.01	64.79	81.95	0.273477961	2.69	84.92	133.39	2.256725547	9.65	145.30	156.22	3.560053043	11.84	171.63	213.59	5.33947554	15.79	234.71	276.99	7.963040455	26.13	311.08
1:10:00	0.00	0.026357	0.18	0.20	0.00	0.211430	1.02	1.24	35.54	0.17944162	0.85	36.57	52.87	0.243211004	1.03	54.14	70.48	0.347690013	4.08	74.91	101.30	2.381717236	8.58	112.26	119.28	3.497923314	10.22	133.00	158.81	5.044265028	12.87	176.73	207.52	7.275490744	25.74	240.53
1:15:00	0.00	0.02634	0.17	0.20	0.00	0.210077	1.02	1.23	28.90	0.183901103	0.87	29.95	45.76	0.247437997	1.04	47.05	66.13	0.498109047	5.00	71.63	76.70	2.346079565	7.56	86.60	91.26	3.282052329	8.84	103.38	113.58	4.566473654	10.36	128.51	151.32	6.425754071	23.60	181.34
1:20:00	0.00	0.026323	0.17	0.20	0.00	0.208724	1.02	1.23	25.81	0.187092677	0.88	26.87	40.38	0.250488537	1.05	41.68	59.47	0.614466666	5.27	65.36	60.44	2.196351461	6.62	69.25	71.99	2.965995448	7.65	82.60	82.07	3.9884815	8.26	94.32	110.08	5.503606841	15.13	130.71
1:25:00	0.00	0.026305	0.17	0.20	0.00	0.207360	1.01	1.22	24.01	0.189422413	0.88	25.09	36.73	0.252761332	1.06	38.05	50.32	0.680400483	5.14	56.14	49.58	1.980023488	5.80	57.36	58.81	2.603015391	6.65	68.06	60.47	3.391017979	6.71	70.57	81.21	4.612237344	10.73	96.55
1:30:00	0.00	0.026288	0.17	0.20	0.00	0.205990	1.01	1.22	23.08	0.191295667	0.89	24.17	34.42	0.254621669	1.07	35.75	43.53	0.71251507	4.88	49.12	40.96	1.745711834	5.08	47.79	48.25	2.245380231	5.79	56.28	47.52	2.84206153	5.62	55.99	63.88	3.82269843	8.24	75.94
1:35:00	0.00	0.026271	0.17	0.20	0.00	0.204619	1.01	1.21	22.45	0.192953739	0.90	23.54	32.94	0.256162219	1.08	34.27	39.07	0.723645675	4.62	44.42	34.71	1.529227469	4.53	40.77	40.54	1.930901654	5.14	47.61	39.17	2.379771909	4.89	46.44	52.60	3.170307521	6.78	62.55
1:40:00	0.00	0.026253	0.17	0.20	0.00	0.203230	1.00	1.20	21.97	0.194472671	0.91	23.08	29.32	0.257386255	1.15	30.73	36.05	0.721851212	4.40	41.18	31.00	1.342205427	4.13	36.47	35.93	1.66713552	4.67	42.26	33.67	2.003182256	4.42	40.09	45.21	2.646632809	5.91	53.77
1:45:00	0.00	0.026236	0.17	0.20	0.00	0.201840	1.00	1.20	21.67	0.19590936	0.92	22.78	26.03	0.258380403	1.40	27.69	34.04	0.712625142	4.24	39.00	28.47	1.184665398	3.84	33.49	32.78	1.450658625	4.35	38.57	30.09	1.700001723	4.11	35.91	40.38	2.230114422	5.39	48.00
1:50:00	0.00	0.026219	0.17	0.20	0.00	0.200443	0.99	1.19	21.53	0.197112449	0.93	22.66	23.90	0.259199728	1.67	25.83	32.61	0.697756853	4.10	37.40	26.93	1.054566163	3.64	31.63	30.85	1.274653549	4.13	36.26	28.20	1.457106696	3.92	33.58	37.78	1.900024937	5.07	44.75
1:55:00	0.00	0.026202	0.17	0.20	0.00	0.199034	0.99	1.19	18.72	0.197979431	0.93	19.84	22.47	0.25986824	1.87	24.60	30.55	0.675861906	3.89	35.11	26.11	0.947664631	3.51	30.57	29.79	1.132284379	3.98	34.90	27.58	1.263036741	3.79	32.63	36.84	1.639156974	4.87	43.34
2:00:00	0.00	0.026185	0.17	0.20	0.00	0.197625	0.99	1.18	15.95	0.198427104	0.93	17.09	20.92	0.26024136	1.87	23.05	27.32	0.641106719	3.43	31.38	25.62	0.850598135	3.19	29.68	29.17	1.005317279	3.61	33.76	27.33	1.097110718	3.44	31.87	36.46	1.416541805	4.38	42.26
2:05:00	0.00	0.026167	0.17	0.20	0.00	0.196199	0.98	1.18	11.37	0.198409882	0.93	12.50	15.05	0.260229435	1.68	16.99	19.46	0.594566449	2.79	22.84	18.71	0.755548939	2.65	22.11	21.27	0.884053056	2.97	25.12	20.07	0.948694802	2.84	23.86	26.75	1.214965788	3.55	31.51
2:10:00	0.00	0.026149	0.17	0.20	0.00	0.194770	0.98	1.17	7.36	0.19803432	0.93	8.48	9.68	0.259923299	1.45	11.39	12.65	0.542717195	2.21	15.41	12.10	0.667282156	2.13	14.89	13.74	0.773146076	2.36	16.87	13.03	0.818679041	2.27	16.11	17.34	1.039158273	2.77	21.15
2:15:00	0.00	0.026132	0.17	0.20	0.00	0.193334	0.97	1.17	4.78	0.197379473	0.93	5.90	6.23	0.259396755	1.25	7.74	8.24	0.490994935	1.76	10.49	7.96	0.588309187	1.71	10.25	9.03	0.678833602	1.87	11.57	8.56	0.708128033	1.80	11.07	11.38	0.88871326	2.15	14.41
2:20:00	0.00	0.026115	0.17	0.20	0.00	0.191886	0.97	1.16	2.96	0.196510867	0.92	4.08	3.86	0.258702012	1.11	5.23	5.16	0.443010433	1.42	7.03	5.01	0.519316787	1.39	6.92	5.68	0.589715703	1.50	7.77	5.37	0.614556999	1.46	7.45	7.14	0.76220368	1.68	9.58
2:25:00	0.00	0.026097	0.17	0.20	0.00	0.190439	0.97	1.16	1.73	0.195486245	0.92	2.85	2.39	0.257872606	1.08	3.73	3.13	0.400633878	1.20	4.74	3.11	0.460131746	1.18	4.76	3.53	0.517133154	1.25	5.29	3.34	0.53587299	1.22	5.10	4.43	0.655754618	1.36	6.45
2:30:00	0.00	0.026080	0.17	0.20	0.00	0.188971	0.96	1.15	0.91	0.194324424	0.91	2.02	1.37	0.256952053	1.08	2.71	1.74	0.363491022	1.09	3.19	1.81	0.410202906	1.09	3.30	2.04	0.456255448	1.11	3.61	1.93	0.470424847	1.10	3.50	2.55	0.567436968	1.16	4.29
2:35:00	0.00	0.026062	0.17	0.20	0.00	0.187504	0.96	1.15	0.38	0.193072776	0.91	1.48	0.64	0.25595832	1.08	1.97	0.77	0.331313428	1.08	2.18	0.85	0.368428349	1.08	2.30	0.96	0.405638365	1.08	2.45	0.90	0.416311451	1.08	2.48	1.19	0.494717759	1.09	2.77
2:40:00	0.00	0.026045	0.17	0.20	0.00	0.186026	0.95	1.14	0.12	0.191729772	0.91	1.21	0.18	0.254913457	1.07	1.51	0.21	0.306556727	1.08	1.59	0.25	0.333466458	1.08	1.66	0.28	0.363767773	1.08	1.72	0.26	0.37167577	1.08	1.71	0.34	0.434467975	1.08	1.86
2:45:00	0.00	0.026027	0.17	0.20	0.00	0.184537	0.95	1.13	0.00	0.190336162	0.90	1.09	0.00	0.253818854	1.07	1.32	0.00	0.288610106	1.08	1.36	0.00	0.307584288	1.08	1.38	0.00	0.329352134	1.08	1.41	0.00	0.329352134	1.08	1.41	0.00	0.385329465	1.08	1.46
2:50:00	0.00	0.026009	0.17	0.20	0.00	0.183047	0.95	1.13	0.00	0.188891855	0.90	1.09	0.00	0.252694738	1.07	1.32	0.00	0.275632372	1.07	1.35	0.00	0.288808876	1.07	1.36	0.00	0.303210053	1.07	1.38	0.00	0.308234608	1.07	1.38	0.00	0.346229087	1.07	1.42
2:55:00	0.00	0.025991	0.17	0.20	0.00	0.181537	0.94	1.12	0.00	0.187428828	0.89	1.08	0.00	0.251550382	1.06	1.31	0.00	0.27458083	1.07	1.34	0.00	0.275632805	1.07	1.34	0.00	0.286269592	1.07	1.36	0.00	0.286269592	1.07	1.36	0.00	0.315736277	1.07	1.39
3:00:00	0.00	0.025974	0.17	0.20	0.00	0.180029	0.94	1.12	0.00	0.185951101	0.89	1.07	0.00	0.250393098	1.06	1.31	0.00	0.27352296	1.06	1.34	0.00	0.274576789	1.06	1.34	0.00	0.275430443	1.07	1.34	0.00	0.275638142	1.06	1.34	0.00	0.292885669	1.07	1.36
3:05:00	0.00	0.025956	0.17	0.20	0.00	0.178504	0.93	1.11	0.00	0.184461291	0.88	1.07	0.00	0.249234258	1.05	1.30	0.00	0.272461957	1.06	1.33	0.00	0.273518885	1.06	1.33	0.00	0.274373203	1.06	1.34	0.00	0.274582105	1.06	1.34	0.00	0.279112424	1.06	1.34
3:10:00	0.00	0.025938	0.17	0.20	0.00	0.176974	0.93	1.11	0.00	0.182972488	0.88	1.06	0.00	0.248067884	1.05	1.30	0.00	0.271393453	1.06	1.33	0.00	0.272457898	1.06	1.33	0.00	0.273315566	1.06	1.33	0.00	0.273524247	1.06	1.33	0.00	0.274874765	1.06	1.33
3:15:00	0.00	0.025921	0.17	0.20	0.00	0.175436	0.93	1.10	0.00	0.181461054	0.88	1.06	0.00	0.246896064	1.05	1.29	0.00	0.270323432	1.05	1.32	0.00	0.271389358	1.05	1.32	0.00	0.27225446	1.05	1.33	0.00	0.272463239	1.05	1.33	0.00	0.273819421	1.06	1.33
3:20:00	0.00	0.025903	0.17	0.20	0.00	0.173884	0.92	1.09	0.00	0.179951945	0.87	1.05	0.00	0.245722743	1.04	1.29	0.00	0.269248126	1.05	1.32	0.00	0.270319301	1.05	1.32	0.00	0.271184705	1.05	1.32	0.00	0.271394745	1.05	1.32	0.00	0.272757268	1.05	1.33
3:25:00	0.00	0.025885	0.17	0.19	0.00	0.172339	0.92	1.09	0.00	0.17842736	0.87	1.04	0.00	0.244538618	1.04	1.28	0.00	0.268167189	1.05	1.31	0.00	0.269244012	1.05	1.31	0.00	0.270113233	1.05	1.32	0.00	0.270324736	1.05	1.32	0.00	0.271691329	1.05	1.32
3:30:00	0.00	0.025867	0.17	0.19	0.00	0.170794	0.91	1.08	0.00	0.176896197	0.86	1.04	0.00	0.243351951	1.04	1.28	0.00	0.26708474	1.04	1.31	0.00	0.268163098	1.04	1.31	0.00	0.269038763	1.04	1.31	0.00	0.269249424	1.04	1.31	0.00	0.270023907	1.04	1.32
3:35:00	0.00	0.025849	0.17	0.19	0.00	0.169187	0.91	1.08	0.00	0.175359275	0.86	1.03	0.00	0.242161627	1.03	1.27	0.00	0.265994698	1.04	1.30	0.00	0.267080553	1.04	1.30	0.00	0.267955979	1.04	1.31	0.00	0.268168498	1.04	1.31	0.00	0.269547405	1.04	1.31
3:40:00	0.00	0.025831	0.17	0.19	0.00	0.167549	0.90	1.07	0.00	0.173805432	0.85	1.03	0.00	0.240961327	1.03	1.27	0.00	0.264901042	1.03	1.30	0.00	0.265990527	1.03	1.30	0.00	0.266871652	1.04	1.30	0.00	0.267086062	1.03	1.30	0.00	0.268469108	1.04	1.31
3:45:00	0.00	0.025813	0.17	0.19	0.00	0.166004	0.90	1.07	0.00	0.172255796	0.85	1.02	0.00	0.23975951	1.02	1.26	0.00	0.263805732	1.03	1.29	0.00	0.264896834	1.03	1.30	0.00	0.265782479	1.03	1.30	0.00	0.265996014	1.03	1.30	0.00	0.267387456	1.03	1.30
3:50:00	0.00	0.025796	0.17	0.19	0.00	0.164393	0.90	1.06	0.00	0.170678618	0.84	1.02	0.00	0.238550557	1.02	1.26	0.00	0.26270065	1.03	1.29	0.00	0.263801541	1.03	1.29	0.00	0.264686917	1.03	1.29	0.00	0.26490237	1.03	1.29	0.00	0.266298068	1.03	1.30
3:55:00	0.00	0.025777	0.17	0.19	0.00	0.162748	0.89	1.05	0.00	0.169106074	0.84	1.01	0.00	0.237334717	1.02	1.25	0.00	0.261593986	1.02	1.28	0.00	0.262696421	1.02	1.29	0.00	0.263589821	1.02	1.29	0.00	0.263807054	1.02	1.29	0.00	0.265207137	1.03	1.29
4:00:00	0.00	0.025759	0.17	0.19	0.00	0.161527	0.89	1.05	0.00	0.167514741	0.84	1.00	0.00	0.236117454	1.01	1.25	0.00	0.260483335	1.02	1.28	0.00	0.261589719	1.02	1.28	0.00	0.262485489	1.02	1.28	0.00	0.262701984	1.02	1.28	0.00	0.264110561	1.02	1.29
4:05:00	0.00	0.025743	0.17	0.19	0.00	0.159509	0.88	1.04	0.00	0.165918635	0.83	1.00	0.00	0.23488914	1.01	1.24	0.00	0.259364934	1.02	1.27	0.00	0.260479086	1.01	1.28	0.00	0.261376856	1.02	1.28	0.00	0.261595332	1.02	1.28	0.00	0.263008242	1.02	1.28
4:10:00	0.00	0.025727	0.17	0.19	0.00	0.157871	0.88	1.04	0.00	0.164312627	0.83	0.99	0.00	0.233657452	1.01	1.24	0.00	0.25824497	1.01	1.27	0.00	0.259360646	1.01	1.27	0.00	0.260266708	1.01	1.27	0.00	0.260484676	1.01	1.27	0.00	0.261904392	1.01	1.28
4:15:00	0.00	0.025709	0.17	0.19	0.00	0.156202	0.87	1.03	0.00	0.162692313	0.82	0.98	0.00	0.232422439	1.00	1.23	0.00	0.257118482	1.01	1.26	0.00	0.258240642	1.01	1.27	0.00	0.259146731	1.01	1.27	0.00	0.259366287	1.01	1.27	0.00	0.260792423	1.01	1.27
4:20:00	0.00	0.025692	0.17	0.19	0.00	0.154540	0.87	1.02	0.00	0.161071016	0.82	0.98	0.00	0.231176003	1.00	1.23	0.00	0.2559646	1.00	1.26	0.00	0.257114173	1.00	1.26	0.00	0.258024733	1.00	1.26	0.00	0.258246396	1.00	1.26	0.00	0.259676877	1.01	1.27
4:25:00	0.00	0.025676	0.17	0.19	0.00	0.152852	0.87	1.02	0.00	0.159425826	0.81	0.97	0.00	0.229928176	0.99	1.22	0.00	0.254852904	1.00	1.25	0.00	0.255982111	1.00	1.26	0.00	0.256899205	1.00	1.26	0.00	0.257119842	1.00	1.26	0.00	0.258559438	1.00	1.26
4:30:00	0.00	0.025654	0.17	0.19	0.00	0.151168	0.86	1.01	0.00	0.157788549	0.81	0.97	0.00	0.228672747	0.99	1.22	0.00	0.253710051	1.00	1.25	0.00	0.254848513	1.00	1.25	0.00	0.255765118	1.00	1.25	0.00	0.255987833	1.00	1.25	0.00	0.257431963	1.00	1.26
4:35:00	0.00	0.025632	0.17	0.19	0.00	0.149454	0.86	1.01	0.00	0.156117799	0.80	0.96	0.00	0.227409743	0.99	1.21	0.00	0.252564104	0.99	1.24	0.00	0.25370568	0.99	1.25	0.00	0.254629457	0.99	1.25	0.00	0.25485429	0.99	1.25	0.00	0.256302893	0.99	1.25
4:40:00	0.00	0.025613	0.17	0.19	0.00	0.147748	0.85	1.00	0.00	0.154457011	0.80	0.95	0.00	0.226145508	0.98	1.21	0.00	0.251415481	0.99	1.24	0.00	0.252559691	0.99	1.24	0.00	0.253487606	0.99	1.24	0.00	0.253731431	0.99	1.24	0.00	0.255169403	0.99	1.25
4:45:00	0.00	0.025595	0.17	0.19	0.00	0.146036	0.85	0.99	0.00	0.152766823	0.79	0.95	0.00	0.224868772	0.98	1.20	0.00	0.250256888	0.98	1.23	0.00	0.251411088	0.98	1.24	0.00	0.252339521	0.99	1.24	0.00	0.252565497	0.98	1.24	0.00	0.254028075	0.99	1.24
4:50:00	0.00	0.025576	0.17	0.19	0.00	0.144281	0.84	0.99	0.00	0.151081032	0.79	0.94	0.00	0.22358892	0.97	1.20	0.00	0.249096711	0.98	1.23	0.00	0.250252452	0.98	1.23	0.00	0.251189899	0.98	1.23	0.00	0.251416868	0.98	1.23	0.00	0.252885184	0.98	1.24
4:55:00	0.00	0.025558	0.16	0.19	0.00	0.142527	0.84	0.98	0.00	0.149371317	0.79	0.93	0.00	0.222304872	0.97	1.19	0.00	0.247930981	0.98	1.22	0.00	0.249092232	0.98	1.22	0.00	0.250031165	0.98	1.23	0.00	0.250258288	0.98	1.23	0.00	0.2517351	0.98	1.23
5:00:00	0.00	0.025539	0.16	0.19	0.00	0.140767	0.83	0.98	0.00	0.147660061	0.78	0.93	0.00	0.221009035	0.97	1.19	0.00	0.246757804	0.97	1.22	0.00	0.247926523	0.97	1.22	0.00	0.248868774	0.97	1.22	0.00	0.249086125	0.97	1.22	0.00	0.25057961	0.98	1.23
5:05:00	0.00	0.025521	0.16	0.19	0.00	0.138989	0.83	0.97	0.00	0.145929558	0.78	0.92	0.00	0.219712088	0.96	1.18	0.00	0.245583096	0.97	1.21	0.00	0.246753301	0.97	1.21	0.00	0.247704111	0.97	1.22	0.00	0.247932388	0.97	1.22	0.00	0.2494226	0.97	1.22
5:10:00	0.00	0.025503	0.16	0.19	0.00	0.137210	0.83	0.96	0.00	0.144192443	0.77	0.92	0.00	0.21840543	0.96	1.18	0

Figure 13-9. Concept for Integral Forebay at Pipe Outfall



Weir Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Monday, Apr 14 2025

RECTANGULAR SLOT IN FOREBAY (1100cf), 4.68 in wide

Rectangular Weir

Crest	= Sharp
Bottom Length (ft)	= 0.39
Total Depth (ft)	= 2.00

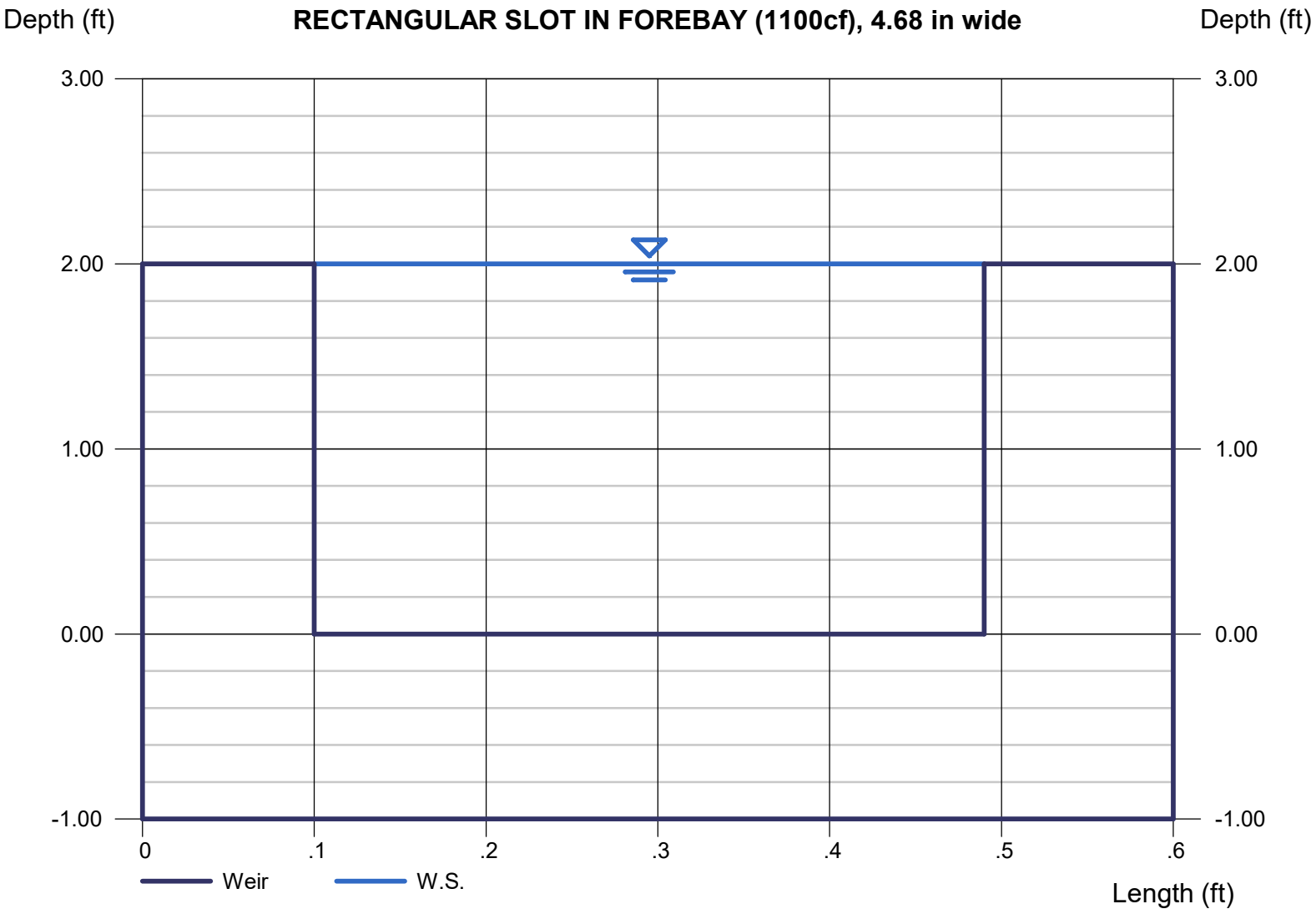
Calculations

Weir Coeff. Cw	= 3.33
Compute by:	Q vs Depth
No. Increments	= 10

Highlighted

Depth (ft)	= 2.00
Q (cfs)	= 3.673
Area (sqft)	= 0.78
Velocity (ft/s)	= 4.71
Top Width (ft)	= 0.39

Required Time = 3-5 minutes
Calculated Drain Time = 1100cf/3.673 = 299seconds = 4.99minutes



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Monday, Apr 14 2025

LOW FLOW CHANNEL (2xforebay discharge)

Rectangular

Bottom Width (ft)	= 4.00
Total Depth (ft)	= 0.50
Invert Elev (ft)	= 100.00
Slope (%)	= 0.50
N-Value	= 0.013

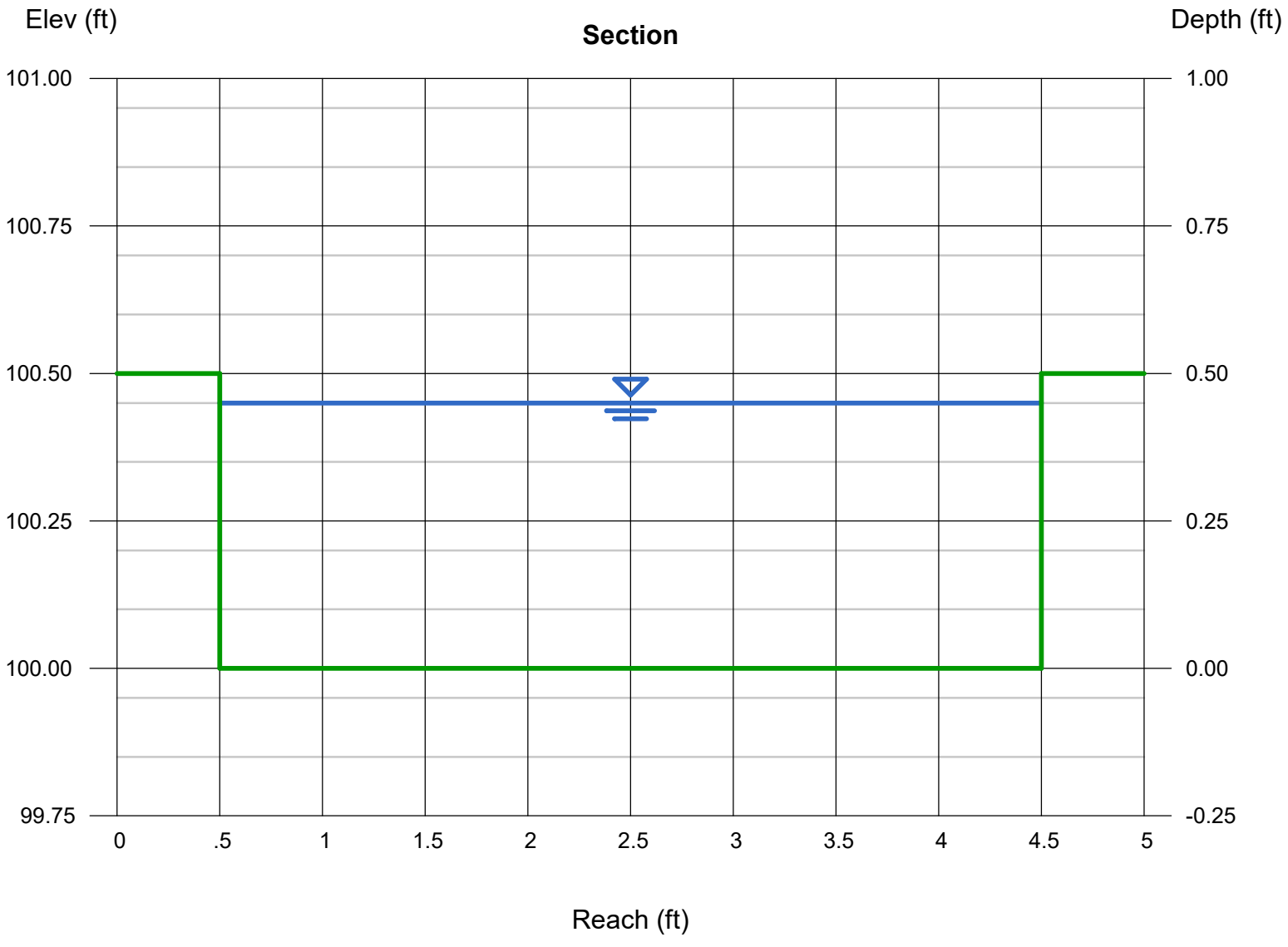
Calculations

Compute by:	Q vs Depth
No. Increments	= 10

Highlighted

Depth (ft)	= 0.45
Q (cfs)	= 7.460
Area (sqft)	= 1.80
Velocity (ft/s)	= 4.14
Wetted Perim (ft)	= 4.90
Crit Depth, Yc (ft)	= 0.48
Top Width (ft)	= 4.00
EGL (ft)	= 0.72

Required Discharge (for one forebay) = 2 x 3.673 = 7.346cfs



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Monday, Apr 14 2025

LOW FLOW CHANNEL (2 x forebay discharge)

Rectangular

Bottom Width (ft)	= 7.00
Total Depth (ft)	= 0.50
Invert Elev (ft)	= 100.00
Slope (%)	= 0.50
N-Value	= 0.013

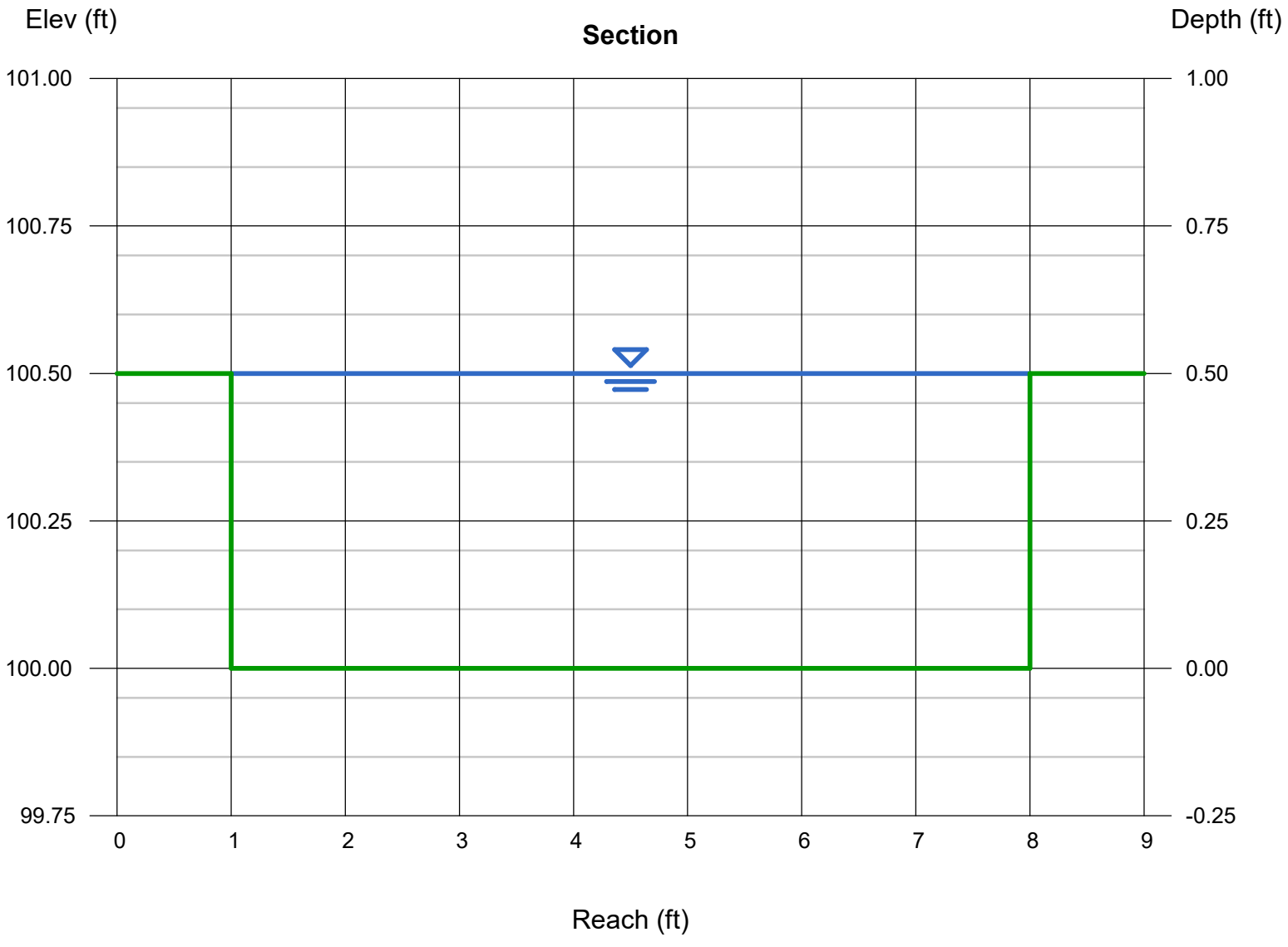
Calculations

Compute by:	Q vs Depth
No. Increments	= 10

Highlighted

Depth (ft)	= 0.50
Q (cfs)	= 16.30
Area (sqft)	= 3.50
Velocity (ft/s)	= 4.66
Wetted Perim (ft)	= 8.00
Crit Depth, Yc (ft)	= 0.50
Top Width (ft)	= 7.00
EGL (ft)	= 0.84

Required Discharge = 3.673 x 2 x 2 forebays
= 14.69cfs



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Monday, Jan 19 2026

Outfall Channel in Etrib

Trapezoidal

Bottom Width (ft)	= 15.00
Side Slopes (z:1)	= 4.00, 4.00
Total Depth (ft)	= 2.40
Invert Elev (ft)	= 100.00
Slope (%)	= 1.00
N-Value	= 0.020

Calculations

Compute by:	Known Q
Known Q (cfs)	= 219.20

Highlighted

Depth (ft)	= 1.38
Q (cfs)	= 219.20
Area (sqft)	= 28.32
Velocity (ft/s)	= 7.74
Wetted Perim (ft)	= 26.38
Crit Depth, Yc (ft)	= 1.62
Top Width (ft)	= 26.04
EGL (ft)	= 2.31

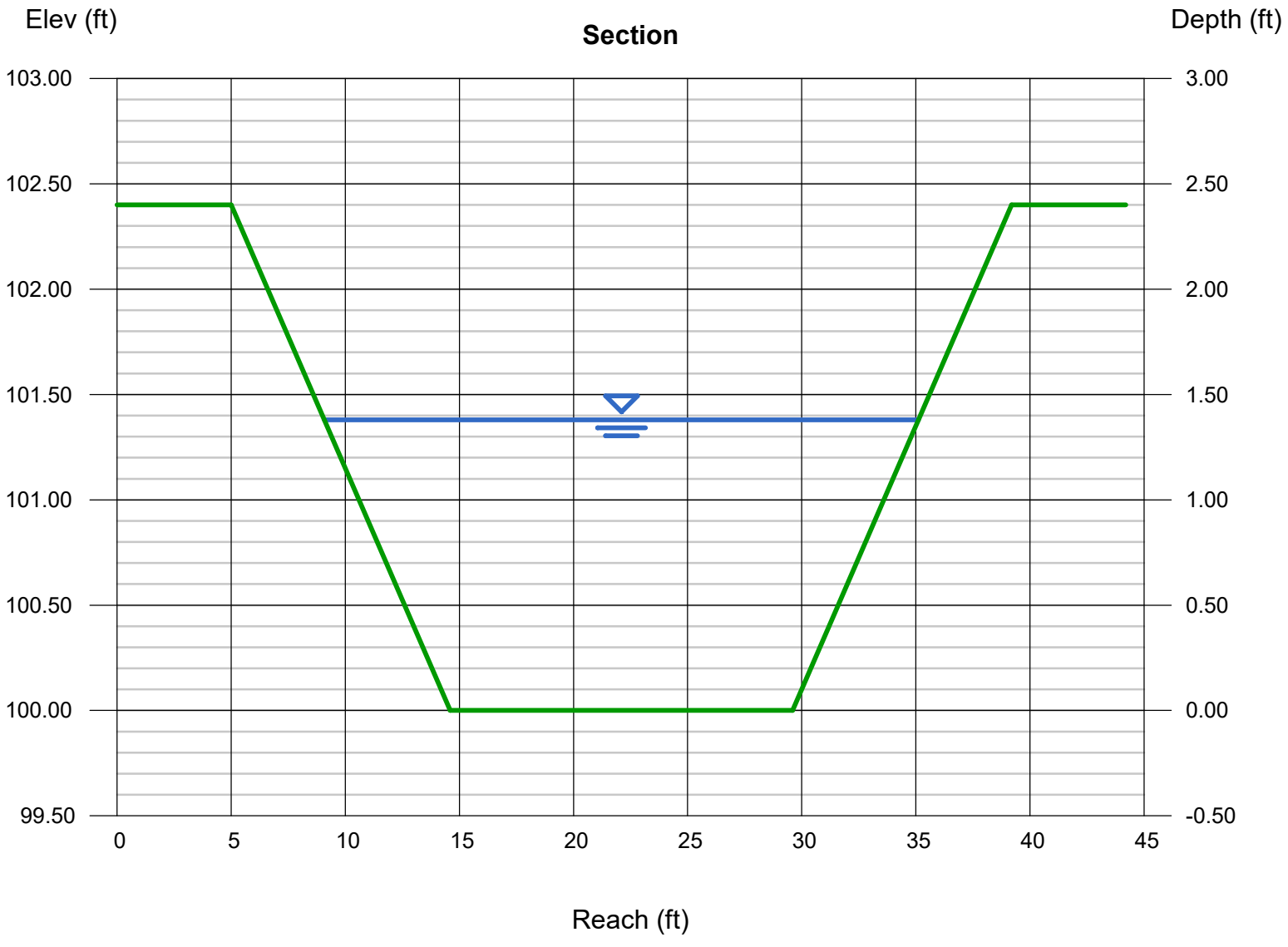


Figure 13-12c. Emergency Spillway Protection

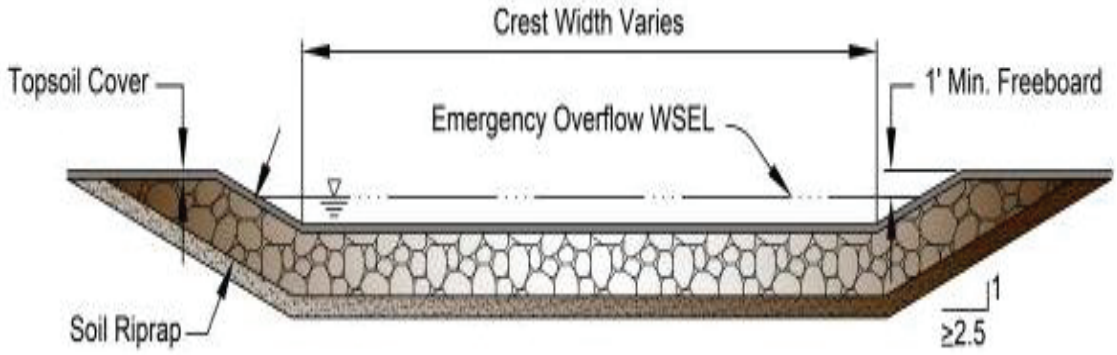
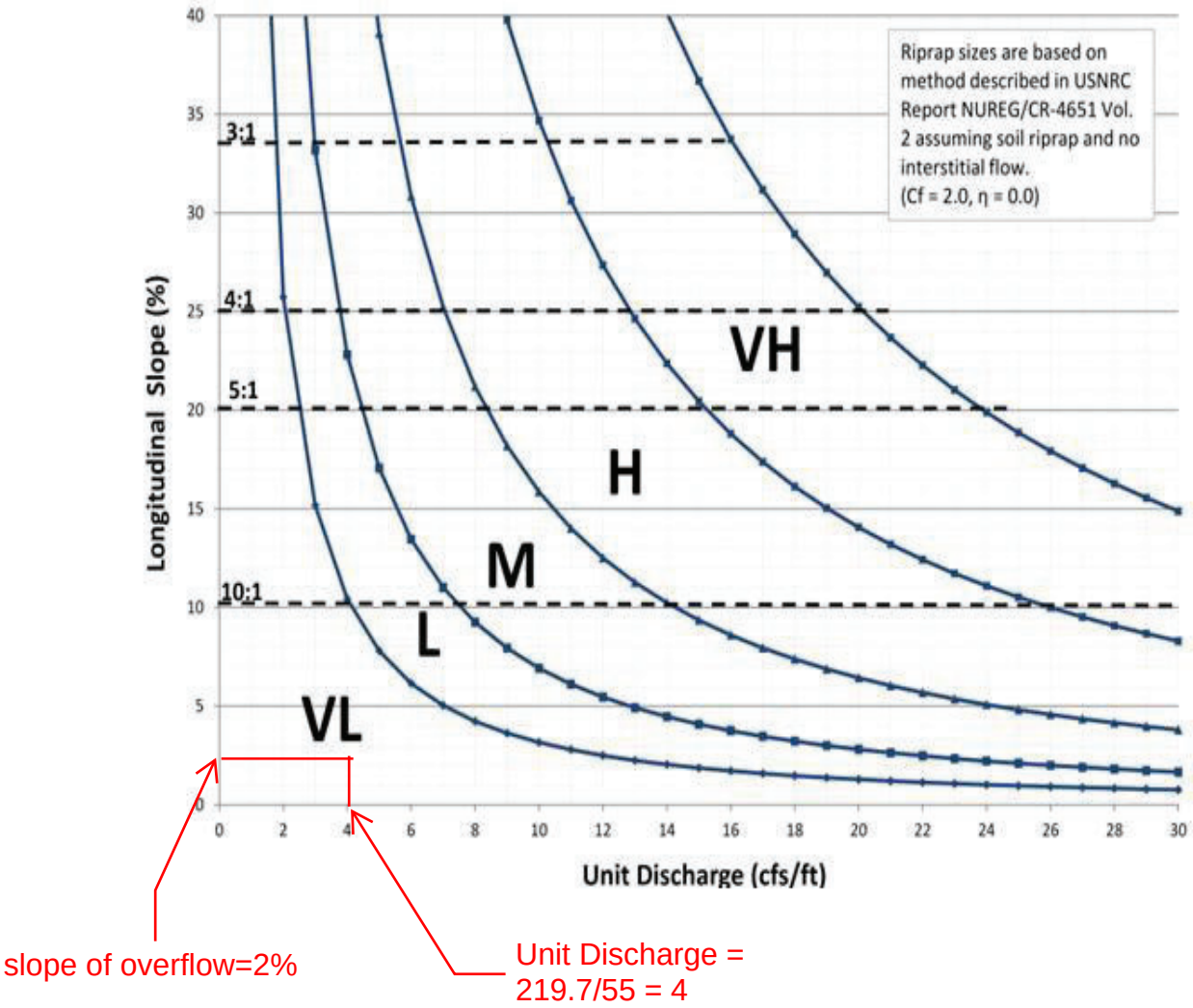


Figure 13-12d. Riprap Types for Emergency Spillway Protection



2. ASTM International (ASTM): D698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft^3 (600 kN-m/m^3)).

1.04 SUBMITTALS

A. CONTRACTOR shall cooperate with ENGINEER in obtaining and providing samples of all specified materials.

B. CONTRACTOR shall submit certified laboratory test certificates for all items required in this section.

PART 2 PRODUCTS

2.01 MATERIALS

A. RIPRAP

1. Riprap used shall be the type designated on the DRAWINGS and shall conform to Table 1.

Table 1: Riprap Gradation

Riprap Designation	% Smaller Than Given Size By Weight	Intermediate Rock Dimension (inches)	d_{50}* (inches)
Type VL	70 - 100 50 - 70 35 - 50 2 - 10	12 9 6 2	6**
Type L	70 - 100 50 - 70 35 - 50 2 - 10	15 12 9 3	9**
Type M	70 - 100 50 - 70 35 - 50 2 - 10	21 18 12 4	12**
Type H	70 - 100 50 - 70 35 - 50 2 - 10	30 24 18 6	18
Type VH	70 - 100 50 - 70 35 - 50 2 - 10	41 33 24 9	24

*d_{50} = Mean Particle Size

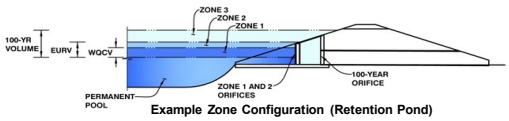
**Mix VL, L and M riprap with 35% topsoil (by volume) and bury it with 4 to 6 inches of topsoil, all vibration compacted, and revegetate.

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)

Project: MVEA Substation Concept Pond

Basin ID:



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	**EDB**	
Watershed Area =	4.50	acres
Watershed Length =	520	ft
Watershed Length to Centroid =	250	ft
Watershed Slope =	0.020	ft/ft
Watershed Imperviousness =	40.00%	percent
Percentage Hydrologic Soil Group A =	0.0%	percent
Percentage Hydrologic Soil Group B =	100.0%	percent
Percentage Hydrologic Soil Groups C/D =	0.0%	percent
Target WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	User Input	

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

			Optional User Overrides	
Water Quality Capture Volume (WQCV) =	0.067	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	0.189	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	0.179	acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	0.267	acre-feet	1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	0.346	acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	0.461	acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	0.549	acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	0.665	acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 3.14 in.) =	0.895	acre-feet		inches
Approximate 2-yr Detention Volume =	0.139	acre-feet		
Approximate 5-yr Detention Volume =	0.195	acre-feet		
Approximate 10-yr Detention Volume =	0.268	acre-feet		
Approximate 25-yr Detention Volume =	0.299	acre-feet		
Approximate 50-yr Detention Volume =	0.314	acre-feet		
Approximate 100-yr Detention Volume =	0.360	acre-feet		

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	0.067	acre-feet
Zone 2 Volume (EURV - Zone 1) =	0.122	acre-feet
Zone 3 (100yr + 1 / 2 WQCV - Zones 1 & 2) =	0.205	acre-feet
Total Detention Basin Volume =	0.394	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

micropool - 5803.20

1.8 ac gravel

2.7ac landscaping

Depth Increment = 0.20 ft

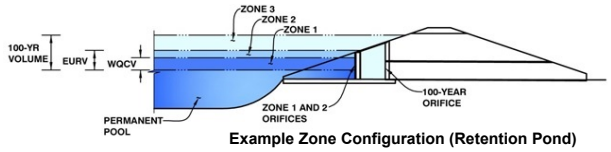
Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	--	0.00	--	--	--	30	0.001		
5803.53	--	0.33	--	--	--	30	0.001	10	0.000
5804	--	0.80	--	--	--	300	0.007	87	0.002
5805	--	1.88	--	--	--	8,190	0.188	4,672	0.107
5806	--	2.88	--	--	--	16,000	0.367	16,767	0.385
5807	--	3.88	--	--	--	18,100	0.416	33,817	0.776
5808	--	4.88	--	--	--	20,200	0.464	52,967	1.216

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)

Project: MVEA Substation Concept Pond

Basin ID:



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	1.65	0.067	Orifice Plate
Zone 2 (EURV)	2.25	0.122	Rectangular Orifice
Z3 (100+1/2WQCV)	2.91	0.205	Weir&Pipe (Restrict)
Total (all zones)		0.394	

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

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

Calculated Parameters for Underdrain

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

Centroid of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)	WQ Orifice Area per Row =	1.806E-03	ft²
Depth at top of Zone using Orifice Plate =	1.65	ft (relative to basin bottom at Stage = 0 ft)	Elliptical Half-Width =	N/A	feet
Orifice Plate: Orifice Vertical Spacing =	6.60	inches	Elliptical Slot Centroid =	N/A	feet
Orifice Plate: Orifice Area per Row =	0.26	sq. inches (diameter = 9/16 inch)	Elliptical Slot Area =	N/A	ft²

Calculated Parameters for Plate

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

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	0.55	1.10					
Orifice Area (sq. inches)	0.26	0.26	0.26					

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

User Input: Vertical Orifice (Circular or Rectangular)

	Zone 2 Rectangular	Not Selected			
Invert of Vertical Orifice =	1.65	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Area =	0.06	N/A
Depth at top of Zone using Vertical Orifice =	2.25	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Centroid =	0.08	N/A
Vertical Orifice Height =	2.00	N/A	inches			
Vertical Orifice Width =	4.09		inches			

Calculated Parameters for Vertical Orifi

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

	Zone 3 Weir	Not Selected				
Overflow Weir Front Edge Height, Ho =	2.50	N/A	ft (relative to basin bottom at Stage = 0 ft)	Height of Grate Upper Edge, H_t =	2.50	N/A
Overflow Weir Front Edge Length =	3.00	N/A	feet	Overflow Weir Slope Length =	3.00	N/A
Overflow Weir Grate Slope =	0.00	N/A	H:V	Grate Open Area / 100-yr Orifice Area =	3.54	N/A
Horiz. Length of Weir Sides =	3.00	N/A	feet	Overflow Grate Open Area w/o Debris =	6.26	N/A
Overflow Grate Type =	Type C Grate	N/A		Overflow Grate Open Area w/ Debris =	3.13	N/A
Debris Clogging % =	50%	N/A	%			

Calculated Parameters for Overflow We

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

	Zone 3 Restrictor	Not Selected				
Depth to Invert of Outlet Pipe =	0.33	N/A	ft (distance below basin bottom at Stage = 0 ft)	Outlet Orifice Area =	1.77	N/A
Outlet Pipe Diameter =	18.00	N/A	inches	Outlet Orifice Centroid =	0.75	N/A
Restrictor Plate Height Above Pipe Invert =	18.00		inches	Half-Central Angle of Restrictor Plate on Pipe =	3.14	N/A

Calculated Parameters for Outlet Pipe w/ Flow Restriction Pla

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	3.50	ft (relative to basin bottom at Stage = 0 ft)	Spillway Design Flow Depth=	0.66	feet
Spillway Crest Length =	5.00	feet	Stage at Top of Freeboard =	4.66	feet
Spillway End Slopes =	4.00	H:V	Basin Area at Top of Freeboard =	0.45	acres
Freeboard above Max Water Surface =	0.50	feet	Basin Volume at Top of Freeboard =	1.12	acre-ft

Calculated Parameters for Spillway

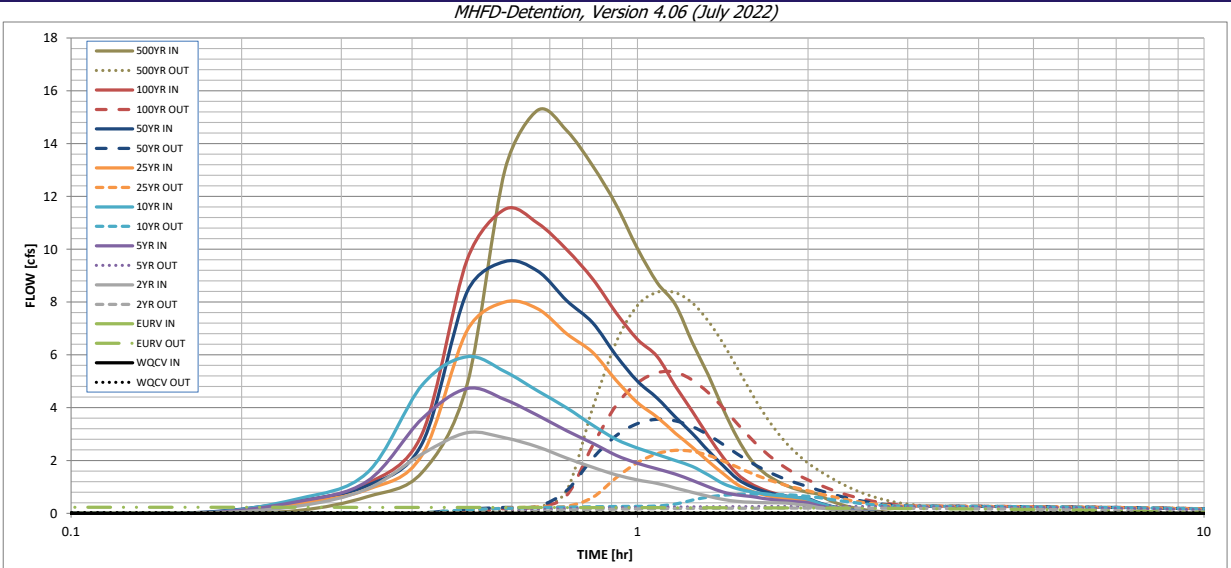
Routed Hydrograph Results

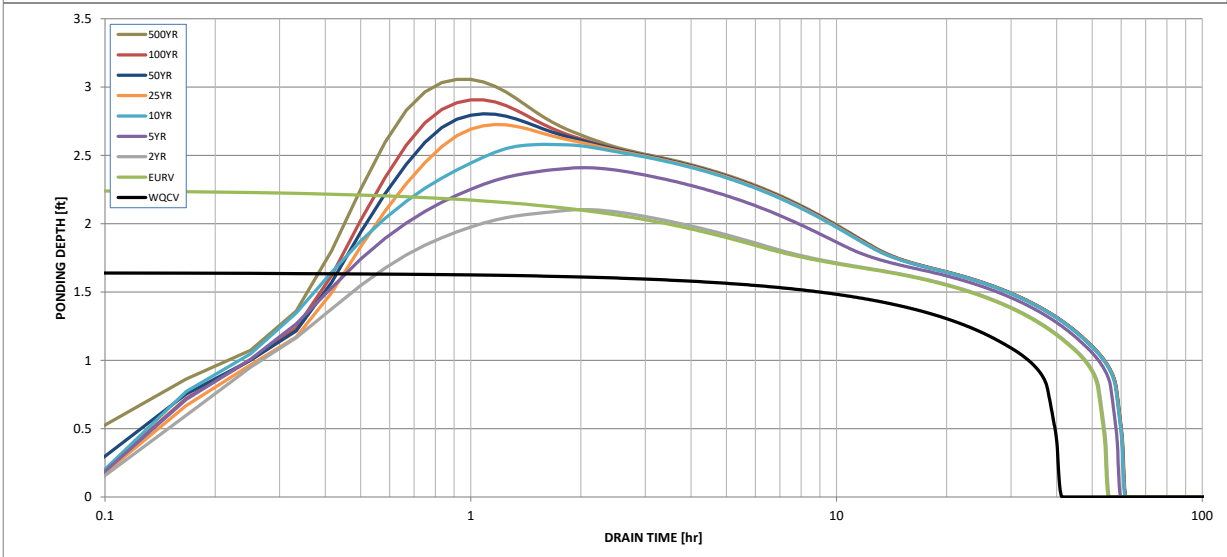
The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF)

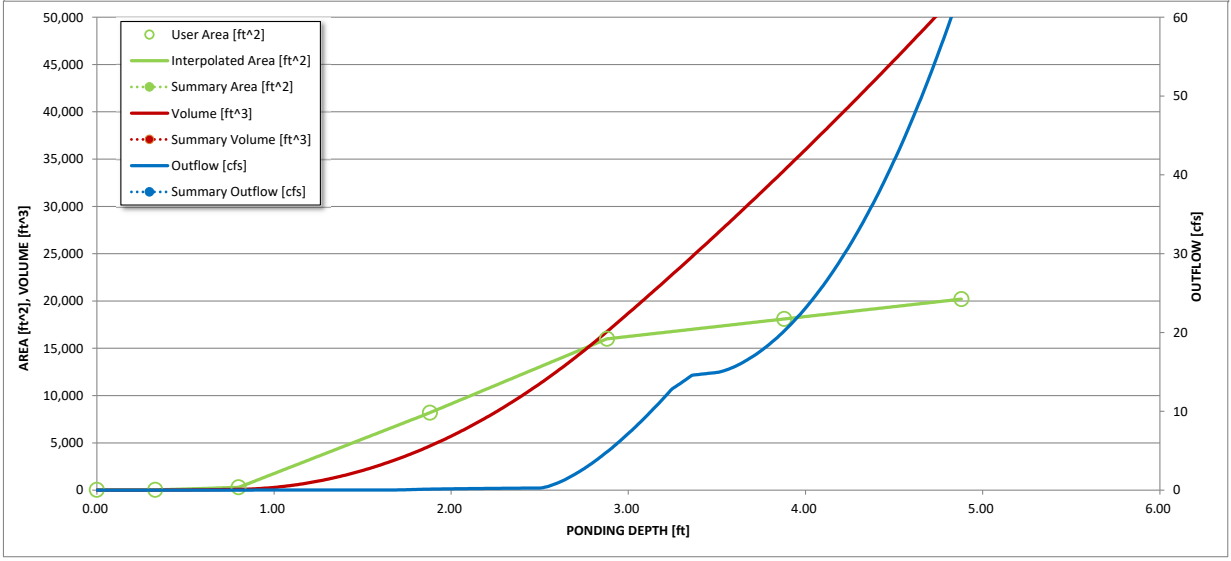
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
One-Hour Rainfall Depth (in) =	N/A	N/A	1.19	1.50	1.75	2.00	2.25	2.52
CUHP Runoff Volume (acre-ft) =	0.067	0.189	0.179	0.267	0.346	0.461	0.549	0.665
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	0.179	0.267	0.346	0.461	0.549	0.665
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	0.6	1.6	2.5	4.4	5.5	6.8
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A						
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.13	0.37	0.55	0.97	1.21	1.52
Peak Inflow Q (cfs) =	N/A	N/A	3.0	4.7	5.9	8.0	9.5	11.5
Peak Outflow Q (cfs) =	0.0	0.2	0.2	0.3	0.7	2.4	3.6	5.3
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.2	0.3	0.5	0.7	0.8
Structure Controlling Flow =	Plate	Vertical Orifice 1	Vertical Orifice 1	Vertical Orifice 1	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	N/A	0.1	0.3	0.5	0.8
Max Velocity through Grate 2 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours) =	38	49	49	51	51	48	47	45
Time to Drain 99% of Inflow Volume (hours) =	**39**	52	52	56	57	56	55	54
Maximum Ponding Depth (ft) =	1.65	2.25	2.10	2.41	2.58	2.73	2.80	2.91
Area at Maximum Ponding Depth (acres) =	0.15	0.25	0.23	0.28	0.31	0.34	0.35	0.37
Maximum Volume Stored (acre-ft) =	0.068	0.189	0.153	0.229	0.280	0.328	0.356	0.392

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)







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

DETENTION BASIN OUTLET STRUCTURE DESIGN

Outflow Hydrograph Workbook Filename: *mvea pond outflow*

Inflow Hydrographs

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

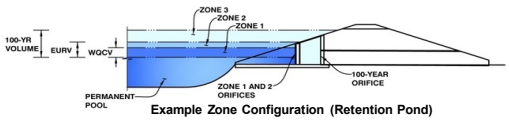
	SOURCE	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP
Time Interval	TIME	WQCV [cfs]	EURV [cfs]	2 Year [cfs]	5 Year [cfs]	10 Year [cfs]	25 Year [cfs]	50 Year [cfs]	100 Year [cfs]	500 Year [cfs]
5.00 min	0:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.10
	0:15:00	0.00	0.00	0.26	0.43	0.54	0.36	0.45	0.44	0.63
	0:20:00	0.00	0.00	0.92	1.21	1.54	0.90	1.04	1.12	1.55
	0:25:00	0.00	0.00	2.25	3.58	4.85	2.21	2.64	3.01	4.87
	0:30:00	0.00	0.00	3.05	4.72	5.93	6.92	8.38	9.59	13.01
	0:35:00	0.00	0.00	2.85	4.31	5.36	8.00	9.54	11.51	15.26
	0:40:00	0.00	0.00	2.51	3.71	4.63	7.74	9.17	10.98	14.49
	0:45:00	0.00	0.00	2.09	3.12	3.99	6.80	8.05	9.98	13.16
	0:50:00	0.00	0.00	1.74	2.65	3.33	6.09	7.21	8.87	11.69
	0:55:00	0.00	0.00	1.46	2.20	2.80	5.04	5.98	7.60	10.02
	1:00:00	0.00	0.00	1.27	1.90	2.47	4.19	5.00	6.58	8.73
	1:05:00	0.00	0.00	1.13	1.68	2.23	3.64	4.36	5.94	7.90
	1:10:00	0.00	0.00	0.96	1.48	2.00	3.03	3.64	4.82	6.46
	1:15:00	0.00	0.00	0.79	1.25	1.77	2.50	3.02	3.86	5.23
	1:20:00	0.00	0.00	0.65	1.00	1.45	1.96	2.37	2.92	3.94
	1:25:00	0.00	0.00	0.52	0.80	1.12	1.50	1.80	2.11	2.86
	1:30:00	0.00	0.00	0.45	0.69	0.93	1.09	1.30	1.49	2.04
	1:35:00	0.00	0.00	0.42	0.64	0.82	0.85	1.02	1.12	1.56
	1:40:00	0.00	0.00	0.40	0.56	0.74	0.71	0.84	0.90	1.26
	1:45:00	0.00	0.00	0.39	0.51	0.68	0.61	0.72	0.75	1.04
	1:50:00	0.00	0.00	0.39	0.46	0.65	0.55	0.64	0.64	0.90
	1:55:00	0.00	0.00	0.34	0.43	0.60	0.51	0.59	0.56	0.79
	2:00:00	0.00	0.00	0.30	0.40	0.53	0.48	0.56	0.51	0.72
	2:05:00	0.00	0.00	0.22	0.30	0.39	0.36	0.41	0.37	0.52
	2:10:00	0.00	0.00	0.17	0.22	0.29	0.26	0.30	0.27	0.38
	2:15:00	0.00	0.00	0.12	0.16	0.21	0.19	0.22	0.20	0.28
	2:20:00	0.00	0.00	0.09	0.12	0.15	0.14	0.16	0.15	0.20
	2:25:00	0.00	0.00	0.06	0.08	0.11	0.10	0.11	0.10	0.14
	2:30:00	0.00	0.00	0.04	0.06	0.07	0.07	0.08	0.07	0.10
	2:35:00	0.00	0.00	0.03	0.04	0.05	0.05	0.06	0.05	0.07
	2:40:00	0.00	0.00	0.02	0.03	0.03	0.03	0.04	0.03	0.05
	2:45:00	0.00	0.00	0.01	0.01	0.02	0.02	0.02	0.02	0.03
	2:50:00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01
	2:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)

Project: Bull Hill/Rolling Meadows MDDP

Basin ID: Pond C1 - school (CONCEPT)



Example Zone Configuration (Retention Pond)

micropool=5790.00

Depth Increment = ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft²)	Optional Override Area (ft²)	Area (acre)	Volume (ft³)	Volume (ac-ft)
Top of Micropool	--	0.00	--	--	--	30	0.001		
5790.33	--	0.30	--	--	--	30	0.001	9	0.000
5791	--	1.00	--	--	--	100	0.002	54	0.001
5792	--	2.00	--	--	--	7,997	0.184	4,103	0.094
5793	--	3.00	--	--	--	9,873	0.227	13,038	0.299
5794	--	4.00	--	--	--	11,932	0.274	23,940	0.550
5795	--	5.00	--	--	--	14,176	0.325	36,994	0.849
5796	--	6.00	--	--	--	16,604	0.381	52,384	1.203
5797	--	7.00	--	--	--	19,216	0.441	70,294	1.614
5798	--	8.00	--	--	--	22,013	0.505	90,909	2.087
5799	--	9.00	--	--	--	25,000	0.574	114,415	2.627

Watershed Information

Selected BMP Type =	**EDB**	
Watershed Area =	14.29	acres
Watershed Length =	800	ft
Watershed Length to Centroid =	375	ft
Watershed Slope =	0.025	ft/ft
Watershed Imperviousness =	80.00%	percent
Percentage Hydrologic Soil Group A =	0.0%	percent
Percentage Hydrologic Soil Group B =	70.0%	percent
Percentage Hydrologic Soil Groups C/D =	30.0%	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) =	0.391	acre-feet	acre-feet
Excess Urban Runoff Volume (EURV) =	1.225	acre-feet	acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	1.081	acre-feet	1.19 inches
5-yr Runoff Volume (P1 = 1.5 in.) =	1.430	acre-feet	1.50 inches
10-yr Runoff Volume (P1 = 1.75 in.) =	1.720	acre-feet	1.75 inches
25-yr Runoff Volume (P1 = 2 in.) =	2.034	acre-feet	2.00 inches
50-yr Runoff Volume (P1 = 2.25 in.) =	2.332	acre-feet	2.25 inches
100-yr Runoff Volume (P1 = 2.52 in.) =	2.670	acre-feet	2.52 inches
500-yr Runoff Volume (P1 = 3.14 in.) =	3.416	acre-feet	inches
Approximate 2-yr Detention Volume =	1.009	acre-feet	
Approximate 5-yr Detention Volume =	1.343	acre-feet	
Approximate 10-yr Detention Volume =	1.630	acre-feet	
Approximate 25-yr Detention Volume =	1.741	acre-feet	
Approximate 50-yr Detention Volume =	1.801	acre-feet	
Approximate 100-yr Detention Volume =	1.899	acre-feet	

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	0.391	acre-feet
Zone 2 Volume (EURV - Zone 1) =	0.834	acre-feet
Zone 3 (100yr + 1 / 2 WQCV - Zones 1 & 2) =	0.870	acre-feet
Total Detention Basin Volume =	2.095	acre-feet
Initial Surcharge Volume (ISV) =	user	ft^3
Initial Surcharge Depth (ISD) =	user	ft
Total Available Detention Depth (H_{total}) =	user	ft
Depth of Trickle Channel (H_{TC}) =	user	ft
Slope of Trickle Channel (S_{TC}) =	user	ft/ft
Slopes of Main Basin Sides (S_{main}) =	user	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	user	

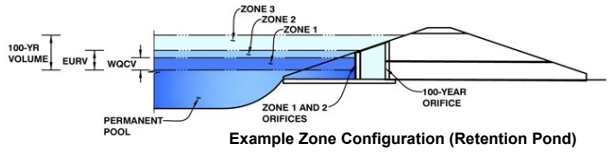
Initial Surcharge Area (A_{ISV}) =	user	ft^2
Surcharge Volume Length (L_{ISV}) =	user	ft
Surcharge Volume Width (W_{ISV}) =	user	ft
Depth of Basin Floor (H_{FLOOR}) =	user	ft
Length of Basin Floor (L_{FLOOR}) =	user	ft
Width of Basin Floor (W_{FLOOR}) =	user	ft
Area of Basin Floor (A_{FLOOR}) =	user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

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)

Project: Bull Hill/Rolling Meadows MDDP

Basin ID: Pond C1 - school (CONCEPT)



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	3.39	0.391	Orifice Plate
Zone 2 (EURV)	6.06	0.834	Rectangular Orifice
Z3 (100+1/2WQCV)	8.02	0.870	Weir&Pipe (Restrict)
Total (all zones)		2.095	

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

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

Calculated Parameters for Underdrain

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

Centroid of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)	WQ Orifice Area per Row =	7.153E-03	ft²
Depth at top of Zone using Orifice Plate =	3.39	ft (relative to basin bottom at Stage = 0 ft)	Elliptical Half-Width =	N/A	feet
Orifice Plate: Orifice Vertical Spacing =	11.20	inches	Elliptical Slot Centroid =	N/A	feet
Orifice Plate: Orifice Area per Row =	1.03	sq. inches (diameter = 1-1/8 inches)	Elliptical Slot Area =	N/A	ft²

Calculated Parameters for Plate

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

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	1.13	2.26					
Orifice Area (sq. inches)	1.03	1.03	1.03					

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

User Input: Vertical Orifice (Circular or Rectangular)

	Zone 2 Rectangular	Not Selected				
Invert of Vertical Orifice =	3.39	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Area =	0.11	N/A
Depth at top of Zone using Vertical Orifice =	6.06	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Centroid =	0.17	N/A
Vertical Orifice Height =	4.00	N/A	inches			
Vertical Orifice Width =	3.83		inches			

Calculated Parameters for Vertical Orifi

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

	Zone 3 Weir	Not Selected				
Overflow Weir Front Edge Height, Ho =	6.06	N/A	ft (relative to basin bottom at Stage = 0 ft)	Height of Grate Upper Edge, H_t =	6.06	N/A
Overflow Weir Front Edge Length =	4.00	N/A	feet	Overflow Weir Slope Length =	4.00	N/A
Overflow Weir Grate Slope =	0.00	N/A	H:V	Grate Open Area / 100-yr Orifice Area =	7.25	N/A
Horiz. Length of Weir Sides =	4.00	N/A	feet	Overflow Grate Open Area w/o Debris =	11.14	N/A
Overflow Grate Type =	Type C Grate	N/A		Overflow Grate Open Area w/ Debris =	5.57	N/A
Debris Clogging % =	50%	N/A	%			

Calculated Parameters for Overflow We

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

	Zone 3 Restrictor	Not Selected				
Depth to Invert of Outlet Pipe =	0.33	N/A	ft (distance below basin bottom at Stage = 0 ft)	Outlet Orifice Area =	1.54	N/A
Outlet Pipe Diameter =	18.00	N/A	inches	Outlet Orifice Centroid =	0.66	N/A
Restrictor Plate Height Above Pipe Invert =	14.60		inches	Half-Central Angle of Restrictor Plate on Pipe =	2.24	N/A

Calculated Parameters for Outlet Pipe w/ Flow Restriction Pla

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	7.50	ft (relative to basin bottom at Stage = 0 ft)	Spillway Design Flow Depth=	0.89	feet
Spillway Crest Length =	16.00	feet	Stage at Top of Freeboard =	8.89	feet
Spillway End Slopes =	4.00	H:V	Basin Area at Top of Freeboard =	0.57	acres
Freeboard above Max Water Surface =	0.50	feet	Basin Volume at Top of Freeboard =	2.56	acre-ft

Calculated Parameters for Spillway

micropool=5775.00

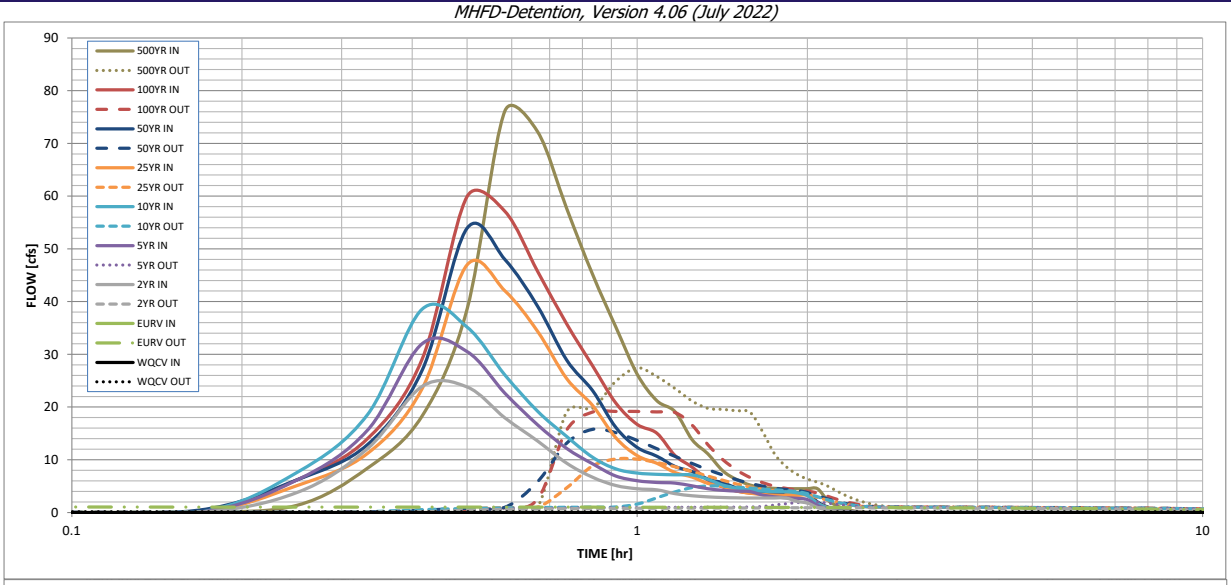
Routed Hydrograph Results

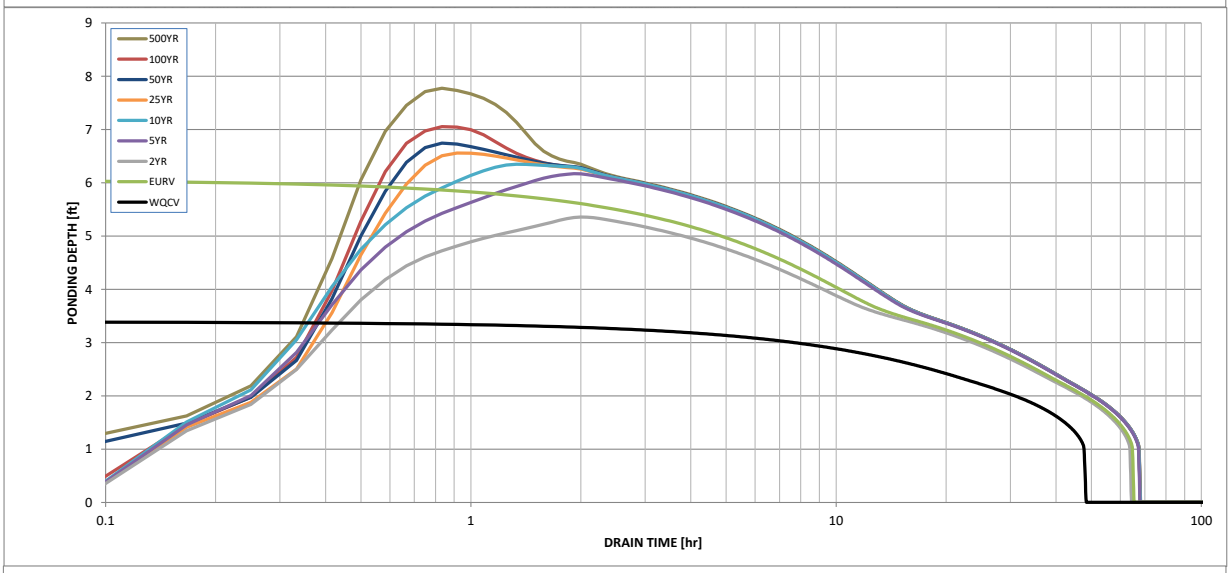
The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF)

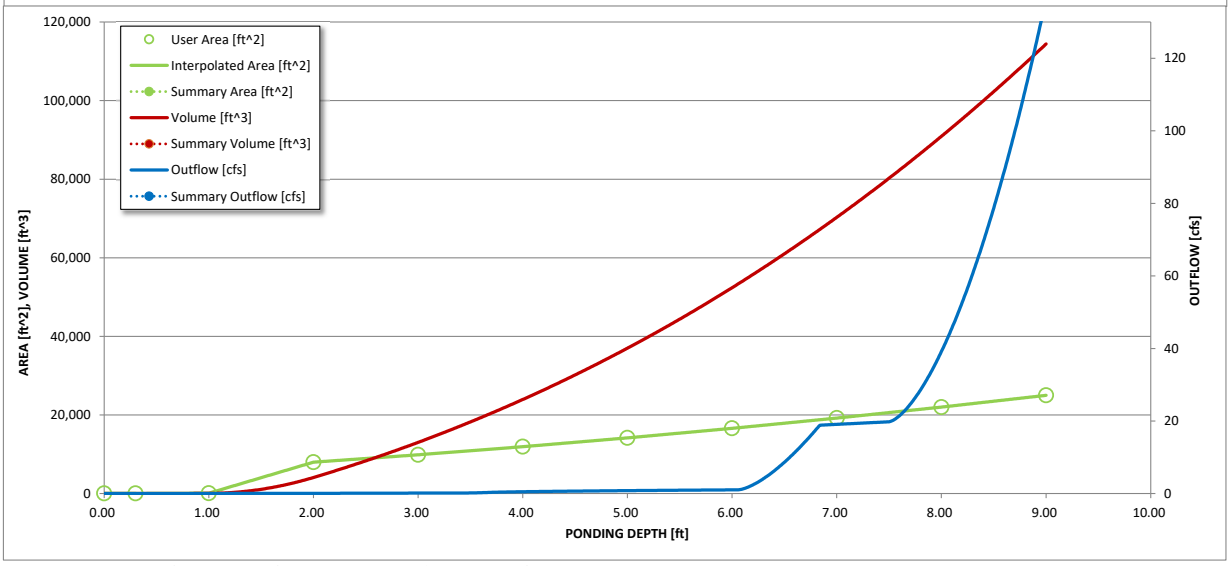
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
One-Hour Rainfall Depth (in) =	N/A	N/A	1.19	1.50	1.75	2.00	2.25	2.52
CUHP Runoff Volume (acre-ft) =	0.391	1.225	1.081	1.430	1.720	2.034	2.332	2.670
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	1.081	1.430	1.720	2.034	2.332	2.670
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	2.8	6.6	9.8	16.3	20.2	25.2
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A						
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.20	0.47	0.68	1.14	1.42	1.76
Peak Inflow Q (cfs) =	N/A	N/A	23.9	32.0	38.6	47.0	53.9	59.9
Peak Outflow Q (cfs) =	0.2	1.0	0.9	2.0	5.0	10.1	15.8	19.2
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.3	0.5	0.6	0.8	0.8
Structure Controlling Flow =	Vertical Orifice 1	Overflow Weir 1	Vertical Orifice 1	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Outlet Plate 1
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	0.1	0.4	0.8	1.3	1.6
Max Velocity through Grate 2 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours) =	45	57	57	59	57	56	54	53
Time to Drain 99% of Inflow Volume (hours) =	**47**	62	61	64	64	63	62	62
Maximum Ponding Depth (ft) =	3.39	6.06	5.36	6.17	6.35	6.56	6.74	7.05
Area at Maximum Ponding Depth (acres) =	0.25	0.38	0.34	0.39	0.40	0.41	0.43	0.44
Maximum Volume Stored (acre-ft) =	0.391	1.226	0.967	1.268	1.336	1.421	1.501	1.636

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)







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

DETENTION BASIN OUTLET STRUCTURE DESIGN

Outflow Hydrograph Workbook Filename: *Pond C1 outflow*

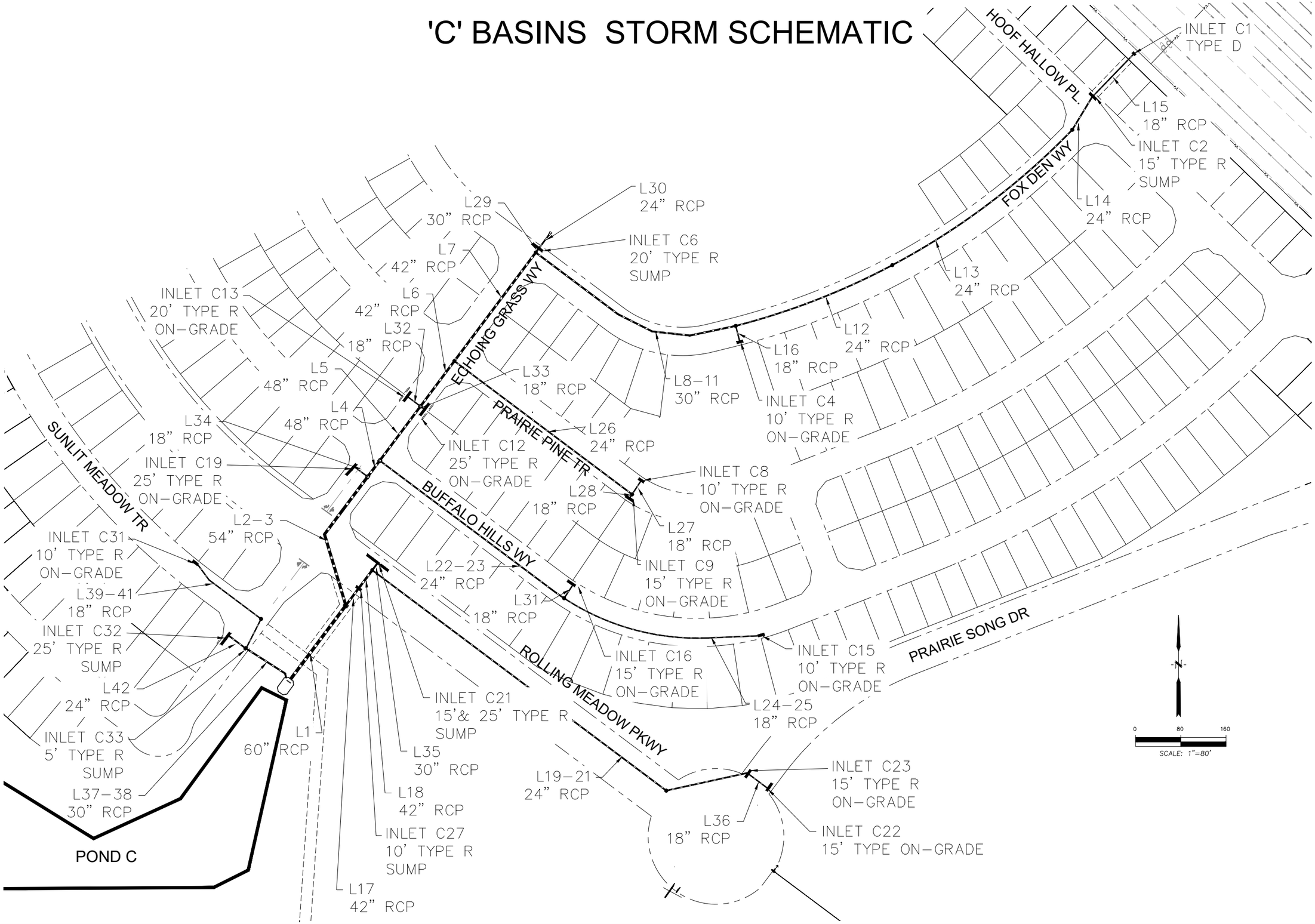
Inflow Hydrographs

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

	SOURCE	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP
Time Interval	TIME	WQCV [cfs]	EURV [cfs]	2 Year [cfs]	5 Year [cfs]	10 Year [cfs]	25 Year [cfs]	50 Year [cfs]	100 Year [cfs]	500 Year [cfs]
5.00 min	0:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.42	0.04	1.36
	0:15:00	0.00	0.00	3.77	6.14	7.58	5.08	6.19	6.17	8.39
	0:20:00	0.00	0.00	12.08	15.57	18.53	11.19	12.86	13.98	18.33
	0:25:00	0.00	0.00	23.94	32.04	38.58	23.52	27.03	29.15	38.57
	0:30:00	0.00	0.00	23.80	30.52	35.16	46.97	53.92	59.90	76.12
	0:35:00	0.00	0.00	17.93	22.63	26.09	42.04	47.98	57.13	72.21
	0:40:00	0.00	0.00	13.56	16.62	19.18	34.34	39.11	45.72	57.69
	0:45:00	0.00	0.00	9.35	12.16	14.44	25.41	28.93	35.80	45.19
	0:50:00	0.00	0.00	6.68	9.23	10.48	20.32	23.14	27.85	35.15
	0:55:00	0.00	0.00	5.10	6.92	8.26	14.14	16.12	20.75	26.23
	1:00:00	0.00	0.00	4.50	6.03	7.48	10.79	12.33	16.70	21.19
	1:05:00	0.00	0.00	4.30	5.70	7.24	9.32	10.68	15.03	19.11
	1:10:00	0.00	0.00	3.55	5.57	7.15	7.58	8.72	10.79	13.82
	1:15:00	0.00	0.00	3.19	5.05	7.12	6.71	7.74	8.61	11.11
	1:20:00	0.00	0.00	2.96	4.51	6.30	5.52	6.34	6.14	7.91
	1:25:00	0.00	0.00	2.84	4.21	5.21	4.92	5.64	4.84	6.22
	1:30:00	0.00	0.00	2.77	4.04	4.60	4.08	4.67	4.05	5.21
	1:35:00	0.00	0.00	2.74	3.95	4.25	3.64	4.17	3.70	4.75
	1:40:00	0.00	0.00	2.74	3.30	4.04	3.41	3.90	3.57	4.57
	1:45:00	0.00	0.00	2.74	2.97	3.95	3.29	3.77	3.52	4.51
	1:50:00	0.00	0.00	2.74	2.78	3.92	3.24	3.71	3.52	4.51
	1:55:00	0.00	0.00	2.11	2.68	3.71	3.22	3.69	3.52	4.51
	2:00:00	0.00	0.00	1.78	2.45	3.21	3.22	3.69	3.52	4.51
	2:05:00	0.00	0.00	0.94	1.32	1.73	1.74	1.99	1.90	2.43
	2:10:00	0.00	0.00	0.50	0.71	0.93	0.95	1.08	1.03	1.32
	2:15:00	0.00	0.00	0.23	0.35	0.45	0.47	0.54	0.52	0.66
	2:20:00	0.00	0.00	0.09	0.16	0.19	0.21	0.24	0.23	0.30
	2:25:00	0.00	0.00	0.02	0.04	0.04	0.05	0.06	0.06	0.07
	2:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

APPENDIX E– STORM SEWER SCHEMATIC AND HYDRAFLOW STORM SEWER CALCS

'C' BASINS STORM SCHEMATIC



CORE ENGINEERING GROUP
15004 1ST AVE. S.
BURNSVILLE, MN 55306
PH: 763.253.1100
CONTACT: RICHARD L. SCHINDLER, P.E.
EMAIL: Rich@ceg1.com

NO. | DESCRIPTION | DATE

PREPARED FOR:
Eagle Development Co.
212 N. WAHSATCH AVE., SUITE 301
COLORADO SPRINGS, COLORADO 80903
(719) 635-3200
CONTACT: JEFF MARK

PROJECT:
Antelope Ridge at Bull Hill No. 1
Bradley Rd - Meridian Rd.
EL PASO COUNTY, COLORADO

DRAWN: RLS
DESIGNED: LAB
CHECKED: LAB

STORM SEWER SCHEMATIC
'C' BASINS
ANTELOPE RIDGE 1

DATE
MAY, 2025

PROJECT NO.
100.302

SHEET NUMBER
1

TOTAL SHEETS: 1

T:\PROJECTS\100.302\Drainage\100.302-storm schematic.dwg, Jan 19, 2026 - 11:20am

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
1	Pipe - 1	78.50	60	Cir	163.532	5781.20	5782.03	0.507	5785.28	5784.54	n/a	5784.54	End	Manhole
2	Pipe - 2	50.40	54	Cir	131.300	5782.53	5783.24	0.541	5784.54	5785.29	0.20	5785.29	1	Manhole
3	Pipe - 3	50.40	54	Cir	127.333	5783.25	5783.93	0.533	5785.29	5785.98	0.20	5785.98	2	Manhole
4	Pipe - 4	47.20	48	Cir	35.667	5784.43	5784.68	0.701	5786.17	5786.74	n/a	5786.74	3	Manhole
5	Pipe - 5	36.50	48	Cir	120.000	5784.78	5785.98	1.000	5786.74	5787.78	n/a	5787.78 j	4	Manhole
6	Pipe - 6	27.00	42	Cir	100.000	5786.48	5787.58	1.100	5787.78	5789.18	0.31	5789.18	5	Manhole
7	Pipe - 7	20.10	42	Cir	240.000	5787.68	5790.36	1.117	5789.18	5791.73	n/a	5791.73 j	6	Manhole
8	Pipe - 8	13.30	30	Cir	182.229	5791.36	5793.18	0.999	5792.34	5794.41	n/a	5794.41	7	None
9	Pipe - 9	13.30	30	Cir	67.200	5793.18	5793.87	1.027	5794.41	5795.10	n/a	5795.10	8	None
10	Pipe - 10	13.30	30	Cir	67.200	5793.86	5794.55	1.027	5795.10	5795.78	n/a	5795.78 j	9	None
11	Pipe - 11	13.30	30	Cir	82.700	5794.55	5795.39	1.016	5795.78	5796.62	n/a	5796.62	10	Manhole
12	Pipe - 12	7.40	24	Cir	297.093	5795.90	5804.54	2.908	5796.62	5805.51	0.12	5805.51	11	Manhole
13	Pipe - 13	7.40	24	Cir	398.310	5805.04	5817.44	3.113	5805.62	5818.41	0.16	5818.41	12	Manhole
14	Pipe - 14	7.40	24	Cir	67.449	5817.93	5818.61	1.008	5818.72	5819.58	0.10	5819.58	13	Generic
15	Pipe - 15	2.90	18	Cir	107.059	5819.31	5821.99	2.503	5819.73	5822.64	n/a	5822.64	14	Generic
16	Pipe - 16	5.90	18	Cir	27.003	5796.40	5797.21	3.000	5796.99	5798.15	n/a	5798.15	11	Generic
17	Pipe - 17	36.80	42	Cir	39.431	5783.53	5783.73	0.508	5785.31	5785.61	n/a	5785.61	1	Generic
18	Pipe - 18	31.30	42	Cir	38.003	5783.83	5784.02	0.500	5785.61	5785.75	0.34	5785.75	17	Manhole
19	Pipe - 19	16.00	24	Cir	400.000	5785.52	5790.80	1.320	5786.66	5792.24	n/a	5792.24	18	Manhole
20	Pipe - 20	16.00	24	Cir	250.000	5790.90	5794.15	1.300	5792.24	5795.59	n/a	5795.59	19	Manhole
21	Pipe - 21	16.00	24	Cir	148.576	5794.25	5796.24	1.340	5795.59	5797.68	n/a	5797.68	20	Generic
22	Pipe - 22	10.70	24	Cir	380.176	5786.68	5790.48	0.999	5787.65	5791.65	0.07	5791.65	4	None
23	Pipe - 23	10.70	24	Cir	26.817	5790.48	5790.75	1.007	5791.65	5791.92	0.24	5791.92	22	Manhole
24	Pipe - 24	5.30	18	Cir	263.427	5791.25	5794.68	1.303	5791.95	5795.57	n/a	5795.57	23	None

Antelope Ridge C-Basins 5-yr | Number of lines: 42 | Run Date: 11/11/2025

NOTES: Return period = 5 Yrs. ; j - Line contains hyd. jump.

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
25	Pipe - 25	5.30	18	Cir	89.440	5794.68	5795.84	1.297	5795.57	5796.73	n/a	5796.73	24	Generic
26	Pipe - 26	10.30	24	Cir	392.895	5789.08	5793.59	1.148	5789.99	5794.74	n/a	5794.74	6	Manhole
27	Pipe - 27	3.50	18	Cir	27.388	5794.10	5794.37	0.986	5794.74	5795.08	n/a	5795.08	26	Generic
28	Pipe -28	6.80	18	Cir	6.615	5794.10	5794.23	1.963	5794.82	5795.24	n/a	5795.24	26	Generic
29	Pipe - 29	9.40	30	Cir	7.000	5791.36	5791.44	1.144	5792.15	5792.46	n/a	5792.46	7	Generic
30	Pipe - 30	4.50	24	Cir	38.000	5791.94	5792.32	1.000	5792.55	5793.07	0.28	5793.07	29	Generic
31	Pipe - 31	5.40	18	Cir	27.000	5791.55	5791.77	0.816	5792.36	5792.67	n/a	5792.67	23	Generic
32	Pipe - 32	9.90	18	Cir	27.000	5789.00	5789.54	2.000	5789.90	5790.75	0.65	5790.75	5	Generic
33	Pipe - 33	5.80	18	Cir	7.000	5789.00	5789.21	2.999	5789.58	5790.14	n/a	5790.14	5	Generic
34	Pipe - 34	6.90	18	Cir	27.003	5786.90	5787.58	2.519	5787.57	5788.60	0.46	5788.60	3	Generic
35	Pipe - 35	15.30	30	Cir	14.000	5785.02	5785.13	0.785	5786.15	5786.45	0.53	5786.45	18	Generic
36	Pipe 36	7.20	18	Cir	41.200	5796.74	5797.15	0.994	5797.68	5798.19	0.47	5798.19	21	Generic
37	Pipe - 37	13.70	30	Cir	7.962	5781.50	5781.60	1.257	5783.82	5782.85	0.37	5782.85	End	Manhole
38	Pipe - 38	13.70	30	Cir	85.127	5781.60	5782.62	1.198	5782.85	5783.87	0.73	5783.87	37	Generic
39	Pipe - 39	4.10	18	Cir	58.426	5783.62	5784.03	0.701	5784.34	5784.81	0.31	5784.81	38	Manhole
40	Pipe - 40	4.10	18	Cir	115.019	5784.33	5785.14	0.704	5785.05	5785.92	0.10	5785.92	39	None
41	Pipe - 41	4.10	18	Cir	33.376	5785.14	5785.37	0.689	5785.92	5786.15	0.31	5786.15	40	Generic
42	Pipe - 42	8.70	24	Cir	34.007	5783.92	5784.26	0.999	5784.78	5785.31	0.42	5785.31	38	Generic

Antelope Ridge C-Basins 5-yr | Number of lines: 42 | Run Date: 11/11/2025

NOTES: Return period = 5 Yrs. ; j - Line contains hyd. jump.

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	163.532	0.00	0.00	0.00	0.00	0.00	0.0	13.7	0.0	78.50	185.5	6.28	60	0.51	5781.20	5782.03	5785.28	5784.54	5786.40	5790.43	Pipe - 1
2	1	131.300	0.00	0.00	0.00	0.00	0.00	0.0	13.0	0.0	50.40	144.7	7.24	54	0.54	5782.53	5783.24	5784.54	5785.29	5790.43	5790.76	Pipe - 2
3	2	127.333	0.00	0.00	0.00	0.00	0.00	0.0	12.3	0.0	50.40	143.6	7.16	54	0.53	5783.25	5783.93	5785.29	5785.98	5790.76	5791.58	Pipe - 3
4	3	35.667	0.00	0.00	0.00	0.00	0.00	0.0	12.1	0.0	47.20	120.3	8.12	48	0.70	5784.43	5784.68	5786.17	5786.74	5791.58	5792.01	Pipe - 4
5	4	120.000	0.00	0.00	0.00	0.00	0.00	0.0	11.4	0.0	36.50	143.7	6.32	48	1.00	5784.78	5785.98	5786.74	5787.78	5792.01	5793.45	Pipe - 5
6	5	100.000	0.00	0.00	0.00	0.00	0.00	0.0	10.9	0.0	27.00	105.5	7.31	42	1.10	5786.48	5787.58	5787.78	5789.18	5793.45	5794.65	Pipe - 6
7	6	240.000	0.00	0.00	0.00	0.00	0.00	0.0	8.9	0.0	20.10	106.3	5.42	42	1.12	5787.68	5790.36	5789.18	5791.73	5794.65	5797.26	Pipe - 7
8	7	182.229	0.00	0.00	0.00	0.00	0.00	0.0	7.8	0.0	13.30	40.99	6.51	30	1.00	5791.36	5793.18	5792.34	5794.41	5797.26	5799.00	Pipe - 8
9	8	67.200	0.00	0.00	0.00	0.00	0.00	0.0	7.4	0.0	13.30	41.56	5.56	30	1.03	5793.18	5793.87	5794.41	5795.10	5799.00	5800.00	Pipe - 9
10	9	67.200	0.00	0.00	0.00	0.00	0.00	0.0	7.0	0.0	13.30	41.56	5.53	30	1.03	5793.86	5794.55	5795.10	5795.78	5800.00	5801.00	Pipe - 10
11	10	82.700	0.00	0.00	0.00	0.00	0.00	0.0	6.5	0.0	13.30	41.34	5.56	30	1.02	5794.55	5795.39	5795.78	5796.62	5801.00	5801.31	Pipe - 11
12	11	297.093	0.00	0.00	0.00	0.00	0.00	0.0	4.4	0.0	7.40	38.57	6.13	24	2.91	5795.90	5804.54	5796.62	5805.51	5801.31	5809.99	Pipe - 12
13	12	398.310	0.00	0.00	0.00	0.00	0.00	0.0	1.6	0.0	7.40	39.91	7.31	24	3.11	5805.04	5817.44	5805.62	5818.41	5809.99	5822.65	Pipe - 13
14	13	67.449	0.00	0.00	0.00	0.00	0.00	0.0	1.1	0.0	7.40	22.70	5.69	24	1.01	5817.93	5818.61	5818.72	5819.58	5822.65	5823.65	Pipe - 14
15	14	107.059	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	2.90	16.62	5.52	18	2.50	5819.31	5821.99	5819.73	5822.64	5823.65	5826.36	Pipe - 15
16	11	27.003	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	5.90	18.19	7.13	18	3.00	5796.40	5797.21	5796.99	5798.15	5801.31	5801.63	Pipe - 16
17	1	39.431	0.00	0.00	0.00	0.00	0.00	0.0	3.0	0.0	36.80	71.69	7.24	42	0.51	5783.53	5783.73	5785.31	5785.61	5790.43	5790.52	Pipe - 17
18	17	38.003	0.00	0.00	0.00	0.00	0.00	0.0	2.8	0.0	31.30	71.13	6.49	42	0.50	5783.83	5784.02	5785.61	5785.75	5790.52	5790.41	Pipe - 18
19	18	400.000	0.00	0.00	0.00	0.00	0.00	0.0	1.5	0.0	16.00	25.99	7.65	24	1.32	5785.52	5790.80	5786.66	5792.24	5790.41	5795.50	Pipe - 19
20	19	250.000	0.00	0.00	0.00	0.00	0.00	0.0	0.7	0.0	16.00	25.79	6.87	24	1.30	5790.90	5794.15	5792.24	5795.59	5795.50	5801.33	Pipe - 20
21	20	148.576	0.00	0.00	0.00	0.00	0.00	0.0	0.2	0.0	16.00	26.18	6.87	24	1.34	5794.25	5796.24	5795.59	5797.68	5801.33	5802.59	Pipe - 21
22	4	380.176	0.00	0.00	0.00	0.00	0.00	0.0	2.1	0.0	10.70	22.61	6.35	24	1.00	5786.68	5790.48	5787.65	5791.65	5792.01	5794.00	Pipe - 22

Antelope Ridge C-Basins 5-yr | Number of lines: 42 | Run Date: 11/11/2025

NOTES:Intensity = 79.26 / (Inlet time + 14.60) ^ 0.84; Return period =Yrs. 5 ; c = cir e = ellip b = box

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
23	22	26.817	0.00	0.00	0.00	0.00	0.00	0.0	2.0	0.0	10.70	22.70	5.60	24	1.01	5790.48	5790.75	5791.65	5791.92	5794.00	5795.44	Pipe - 23
24	23	263.427	0.00	0.00	0.00	0.00	0.00	0.0	0.5	0.0	5.30	11.99	5.73	18	1.30	5791.25	5794.68	5791.95	5795.57	5795.44	5798.00	Pipe - 24
25	24	89.440	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	5.30	11.96	4.88	18	1.30	5794.68	5795.84	5795.57	5796.73	5798.00	5800.79	Pipe - 25
26	6	392.895	0.00	0.00	0.00	0.00	0.00	0.0	0.2	0.0	10.30	24.23	6.46	24	1.15	5789.08	5793.59	5789.99	5794.74	5794.65	5798.28	Pipe - 26
27	26	27.388	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	3.50	10.43	4.56	18	0.99	5794.10	5794.37	5794.74	5795.08	5798.28	5798.57	Pipe - 27
28	26	6.615	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	6.80	14.71	6.77	18	1.96	5794.10	5794.23	5794.82	5795.24	5798.28	5798.58	Pipe -28
29	7	7.000	0.00	0.00	0.00	0.00	0.00	0.0	0.4	0.0	9.40	43.86	6.05	30	1.14	5791.36	5791.44	5792.15	5792.46	5797.26	5797.50	Pipe - 29
30	29	38.000	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	4.50	22.61	4.91	24	1.00	5791.94	5792.32	5792.55	5793.07	5797.50	5794.70	Pipe - 30
31	23	27.000	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	5.40	9.48	5.23	18	0.82	5791.55	5791.77	5792.36	5792.67	5795.44	5795.74	Pipe - 31
32	5	27.000	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	9.90	14.85	7.73	18	2.00	5789.00	5789.54	5789.90	5790.75	5793.45	5793.68	Pipe - 32
33	5	7.000	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	5.80	18.19	7.09	18	3.00	5789.00	5789.21	5789.58	5790.14	5793.45	5793.68	Pipe - 33
34	3	27.003	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	6.90	16.67	7.20	18	2.52	5786.90	5787.58	5787.57	5788.60	5791.58	5791.83	Pipe - 34
35	18	14.000	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	15.30	36.33	6.45	30	0.78	5785.02	5785.13	5786.15	5786.45	5790.41	5790.40	Pipe - 35
36	21	41.200	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	7.20	10.47	5.84	18	0.99	5796.74	5797.15	5797.68	5798.19	5802.59	5802.59	Pipe 36
37	End	7.962	0.00	0.00	0.00	0.00	0.00	0.0	2.0	0.0	13.70	45.98	4.25	30	1.26	5781.50	5781.60	5783.82	5782.85	5784.45	5787.56	Pipe - 37
38	37	85.127	0.00	0.00	0.00	0.00	0.00	0.0	1.5	0.0	13.70	44.89	5.61	30	1.20	5781.60	5782.62	5782.85	5783.87	5787.56	5788.50	Pipe - 38
39	38	58.426	0.00	0.00	0.00	0.00	0.00	0.0	1.1	0.0	4.10	8.79	4.67	18	0.70	5783.62	5784.03	5784.34	5784.81	5788.50	5788.73	Pipe - 39
40	39	115.019	0.00	0.00	0.00	0.00	0.00	0.0	0.2	0.0	4.10	8.81	4.67	18	0.70	5784.33	5785.14	5785.05	5785.92	5788.73	5788.00	Pipe - 40
41	40	33.376	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	4.10	8.72	4.45	18	0.69	5785.14	5785.37	5785.92	5786.15	5788.00	5789.81	Pipe - 41
42	38	34.007	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	8.70	22.61	5.96	24	1.00	5783.92	5784.26	5784.78	5785.31	5788.50	5788.50	Pipe - 42

Antelope Ridge C-Basins 5-yr | Number of lines: 42 | Run Date: 11/11/2025

NOTES:Intensity = 79.26 / (Inlet time + 14.60) ^ 0.84; Return period =Yrs. 5 ; c = cir e = ellip b = box

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
1	Pipe - 1	207.1	60	Cir	163.532	5781.20	5782.03	0.507	5785.36	5786.64	0.93	5787.57	End	Manhole
2	Pipe - 2	142.1	54	Cir	131.300	5782.53	5783.24	0.541	5787.57*	5788.26*	0.31	5788.57	1	Manhole
3	Pipe - 3	142.1	54	Cir	127.333	5783.24	5783.93	0.543	5788.57*	5789.23*	0.31	5789.54	2	Manhole
4	Pipe - 4	126.8	48	Cir	35.667	5784.43	5784.68	0.701	5789.54*	5789.82*	0.55	5790.37	3	Manhole
5	Pipe - 5	107.0	48	Cir	120.000	5784.78	5785.98	1.000	5790.37*	5791.04*	0.56	5791.60	4	Manhole
6	Pipe - 6	86.90	42	Cir	100.000	5786.48	5787.58	1.100	5791.60*	5792.35*	0.63	5792.98	5	Manhole
7	Pipe - 7	72.20	42	Cir	240.000	5787.68	5790.36	1.117	5792.98*	5794.22*	0.44	5794.66	6	Manhole
8	Pipe - 8	38.50	30	Cir	182.229	5791.36	5793.18	0.999	5794.66*	5796.27*	0.14	5796.41	7	None
9	Pipe - 9	38.50	30	Cir	67.200	5793.18	5793.87	1.027	5796.41*	5797.00*	0.14	5797.14	8	None
10	Pipe - 10	38.50	30	Cir	67.200	5793.86	5794.55	1.027	5797.14*	5797.74*	0.14	5797.88	9	None
11	Pipe - 11	38.50	30	Cir	82.700	5794.55	5795.39	1.016	5797.88*	5798.61*	0.48	5799.09	10	Manhole
12	Pipe - 12	29.80	24	Cir	297.093	5795.90	5804.54	2.908	5799.09	5806.40	n/a	5806.40 j	11	Manhole
13	Pipe - 13	29.80	24	Cir	398.310	5805.04	5817.44	3.113	5806.40	5819.30	n/a	5819.30	12	Manhole
14	Pipe - 14	29.80	24	Cir	67.449	5817.93	5818.61	1.008	5819.93*	5821.10*	0.38	5821.48	13	Manhole
15	Pipe - 15	15.70	18	Cir	107.059	5819.31	5821.99	2.503	5821.48*	5823.87*	1.23	5825.10	14	Generic
16	Pipe - 16	8.70	18	Cir	27.003	5796.40	5797.21	3.000	5799.09*	5799.27*	0.38	5799.65	11	Generic
17	Pipe - 17	90.80	42	Cir	39.431	5783.53	5783.73	0.506	5787.57*	5787.89*	0.69	5788.58	1	Generic
18	Pipe - 18	81.00	42	Cir	38.003	5783.83	5784.02	0.497	5788.58*	5788.83*	0.55	5789.38	17	Manhole
19	Pipe - 19	27.90	24	Cir	400.000	5785.52	5790.80	1.320	5789.38*	5795.47*	0.18	5795.65	18	Manhole
20	Pipe - 20	27.90	24	Cir	250.000	5790.90	5794.15	1.300	5795.65*	5799.46*	0.18	5799.64	19	Manhole
21	Pipe - 21	27.90	24	Cir	148.576	5794.25	5796.24	1.340	5799.64*	5801.91*	0.31	5802.21	20	Generic
22	Pipe - 22	19.80	24	Cir	380.176	5786.68	5790.48	0.999	5790.37*	5793.29*	0.09	5793.38	4	None
23	Pipe - 23	19.80	24	Cir	26.817	5790.48	5790.75	1.007	5793.38*	5793.59*	0.31	5793.89	22	Manhole
24	Pipe - 24	9.40	18	Cir	263.427	5791.25	5794.68	1.303	5793.89	5795.89	0.21	5796.10	23	None

Antelope Ridge C-Basins 100-yr | Number of lines: 42 | Run Date: 11/11/2025

NOTES: Return period = 100 Yrs. ; *Surcharged (HGL above crown). ; j - Line contains hyd. jump.

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
25	Pipe - 25	9.40	18	Cir	89.440	5794.68	5795.84	1.298	5796.10	5797.02	n/a	5797.02 j	24	Generic
26	Pipe - 26	18.00	24	Cir	392.895	5789.08	5793.59	1.148	5792.98	5795.29	0.47	5795.76	6	Manhole
27	Pipe - 27	6.20	18	Cir	27.388	5794.10	5794.37	0.986	5795.76	5795.85	0.19	5796.04	26	Generic
28	Pipe -28	11.80	18	Cir	6.615	5794.10	5794.23	1.963	5795.76*	5795.84*	0.69	5796.53	26	Generic
29	Pipe - 29	36.30	30	Cir	7.000	5791.36	5791.44	1.144	5794.66*	5794.71*	0.43	5795.14	7	Generic
30	Pipe - 30	27.50	24	Cir	38.000	5791.94	5792.32	1.000	5795.14*	5795.70*	1.19	5796.89	29	Generic
31	Pipe - 31	10.40	18	Cir	27.000	5791.55	5791.77	0.816	5793.89*	5794.16*	0.54	5794.70	23	Generic
32	Pipe - 32	17.50	18	Cir	27.000	5789.00	5789.54	2.000	5791.60*	5792.35*	1.52	5793.88	5	Generic
33	Pipe - 33	19.30	18	Cir	7.000	5789.00	5789.21	2.999	5791.60*	5791.84*	1.85	5793.69	5	Generic
34	Pipe - 34	18.10	18	Cir	27.003	5786.90	5787.58	2.519	5789.54*	5790.34*	1.63	5791.98	3	Generic
35	Pipe - 35	53.10	30	Cir	14.000	5785.02	5785.13	0.785	5789.38*	5789.62*	1.82	5791.44	18	Generic
36	Pipe 36	12.20	18	Cir	41.200	5796.74	5797.15	0.994	5802.21*	5802.77*	0.74	5803.51	21	Generic
37	Pipe - 37	30.10	30	Cir	7.962	5781.50	5781.60	1.257	5783.82	5783.47	0.68	5783.47	End	Manhole
38	Pipe - 38	30.10	30	Cir	85.127	5781.60	5782.62	1.198	5783.47	5784.49	1.36	5784.49	37	Generic
39	Pipe - 39	6.30	18	Cir	58.426	5783.62	5784.03	0.701	5784.56	5785.00	0.42	5785.00	38	Manhole
40	Pipe - 40	6.30	18	Cir	115.019	5784.33	5785.14	0.704	5785.27	5786.11	0.14	5786.11	39	None
41	Pipe - 41	6.30	18	Cir	33.376	5785.14	5785.37	0.689	5786.11	5786.34	0.42	5786.34	40	Generic
42	Pipe - 42	21.90	24	Cir	34.007	5783.92	5784.26	0.999	5785.51	5785.93	0.95	5785.93	38	Generic

Antelope Ridge C-Basins 100-yr | Number of lines: 42 | Run Date: 11/11/2025

NOTES: Return period = 100 Yrs. ; *Surcharged (HGL above crown). ; j - Line contains hyd. jump.

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	163.532	0.00	0.00	0.00	0.00	0.00	0.0	3.9	0.0	207.1	185.5	11.40	60	0.51	5781.20	5782.03	5785.36	5786.64	5786.40	5790.43	Pipe - 1
2	1	131.300	0.00	0.00	0.00	0.00	0.00	0.0	3.6	0.0	142.1	144.7	8.94	54	0.54	5782.53	5783.24	5787.57	5788.26	5790.43	5790.76	Pipe - 2
3	2	127.333	0.00	0.00	0.00	0.00	0.00	0.0	3.4	0.0	142.1	144.9	8.94	54	0.54	5783.24	5783.93	5788.57	5789.23	5790.76	5791.58	Pipe - 3
4	3	35.667	0.00	0.00	0.00	0.00	0.00	0.0	3.3	0.0	126.8	120.3	10.09	48	0.70	5784.43	5784.68	5789.54	5789.82	5791.58	5792.01	Pipe - 4
5	4	120.000	0.00	0.00	0.00	0.00	0.00	0.0	3.1	0.0	107.0	143.7	8.52	48	1.00	5784.78	5785.98	5790.37	5791.04	5792.01	5793.45	Pipe - 5
6	5	100.000	0.00	0.00	0.00	0.00	0.00	0.0	2.9	0.0	86.90	105.5	9.03	42	1.10	5786.48	5787.58	5791.60	5792.35	5793.45	5794.65	Pipe - 6
7	6	240.000	0.00	0.00	0.00	0.00	0.00	0.0	2.4	0.0	72.20	106.3	7.51	42	1.12	5787.68	5790.36	5792.98	5794.22	5794.65	5797.26	Pipe - 7
8	7	182.229	0.00	0.00	0.00	0.00	0.00	0.0	2.0	0.0	38.50	40.99	7.84	30	1.00	5791.36	5793.18	5794.66	5796.27	5797.26	5799.00	Pipe - 8
9	8	67.200	0.00	0.00	0.00	0.00	0.00	0.0	1.9	0.0	38.50	41.56	7.84	30	1.03	5793.18	5793.87	5796.41	5797.00	5799.00	5800.00	Pipe - 9
10	9	67.200	0.00	0.00	0.00	0.00	0.00	0.0	1.7	0.0	38.50	41.56	7.84	30	1.03	5793.86	5794.55	5797.14	5797.74	5800.00	5801.00	Pipe - 10
11	10	82.700	0.00	0.00	0.00	0.00	0.00	0.0	1.5	0.0	38.50	41.34	7.84	30	1.02	5794.55	5795.39	5797.88	5798.61	5801.00	5801.31	Pipe - 11
12	11	297.093	0.00	0.00	0.00	0.00	0.00	0.0	1.0	0.0	29.80	38.57	9.64	24	2.91	5795.90	5804.54	5799.09	5806.40	5801.31	5809.99	Pipe - 12
13	12	398.310	0.00	0.00	0.00	0.00	0.00	0.0	0.3	0.0	29.80	39.91	11.45	24	3.11	5805.04	5817.44	5806.40	5819.30	5809.99	5822.65	Pipe - 13
14	13	67.449	0.00	0.00	0.00	0.00	0.00	0.0	0.2	0.0	29.80	22.70	9.49	24	1.01	5817.93	5818.61	5819.93	5821.10	5822.65	5823.65	Pipe - 14
15	14	107.059	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	15.70	16.62	8.89	18	2.50	5819.31	5821.99	5821.48	5823.87	5823.65	5826.36	Pipe - 15
16	11	27.003	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	8.70	18.19	4.92	18	3.00	5796.40	5797.21	5799.09	5799.27	5801.31	5801.63	Pipe - 16
17	1	39.431	0.00	0.00	0.00	0.00	0.00	0.0	1.7	0.0	90.80	71.60	9.44	42	0.51	5783.53	5783.73	5787.57	5787.89	5790.43	5790.52	Pipe - 17
18	17	38.003	0.00	0.00	0.00	0.00	0.00	0.0	1.6	0.0	81.00	70.94	8.42	42	0.50	5783.83	5784.02	5788.58	5788.83	5790.52	5790.41	Pipe - 18
19	18	400.000	0.00	0.00	0.00	0.00	0.00	0.0	0.8	0.0	27.90	25.99	8.88	24	1.32	5785.52	5790.80	5789.38	5795.47	5790.41	5795.50	Pipe - 19
20	19	250.000	0.00	0.00	0.00	0.00	0.00	0.0	0.4	0.0	27.90	25.79	8.88	24	1.30	5790.90	5794.15	5795.65	5799.46	5795.50	5801.33	Pipe - 20
21	20	148.576	0.00	0.00	0.00	0.00	0.00	0.0	0.1	0.0	27.90	26.18	8.88	24	1.34	5794.25	5796.24	5799.64	5801.91	5801.33	5802.59	Pipe - 21
22	4	380.176	0.00	0.00	0.00	0.00	0.00	0.0	1.2	0.0	19.80	22.61	6.30	24	1.00	5786.68	5790.48	5790.37	5793.29	5792.01	5794.00	Pipe - 22

Antelope Ridge C-Basins 100-yr | Number of lines: 42 | Run Date: 11/11/2025

NOTES:Intensity = 127.16 / (Inlet time + 17.80) ^ 0.82; Return period =Yrs. 100 ; c = cir e = ellip b = box

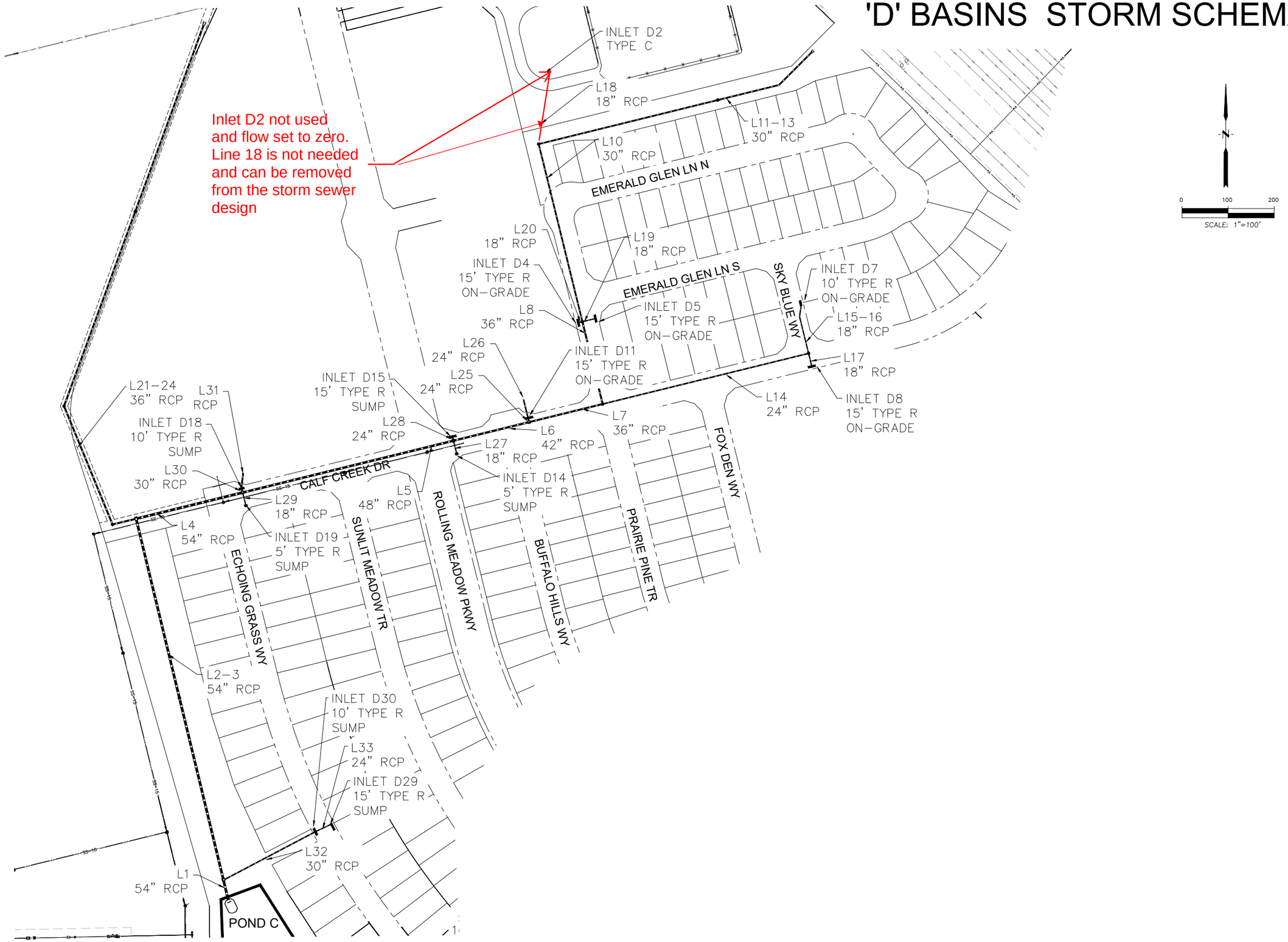
Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
23	22	26.817	0.00	0.00	0.00	0.00	0.00	0.0	1.1	0.0	19.80	22.70	6.30	24	1.01	5790.48	5790.75	5793.38	5793.59	5794.00	5795.44	Pipe - 23
24	23	263.427	0.00	0.00	0.00	0.00	0.00	0.0	0.3	0.0	9.40	11.99	5.74	18	1.30	5791.25	5794.68	5793.89	5795.89	5795.44	5798.00	Pipe - 24
25	24	89.440	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	9.40	11.96	5.86	18	1.30	5794.68	5795.84	5796.10	5797.02	5798.00	5800.79	Pipe - 25
26	6	392.895	0.00	0.00	0.00	0.00	0.00	0.0	0.1	0.0	18.00	24.23	6.03	24	1.15	5789.08	5793.59	5792.98	5795.29	5794.65	5798.28	Pipe - 26
27	26	27.388	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	6.20	10.43	3.52	18	0.99	5794.10	5794.37	5795.76	5795.85	5798.28	5798.57	Pipe - 27
28	26	6.615	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	11.80	14.71	6.68	18	1.96	5794.10	5794.23	5795.76	5795.84	5798.28	5798.58	Pipe -28
29	7	7.000	0.00	0.00	0.00	0.00	0.00	0.0	0.1	0.0	36.30	43.86	7.40	30	1.14	5791.36	5791.44	5794.66	5794.71	5797.26	5797.50	Pipe - 29
30	29	38.000	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	27.50	22.61	8.75	24	1.00	5791.94	5792.32	5795.14	5795.70	5797.50	5794.70	Pipe - 30
31	23	27.000	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	10.40	9.48	5.89	18	0.82	5791.55	5791.77	5793.89	5794.16	5795.44	5795.74	Pipe - 31
32	5	27.000	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	17.50	14.85	9.90	18	2.00	5789.00	5789.54	5791.60	5792.35	5793.45	5793.68	Pipe - 32
33	5	7.000	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	19.30	18.19	10.92	18	3.00	5789.00	5789.21	5791.60	5791.84	5793.45	5793.68	Pipe - 33
34	3	27.003	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	18.10	16.67	10.24	18	2.52	5786.90	5787.58	5789.54	5790.34	5791.58	5791.83	Pipe - 34
35	18	14.000	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	53.10	36.33	10.82	30	0.78	5785.02	5785.13	5789.38	5789.62	5790.41	5790.40	Pipe - 35
36	21	41.200	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	12.20	10.47	6.90	18	0.99	5796.74	5797.15	5802.21	5802.77	5802.59	5802.59	Pipe 36
37	End	7.962	0.00	0.00	0.00	0.00	0.00	0.0	1.2	0.0	30.10	45.98	6.99	30	1.26	5781.50	5781.60	5783.82	5783.47	5784.45	5787.56	Pipe - 37
38	37	85.127	0.00	0.00	0.00	0.00	0.00	0.0	1.0	0.0	30.10	44.89	7.65	30	1.20	5781.60	5782.62	5783.47	5784.49	5787.56	5788.50	Pipe - 38
39	38	58.426	0.00	0.00	0.00	0.00	0.00	0.0	0.7	0.0	6.30	8.79	5.31	18	0.70	5783.62	5784.03	5784.56	5785.00	5788.50	5788.73	Pipe - 39
40	39	115.019	0.00	0.00	0.00	0.00	0.00	0.0	0.2	0.0	6.30	8.81	5.32	18	0.70	5784.33	5785.14	5785.27	5786.11	5788.73	5788.00	Pipe - 40
41	40	33.376	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	6.30	8.72	5.21	18	0.69	5785.14	5785.37	5786.11	5786.34	5788.00	5789.81	Pipe - 41
42	38	34.007	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	21.90	22.61	8.01	24	1.00	5783.92	5784.26	5785.51	5785.93	5788.50	5788.50	Pipe - 42

Antelope Ridge C-Basins 100-yr | Number of lines: 42 | Run Date: 11/11/2025

NOTES:Intensity = 127.16 / (Inlet time + 17.80) ^ 0.82; Return period =Yrs. 100 ; c = cir e = ellip b = box

'D' BASINS STORM SCHEMATIC



CORE ENGINEERING GROUP
15004 1ST AVE. S.
BURNSVILLE, MN 55306
PH: 763.210.1100
CONTACT: RICHARD L. SCHINDLER, P.E.
EMAIL: Rich@ceg1.com

DATE

DESCRIPTION

NO.

PREPARED FOR:
Eagle Development Co.
212 N. WAHSATCH AVE., SUITE 301
COLORADO SPRINGS, COLORADO 80903
(719) 635-3200
CONTACT: JEFF MARK

PROJECT:
Antelope Ridge at Bull Hill No. 1
Bradley Rd – Meridian Rd.
EL PASO COUNTY, COLORADO

DRAWN: RLS
DESIGNED: LAB
CHECKED: LAB

STORM SEWER SCHEMATIC
'D' BASINS
ANTELOPE RIDGE 1

DATE
MAY, 2025

PROJECT NO.
100.302

SHEET NUMBER
1

TOTAL SHEETS: 1

T:\PROJECTS\100.302\Drainage\100.302-storm_schematic.dwg, Jan 19, 2026 - 11:23am

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
1	P 1	87.40	54	Cir	44.717	5778.96	5779.32	0.805	5782.92	5782.06	n/a	5782.06	End	Manhole
2	P 2	79.10	54	Cir	405.928	5779.42	5782.67	0.801	5782.06	5785.27	n/a	5785.27	1	Manhole
3	P 3	79.10	54	Cir	400.000	5782.85	5786.05	0.800	5785.27	5788.65	n/a	5788.65	2	Generic
4	P 4	59.80	54	Cir	238.098	5786.15	5787.82	0.701	5788.65	5790.06	n/a	5790.06 j	3	Manhole
5	P 5	35.30	48	Cir	471.000	5788.32	5791.61	0.699	5790.06	5793.38	0.17	5793.38	4	Manhole
6	P 6	34.50	42	Cir	168.914	5792.11	5793.80	1.000	5793.52	5795.62	n/a	5795.62	5	Manhole
7	P 7	25.70	36	Cir	164.420	5794.30	5795.51	0.736	5795.71	5797.15	0.33	5797.15	6	Manhole
8	P 8	21.00	36	Cir	183.927	5795.61	5796.90	0.701	5797.15	5798.37	n/a	5798.37 j	7	Manhole
9	P 9	10.70	30	Cir	194.042	5797.40	5798.57	0.605	5798.40	5799.67	n/a	5799.67	8	None
10	P 10	10.70	30	Cir	202.958	5798.57	5799.79	0.601	5799.67	5800.88	n/a	5800.88 j	9	Manhole
11	P 11	10.70	30	Cir	400.000	5799.90	5802.30	0.600	5800.90	5803.40	n/a	5803.40	10	Manhole
12	P 12	10.70	30	Cir	136.808	5802.40	5803.15	0.552	5803.42	5804.25	n/a	5804.25	11	None
13	P 13	10.70	30	Cir	105.642	5803.15	5803.73	0.549	5804.25	5804.82	n/a	5804.82 j	12	Generic
14	P 14	8.50	24	Cir	459.999	5796.61	5801.67	1.100	5797.44	5802.71	n/a	5802.71	7	Manhole
15	P 15	3.40	18	Cir	82.203	5802.17	5802.75	0.706	5802.82	5803.46	0.12	5803.46	14	None
16	P 16	3.40	18	Cir	23.954	5802.75	5802.92	0.709	5803.46	5803.62	n/a	5803.62 j	15	Generic
17	P 17	5.50	18	Cir	27.003	5802.17	5802.39	0.816	5802.99	5803.29	n/a	5803.29	14	Generic
18	P 18	0.00	18	Cir	160.000	5805.23	5806.51	0.800	5805.24	5806.52	n/a	5806.53 j	10	Generic
19	P 19	6.90	18	Cir	27.000	5799.00	5799.27	1.000	5799.89	5800.29	0.46	5800.29	8	Generic
20	P 20	5.30	18	Cir	7.000	5799.00	5799.14	2.002	5799.62	5800.03	n/a	5800.03	8	Generic
21	P 21	25.80	36	Cir	52.596	5787.55	5788.39	1.598	5788.69	5790.03	0.33	5790.03	3	Manhole
22	P 22	25.80	36	Cir	277.554	5788.49	5791.82	1.200	5790.03	5793.46	0.17	5793.46	21	Manhole
23	P 23	25.80	36	Cir	450.000	5791.92	5797.32	1.200	5793.46	5798.96	0.10	5798.96	22	Manhole
24	P 24	25.80	36	Cir	437.609	5797.42	5803.12	1.303	5798.96	5804.76	0.33	5804.76	23	Generic

Antelope Ridge D basins-5yr | Number of lines: 33 | Run Date: 1/13/2026

NOTES: Return period = 5 Yrs. ; j - Line contains hyd. jump.

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
25	P 25	12.80	24	Cir	7.003	5795.30	5795.37	1.004	5796.38	5796.66	0.28	5796.66	6	Generic
26	P 26	8.60	24	Cir	43.231	5795.47	5795.90	0.994	5796.66	5796.94	n/a	5796.94	25	Generic
27	P 27	2.40	18	Cir	27.003	5794.11	5794.38	1.000	5794.60	5794.97	0.22	5794.97	5	Generic
28	P 28	4.00	24	Cir	7.003	5793.61	5793.68	1.004	5794.18	5794.38	n/a	5794.38	5	Generic
29	P 29	0.60	18	Cir	27.000	5791.80	5792.07	1.000	5792.04	5792.36	0.10	5792.36	4	Generic
30	P 30	16.70	30	Cir	7.003	5789.82	5789.89	1.004	5790.93	5791.27	n/a	5791.27	4	Generic
31	P 31	10.00	30	Cir	34.668	5789.99	5790.34	1.008	5791.27	5791.40	n/a	5791.40 j	30	Generic
32	P 32	13.00	30	Cir	227.321	5781.32	5783.37	0.902	5782.32	5784.58	0.24	5784.58	1	Generic
33	P 33	8.10	24	Cir	34.915	5783.87	5784.11	0.687	5784.79	5785.12	0.40	5785.12	32	Generic

Antelope Ridge D basins-5yr | Number of lines: 33 | Run Date: 1/13/2026

NOTES: Return period = 5 Yrs. ; j - Line contains hyd. jump.

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	44.717	0.00	0.00	0.00	0.00	0.00	0.0	4724.5	0.0	87.40	176.4	7.26	54	0.80	5778.96	5779.32	5782.92	5782.06	5784.26	5787.00	P 1
2	1	405.928	0.00	0.00	0.00	0.00	0.00	0.0	4723.2	0.0	79.10	176.0	8.24	54	0.80	5779.42	5782.67	5782.06	5785.27	5787.00	5791.24	P 2
3	2	400.000	0.00	0.00	0.00	0.00	0.00	0.0	4721.8	0.0	79.10	175.9	8.70	54	0.80	5782.85	5786.05	5785.27	5788.65	5791.24	5796.39	P 3
4	3	238.098	0.00	0.00	0.00	0.00	0.00	0.0	4720.8	0.0	59.80	164.7	7.07	54	0.70	5786.15	5787.82	5788.65	5790.06	5796.39	5796.34	P 4
5	4	471.000	0.00	0.00	0.00	0.00	0.00	0.0	4718.0	0.0	35.30	120.1	6.65	48	0.70	5788.32	5791.61	5790.06	5793.38	5796.34	5798.56	P 5
6	5	168.914	0.00	0.00	0.00	0.00	0.00	0.0	4717.2	0.0	34.50	100.6	8.15	42	1.00	5792.11	5793.80	5793.52	5795.62	5798.56	5800.33	P 6
7	6	164.420	0.00	0.00	0.00	0.00	0.00	0.0	4716.5	0.0	25.70	57.21	7.20	36	0.74	5794.30	5795.51	5795.71	5797.15	5800.33	5801.98	P 7
8	7	183.927	0.00	0.00	0.00	0.00	0.00	0.0	4715.4	0.0	21.00	55.86	5.93	36	0.70	5795.61	5796.90	5797.15	5798.37	5801.98	5803.28	P 8
9	8	194.042	0.00	0.00	0.00	0.00	0.00	0.0	4713.9	0.0	10.70	31.90	5.52	30	0.61	5797.40	5798.57	5798.40	5799.67	5803.28	5806.05	P 9
10	9	202.958	0.00	0.00	0.00	0.00	0.00	0.0	4712.4	0.0	10.70	31.80	5.17	30	0.60	5798.57	5799.79	5799.67	5800.88	5806.05	5808.99	P 10
11	10	400.000	0.00	0.00	0.00	0.00	0.00	0.0	1.9	0.0	10.70	31.77	5.51	30	0.60	5799.90	5802.30	5800.90	5803.40	5808.99	5812.01	P 11
12	11	136.808	0.00	0.00	0.00	0.00	0.00	0.0	0.8	0.0	10.70	30.46	5.42	30	0.55	5802.40	5803.15	5803.42	5804.25	5812.01	5812.81	P 12
13	12	105.642	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	10.70	30.39	5.17	30	0.55	5803.15	5803.73	5804.25	5804.82	5812.81	5807.23	P 13
14	7	459.999	0.00	0.00	0.00	0.00	0.00	0.0	0.9	0.0	8.50	23.72	6.04	24	1.10	5796.61	5801.67	5797.44	5802.71	5801.98	5806.12	P 14
15	14	82.203	0.00	0.00	0.00	0.00	0.00	0.0	0.2	0.0	3.40	8.82	4.43	18	0.71	5802.17	5802.75	5802.82	5803.46	5806.12	5805.46	P 15
16	15	23.954	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	3.40	8.84	4.18	18	0.71	5802.75	5802.92	5803.46	5803.62	5805.46	5807.10	P 16
17	14	27.003	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	5.50	9.48	5.25	18	0.82	5802.17	5802.39	5802.99	5803.29	5806.12	5806.37	P 17
18	10	160.000	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	0.00	9.39	0.42	18	0.80	5805.23	5806.51	5805.24	5806.52	5808.99	5810.70	P 18
19	8	27.000	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	6.90	10.50	5.88	18	1.00	5799.00	5799.27	5799.89	5800.29	5803.28	5803.51	P 19
20	8	7.000	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	5.30	14.86	6.29	18	2.00	5799.00	5799.14	5799.62	5800.03	5803.28	5803.51	P 20
21	3	52.596	0.00	0.00	0.00	0.00	0.00	0.0	5.3	0.0	25.80	84.30	8.51	36	1.60	5787.55	5788.39	5788.69	5790.03	5796.39	5795.76	P 21
22	21	277.554	0.00	0.00	0.00	0.00	0.00	0.0	4.1	0.0	25.80	73.05	6.80	36	1.20	5788.49	5791.82	5790.03	5793.46	5795.76	5798.90	P 22

Antelope Ridge D basins-5yr | Number of lines: 33 | Run Date: 1/13/2026

NOTES:Intensity = 79.26 / (Inlet time + 14.60) ^ 0.84; Return period =Yrs. 5 ; c = cir e = ellip b = box

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
23	22	450.000	0.00	0.00	0.00	0.00	0.00	0.0	2.0	0.0	25.80	73.06	6.80	36	1.20	5791.92	5797.32	5793.46	5798.96	5798.90	5804.43	P 23
24	23	437.609	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	25.80	76.12	6.81	36	1.30	5797.42	5803.12	5798.96	5804.76	5804.43	5809.02	P 24
25	6	7.003	0.00	0.00	0.00	0.00	0.00	0.0	0.3	0.0	12.80	22.66	6.71	24	1.00	5795.30	5795.37	5796.38	5796.66	5800.33	5800.57	P 25
26	25	43.231	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	8.60	22.55	4.81	24	0.99	5795.47	5795.90	5796.66	5796.94	5800.57	5801.08	P 26
27	5	27.003	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	2.40	10.50	4.28	18	1.00	5794.11	5794.38	5794.60	5794.97	5798.56	5798.81	P 27
28	5	7.003	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	4.00	22.66	4.76	24	1.00	5793.61	5793.68	5794.18	5794.38	5798.56	5798.81	P 28
29	4	27.000	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	0.60	10.50	2.88	18	1.00	5791.80	5792.07	5792.04	5792.36	5796.34	5796.57	P 29
30	4	7.003	0.00	0.00	0.00	0.00	0.00	0.0	0.3	0.0	16.70	41.09	6.97	30	1.00	5789.82	5789.89	5790.93	5791.27	5796.34	5796.59	P 30
31	30	34.668	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	10.00	41.18	4.52	30	1.01	5789.99	5790.34	5791.27	5791.40	5796.59	5796.58	P 31
32	1	227.321	0.00	0.00	0.00	0.00	0.00	0.0	0.2	0.0	13.00	38.95	6.33	30	0.90	5781.32	5783.37	5782.32	5784.58	5787.00	5788.68	P 32
33	32	34.915	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	8.10	18.74	5.41	24	0.69	5783.87	5784.11	5784.79	5785.12	5788.68	5788.68	P 33

Antelope Ridge D basins-5yr | Number of lines: 33 | Run Date: 1/13/2026

NOTES:Intensity = 79.26 / (Inlet time + 14.60) ^ 0.84; Return period =Yrs. 5 ; c = cir e = ellip b = box

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
1	P 1	189.3	54	Cir	44.717	5778.96	5779.32	0.805	5782.92	5783.39	1.22	5784.61	End	Manhole
2	P 2	169.0	54	Cir	405.928	5779.42	5782.67	0.801	5784.61*	5787.61*	0.26	5787.87	1	Manhole
3	P 3	169.0	54	Cir	400.000	5782.85	5786.05	0.800	5787.87*	5790.83*	1.76	5792.58	2	Generic
4	P 4	130.8	54	Cir	238.098	5786.15	5787.82	0.701	5792.58*	5793.63*	0.26	5793.90	3	Manhole
5	P 5	92.00	48	Cir	471.000	5788.32	5791.61	0.699	5793.90*	5795.83*	0.21	5796.04	4	Manhole
6	P 6	84.10	42	Cir	168.914	5792.11	5793.80	1.000	5796.04	5797.07	0.31	5797.38	5	Manhole
7	P 7	63.80	36	Cir	164.420	5794.30	5795.51	0.736	5797.38*	5798.89*	0.63	5799.52	6	Manhole
8	P 8	53.90	36	Cir	183.927	5795.61	5796.90	0.701	5799.52*	5800.72*	0.23	5800.95	7	Manhole
9	P 9	31.90	30	Cir	194.042	5797.40	5798.57	0.605	5800.95*	5802.12*	0.10	5802.22	8	None
10	P 10	31.90	30	Cir	202.958	5798.57	5799.79	0.601	5802.22*	5803.45*	0.16	5803.61	9	Manhole
11	P 11	31.90	30	Cir	400.000	5799.90	5802.30	0.600	5803.61*	5806.03*	0.10	5806.13	10	Manhole
12	P 12	31.90	30	Cir	136.808	5802.40	5803.15	0.552	5806.13*	5806.96*	0.16	5807.13	11	None
13	P 13	31.90	30	Cir	105.642	5803.15	5803.73	0.549	5807.13*	5807.76*	0.66	5808.42	12	Generic
14	P 14	18.10	24	Cir	459.999	5796.61	5801.67	1.100	5799.52	5803.20	n/a	5803.20 j	7	Manhole
15	P 15	6.10	18	Cir	82.203	5802.17	5802.75	0.706	5803.20	5803.71	n/a	5803.71 j	14	None
16	P 16	6.10	18	Cir	23.954	5802.75	5802.92	0.709	5803.71	5803.87	n/a	5803.87 j	15	Generic
17	P 17	12.00	18	Cir	27.003	5802.17	5802.39	0.816	5803.67*	5804.02*	0.72	5804.74	14	Manhole
18	P 18	0.00	18	Cir	153.328	5805.30	5808.67	2.198	5805.30	5810.17	0.00	5810.17	10	Generic
19	P 19	12.10	18	Cir	27.000	5799.00	5799.27	1.000	5800.95*	5801.31*	0.73	5802.04	8	Generic
20	P 20	10.30	18	Cir	7.000	5799.00	5799.14	2.002	5800.95*	5801.02*	0.53	5801.54	8	Generic
21	P 21	51.40	36	Cir	52.596	5787.55	5788.39	1.596	5792.58*	5792.89*	0.41	5793.30	3	Manhole
22	P 22	51.40	36	Cir	277.554	5788.49	5791.82	1.200	5793.30*	5794.95*	0.21	5795.16	21	Manhole
23	P 23	51.40	36	Cir	450.000	5791.92	5797.32	1.200	5795.16	5799.65	n/a	5799.65	22	Manhole
24	P 24	51.40	36	Cir	437.609	5797.42	5803.12	1.303	5799.65	5805.45	n/a	5805.45	23	Generic

Antelope Ridge D basins-100yr | Number of lines: 33 | Run Date: 1/19/2026

NOTES: Return period = 100 Yrs. ; *Surcharged (HGL above crown). ; j - Line contains hyd. jump.

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
25	P 25	33.30	24	Cir	7.003	5795.30	5795.37	1.004	5797.38*	5797.53*	0.87	5798.41	6	Generic
26	P 26	20.90	24	Cir	43.231	5795.47	5795.90	0.994	5798.41*	5798.78*	0.69	5799.47	25	Generic
27	P 27	5.80	18	Cir	27.003	5794.11	5794.38	1.000	5796.04*	5796.12*	0.17	5796.29	5	Generic
28	P 28	14.20	24	Cir	7.003	5793.61	5793.68	1.004	5796.04*	5796.07*	0.32	5796.38	5	Generic
29	P 29	1.40	18	Cir	27.000	5791.80	5792.07	1.000	5793.90*	5793.90*	0.01	5793.91	4	Generic
30	P 30	42.30	30	Cir	7.003	5789.82	5789.89	1.004	5793.90*	5793.97*	0.63	5794.61	4	Generic
31	P 31	30.00	30	Cir	34.668	5789.99	5790.34	1.008	5794.61*	5794.79*	0.58	5795.37	30	Generic
32	P 32	31.60	30	Cir	227.321	5781.32	5783.37	0.902	5784.61*	5785.96*	0.32	5786.28	1	Generic
33	P 33	15.10	24	Cir	34.915	5783.87	5784.11	0.687	5786.28*	5786.44*	0.36	5786.79	32	Generic

Antelope Ridge D basins-100yr | Number of lines: 33 | Run Date: 1/19/2026

NOTES: Return period = 100 Yrs. ; *Surcharged (HGL above crown). ; j - Line contains hyd. jump.

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	44.717	0.00	0.00	0.00	0.00	0.00	0.0	45163.6	0.0	189.3	176.4	12.64	54	0.80	5778.96	5779.32	5782.92	5783.39	5784.26	5787.00	P 1
2	1	405.928	0.00	0.00	0.00	0.00	0.00	0.0	45163.0	0.0	169.0	176.0	10.63	54	0.80	5779.42	5782.67	5784.61	5787.61	5787.00	5791.24	P 2
3	2	400.000	0.00	0.00	0.00	0.00	0.00	0.0	45162.3	0.0	169.0	175.9	10.63	54	0.80	5782.85	5786.05	5787.87	5790.83	5791.24	5796.39	P 3
4	3	238.098	0.00	0.00	0.00	0.00	0.00	0.0	45161.9	0.0	130.8	164.7	8.22	54	0.70	5786.15	5787.82	5792.58	5793.63	5796.39	5796.34	P 4
5	4	471.000	0.00	0.00	0.00	0.00	0.00	0.0	45160.8	0.0	92.00	120.1	7.32	48	0.70	5788.32	5791.61	5793.90	5795.83	5796.34	5798.56	P 5
6	5	168.914	0.00	0.00	0.00	0.00	0.00	0.0	45160.5	0.0	84.10	100.6	8.87	42	1.00	5792.11	5793.80	5796.04	5797.07	5798.56	5800.33	P 6
7	6	164.420	0.00	0.00	0.00	0.00	0.00	0.0	45160.2	0.0	63.80	57.21	9.03	36	0.74	5794.30	5795.51	5797.38	5798.89	5800.33	5801.98	P 7
8	7	183.927	0.00	0.00	0.00	0.00	0.00	0.0	45159.8	0.0	53.90	55.86	7.63	36	0.70	5795.61	5796.90	5799.52	5800.72	5801.98	5803.28	P 8
9	8	194.042	0.00	0.00	0.00	0.00	0.00	0.0	45159.3	0.0	31.90	31.90	6.50	30	0.61	5797.40	5798.57	5800.95	5802.12	5803.28	5806.05	P 9
10	9	202.958	0.00	0.00	0.00	0.00	0.00	0.0	45158.7	0.0	31.90	31.80	6.50	30	0.60	5798.57	5799.79	5802.22	5803.45	5806.05	5808.99	P 10
11	10	400.000	0.00	0.00	0.00	0.00	0.00	0.0	0.6	0.0	31.90	31.77	6.50	30	0.60	5799.90	5802.30	5803.61	5806.03	5808.99	5812.01	P 11
12	11	136.808	0.00	0.00	0.00	0.00	0.00	0.0	0.3	0.0	31.90	30.46	6.50	30	0.55	5802.40	5803.15	5806.13	5806.96	5812.01	5812.81	P 12
13	12	105.642	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	31.90	30.39	6.50	30	0.55	5803.15	5803.73	5807.13	5807.76	5812.81	5807.23	P 13
14	7	459.999	0.00	0.00	0.00	0.00	0.00	0.0	0.5	0.0	18.10	23.72	6.39	24	1.10	5796.61	5801.67	5799.52	5803.20	5801.98	5806.12	P 14
15	14	82.203	0.00	0.00	0.00	0.00	0.00	0.0	0.1	0.0	6.10	8.82	4.93	18	0.71	5802.17	5802.75	5803.20	5803.71	5806.12	5805.46	P 15
16	15	23.954	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	6.10	8.84	5.14	18	0.71	5802.75	5802.92	5803.71	5803.87	5805.46	5807.10	P 16
17	14	27.003	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	12.00	9.48	6.79	18	0.82	5802.17	5802.39	5803.67	5804.02	5806.12	5806.37	P 17
18	10	153.328	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	0.00	15.57	0.15	18	2.20	5805.30	5808.67	5805.30	5810.17	5808.99	5810.70	P 18
19	8	27.000	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	12.10	10.50	6.85	18	1.00	5799.00	5799.27	5800.95	5801.31	5803.28	5803.51	P 19
20	8	7.000	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	10.30	14.86	5.83	18	2.00	5799.00	5799.14	5800.95	5801.02	5803.28	5803.51	P 20
21	3	52.596	0.00	0.00	0.00	0.00	0.00	0.0	2.7	0.0	51.40	84.25	7.27	36	1.60	5787.55	5788.39	5792.58	5792.89	5796.39	5795.76	P 21
22	21	277.554	0.00	0.00	0.00	0.00	0.00	0.0	2.0	0.0	51.40	73.05	7.27	36	1.20	5788.49	5791.82	5793.30	5794.95	5795.76	5798.90	P 22

Antelope Ridge D basins-100yr | Number of lines: 33 | Run Date: 1/19/2026

NOTES:Intensity = 127.16 / (Inlet time + 17.80) ^ 0.82; Return period =Yrs. 100 ; c = cir e = ellip b = box

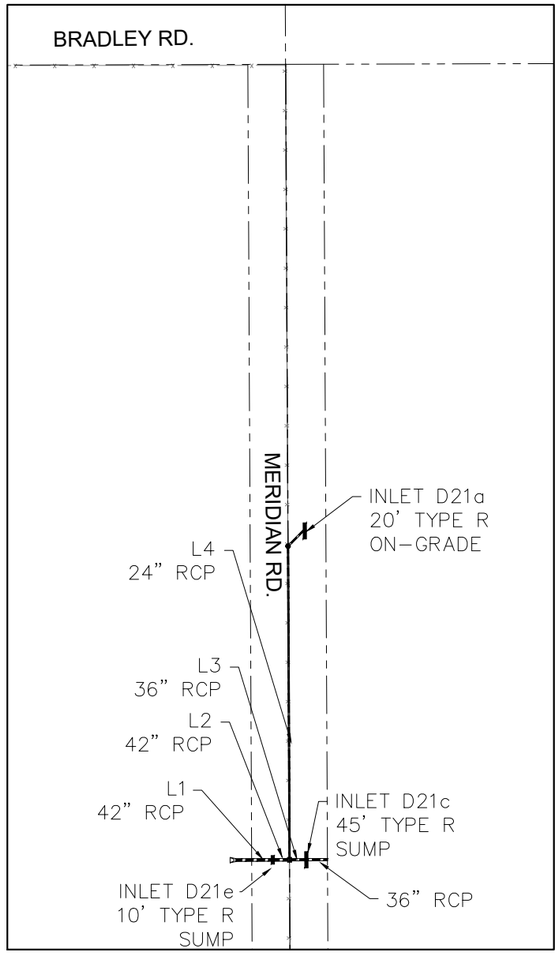
Storm Sewer Tabulation

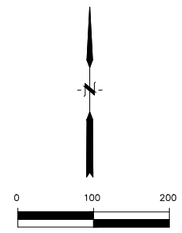
Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
23	22	450.000	0.00	0.00	0.00	0.00	0.00	0.0	1.0	0.0	51.40	73.06	8.00	36	1.20	5791.92	5797.32	5795.16	5799.65	5798.90	5804.43	P 23
24	23	437.609	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	51.40	76.14	8.92	36	1.30	5797.42	5803.12	5799.65	5805.45	5804.43	5809.02	P 24
25	6	7.003	0.00	0.00	0.00	0.00	0.00	0.0	0.1	0.0	33.30	22.66	10.60	24	1.00	5795.30	5795.37	5797.38	5797.53	5800.33	5800.57	P 25
26	25	43.231	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	20.90	22.55	6.65	24	0.99	5795.47	5795.90	5798.41	5798.78	5800.57	5801.08	P 26
27	5	27.003	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	5.80	10.50	3.28	18	1.00	5794.11	5794.38	5796.04	5796.12	5798.56	5798.81	P 27
28	5	7.003	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	14.20	22.66	4.52	24	1.00	5793.61	5793.68	5796.04	5796.07	5798.56	5798.81	P 28
29	4	27.000	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	1.40	10.50	0.79	18	1.00	5791.80	5792.07	5793.90	5793.90	5796.34	5796.57	P 29
30	4	7.003	0.00	0.00	0.00	0.00	0.00	0.0	0.1	0.0	42.30	41.09	8.62	30	1.00	5789.82	5789.89	5793.90	5793.97	5796.34	5796.59	P 30
31	30	34.668	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	30.00	41.18	6.11	30	1.01	5789.99	5790.34	5794.61	5794.79	5796.59	5796.58	P 31
32	1	227.321	0.00	0.00	0.00	0.00	0.00	0.0	0.1	0.0	31.60	38.95	6.44	30	0.90	5781.32	5783.37	5784.61	5785.96	5787.00	5788.68	P 32
33	32	34.915	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	15.10	18.74	4.81	24	0.69	5783.87	5784.11	5786.28	5786.44	5788.68	5788.68	P 33

Antelope Ridge D basins-100yr | Number of lines: 33 | Run Date: 1/19/2026

NOTES:Intensity = 127.16 / (Inlet time + 17.80) ^ 0.82; Return period =Yrs. 100 ; c = cir e = ellip b = box

MERIDIAN RD.
STORM SCHEMATIC





CORE ENGINEERING GROUP
15004 1ST AVE. S.
BURNSVILLE, MN 55306
PH: 763.210.1100
CONTACT: RICHARD L. SCHINDLER, P.E.
EMAIL: Rich@ceg1.com

NO. | DESCRIPTION | DATE

PREPARED FOR:
Eagle Development Co.
212 N. WAHSATCH AVE., SUITE 301
COLORADO SPRINGS, COLORADO 80903
(719) 635-3200
CONTACT: JEFF MARK

PROJECT:
Antelope Ridge at Bull Hill No. 1
Bradley Rd - Meridian Rd.
EL PASO COUNTY, COLORADO

DRAWN: RLS
DESIGNED: LAB
CHECKED: LAB

STORM SEWER SCHEMATIC
MERIDIAN ROAD BASINS
ANTELOPE RIDGE 1

DATE
MAY, 2025

PROJECT NO.
100.302

SHEET NUMBER
1

TOTAL SHEETS: 1

T:\PROJECTS\100.302\Drainage\100.302-storm schematic.dwg, Jan 15, 2026 - 3:53pm

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
1	1	19.20	42	Cir	58.000	5867.70	5868.05	0.603	5871.15	5869.39	n/a	5869.39	End	Generic
2	2	14.30	42	Cir	20.500	5868.15	5868.27	0.591	5869.39	5869.42	n/a	5869.42	1	Manhole
3	3	8.20	36	Cir	20.500	5868.77	5868.91	0.679	5869.56	5869.81	n/a	5869.81	2	Curb-Horiz
4	4	6.40	24	Cir	413.900	5869.55	5877.00	1.800	5870.17	5877.90	0.26	5877.90	2	Manhole
5	5	6.40	24	Cir	28.600	5878.50	5879.01	1.794	5879.12	5879.91	0.34	5879.91	4	Curb-Horiz

Meridian Storm-5yr | Number of lines: 5 | Run Date: 9/8/2025

NOTES: Return period = 5 Yrs.

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	58.000	0.00	0.00	0.00	0.00	0.00	0.0	3.8	0.0	19.20	84.62	3.84	42	0.60	5867.70	5868.05	5871.15	5869.39	0.00	5874.64	1
2	1	20.500	0.00	0.00	0.00	0.00	0.00	0.0	3.5	0.0	14.30	77.32	4.94	42	0.59	5868.15	5868.27	5869.39	5869.42	5874.64	5874.66	2
3	2	20.500	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	8.20	54.95	5.08	36	0.68	5868.77	5868.91	5869.56	5869.81	5874.66	5874.64	3
4	2	413.900	0.00	0.00	0.00	0.00	0.00	0.0	0.2	0.0	6.40	30.34	6.18	24	1.80	5869.55	5877.00	5870.17	5877.90	5874.66	5883.27	4
5	4	28.600	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	6.40	30.30	6.17	24	1.79	5878.50	5879.01	5879.12	5879.91	5883.27	5883.74	5

Meridian Storm-5yr | Number of lines: 5 | Run Date: 10/24/2025

NOTES:Intensity = 79.26 / (Inlet time + 14.60) ^ 0.84; Return period =Yrs. 5 ; c = cir e = ellip b = box

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
1	1	79.70	42	Cir	58.000	5867.70	5868.05	0.603	5871.15	5870.84	n/a	5870.84	End	Generic
2	2	70.90	42	Cir	20.500	5868.15	5868.27	0.586	5870.84	5870.91	0.64	5871.56	1	Manhole
3	3	51.00	36	Cir	20.500	5868.77	5868.91	0.684	5871.56	5871.23	1.17	5871.23	2	Curb-Horiz
4	4	28.30	24	Cir	413.900	5869.55	5877.00	1.800	5871.56	5878.83	n/a	5878.83 j	2	Manhole
5	5	28.30	24	Cir	28.600	5878.50	5879.01	1.782	5880.04	5880.84	n/a	5880.84	4	Curb-Horiz

Meridian Storm-100yr | Number of lines: 5 | Run Date: 9/8/2025

NOTES: Return period = 100 Yrs. ; j - Line contains hyd. jump.

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	58.000	0.00	0.00	0.00	0.00	0.00	0.0	1.0	0.0	79.70	84.62	9.01	42	0.60	5867.70	5868.05	5871.15	5870.84	0.00	5874.64	1
2	1	20.500	0.00	0.00	0.00	0.00	0.00	0.0	0.9	0.0	70.90	77.01	9.02	42	0.59	5868.15	5868.27	5870.84	5870.91	5874.64	5874.66	2
3	2	20.500	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	51.00	55.14	8.07	36	0.68	5868.77	5868.91	5871.56	5871.23	5874.66	5874.64	3
4	2	413.900	0.00	0.00	0.00	0.00	0.00	0.0	0.2	0.0	28.30	30.34	9.20	24	1.80	5869.55	5877.00	5871.56	5878.83	5874.66	5883.27	4
5	4	28.600	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	28.30	30.20	10.15	24	1.78	5878.50	5879.01	5880.04	5880.84	5883.27	5883.74	5

Meridian Storm-100yr | Number of lines: 5 | Run Date: 10/24/2025

NOTES:Intensity = 127.16 / (Inlet time + 17.80) ^ 0.82; Return period =Yrs. 100 ; c = cir e = ellip b = box

MAP POCKET

DESIGN POINT SUMMARY TABLE					
DESIGN POINT	TRIBUTARY BASINS	DRAINAGE AREA (AC)	RUNOFF 5 YR (CFS)	RUNOFF 100 YR (CFS)	COMMENT
S1	ET-31, EX-S4	112.74	23.8	140.3	
S3	ET-31, EX-S4, EX-S5	207.55	39.0	235.5	

EAST TRIBUTARY STANTEC DBPS FLOW DATA		
DESIGN POINT	RUNOFF 5 YR (CFS)	RUNOFF 100 YR (CFS)
E1_T1_5	15	172
E2_2	33	568

LEGEND

- BASIN BOUNDARY-MAJOR
- BASIN BOUNDARY-MINOR
- BASIN DESIGN POINT
- BASIN I.D. ACREAGE 5 YR/100 YR CFS
- DIRECTION OF FLOW
- EXISTING CONTOUR
- TIME OF CONCENTRATION
- 100-YR FLOODPLAIN

EXISTING FLOODPLAIN
BRADLEY ROAD
E1_T1-5
EXISTING 66" TWIN RCP's
S1
E2_2
EXISTING 8' X 12' W TWIN CBC
EAST TRIBUTARY OF JIMMY CAMP CREEK
EX-S4 84.39 AC 19.4 116.6
ET-31 28.35 AC 12.2 68.1
UNPLATTED BJ RANCHES 4500000125
325.0000 ELEC. TRANS. ESMT
EX-S6 207.92 AC 21.7 153.6
ET-28 69.31 AC 21.2 125.7
EX-S5 94.81 AC 18.0 112.5
S3
CITY OF C/S 5500000382
CITY OF C/S 5500000407
BLH 5500000408
UTILITY ESMT. REC.217152003
UTILITY ESMT. REC.217152003
PUD/PRELIM. BOUNDARY
UNPLATTED BANNING LEWIS RANCH
Hunter Ranch
5960
6065
6021
500 0 500 1000
SCALE: 1"=500'

CORE ENGINEERING GROUP
15004 1ST AVENUE S.
BURNSVILLE, MN 55306
PH: 719.570.1100
CONTACT: RICHARD L. SCHINDLER, P.E.
EMAIL: rlsch@cegi.com

PREPARED FOR:
EAGLE DEVELOPMENT CO.
212 NORTH WAHSATCH AVE, SUITE 301
COLORADO SPRINGS, COLORADO 80903 (719) 635-3200
CONTACT: JEFF MARK

NO.	DESCRIPTION	DATE

PROJECT:
ANTELOPE RIDGE AT BULL HILL FIL. 1
BRADLEY RD/MERIDIAN RD.
EL PASO COUNTY, COLORADO

DRAWN: LAB
DESIGNED: LAB
CHECKED: RLS

EXISTING CONDITIONS
ANTELOPE RIDGE AT BULL HILL 1

DATE:
OCT, 2025

PROJECT NO.
100.302

SHEET NUMBER
1

TOTAL SHEETS: 1

LEGEND

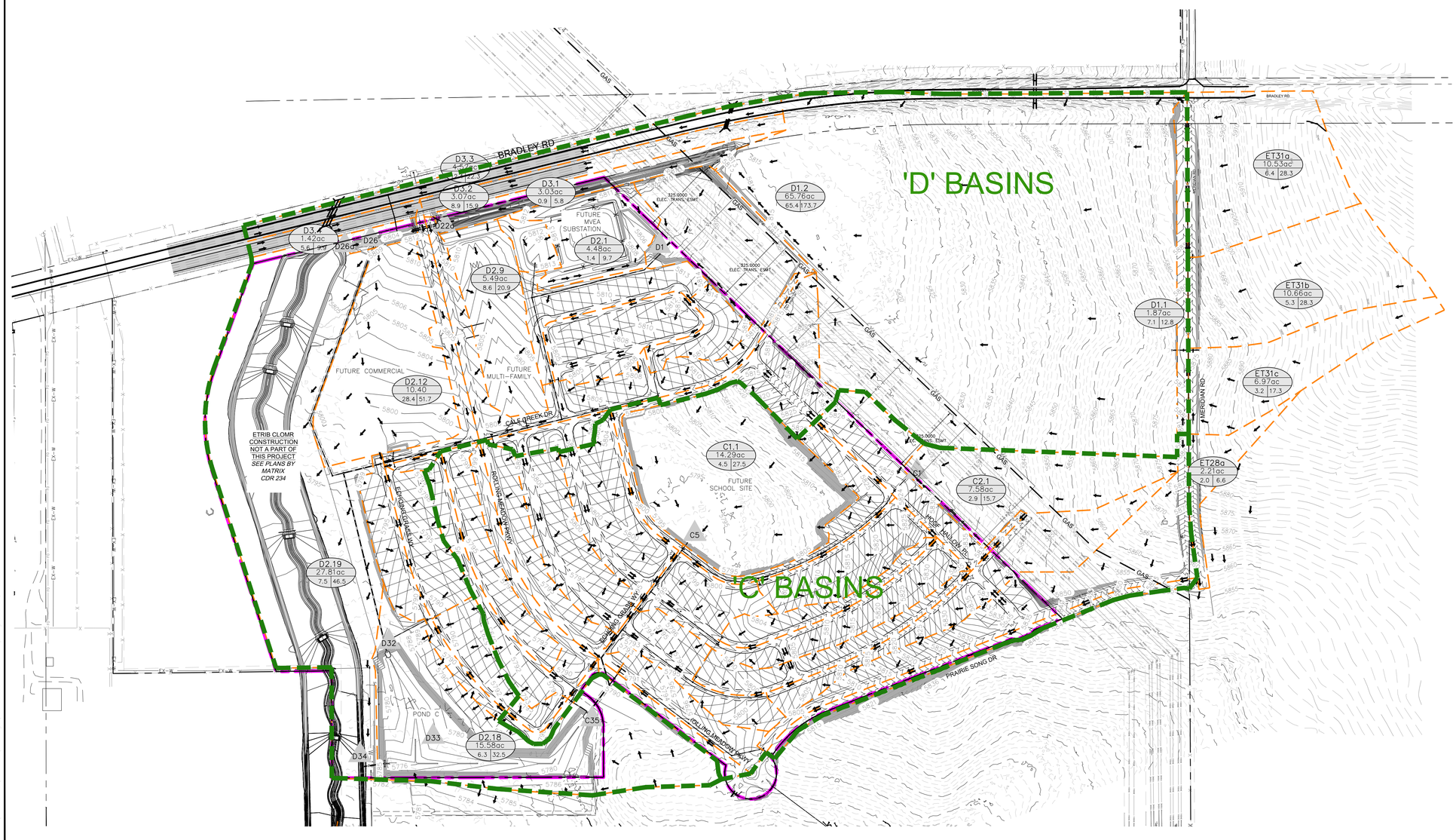
- PLAT BOUNDARY
- BASIN BOUNDARY
- MAJOR BASIN BOUNDARY
- BASIN DESIGN POINT
- BASIN I.D. / ACREAGE / 5 YR/100 YR CFS
- DIRECTION OF FLOW
- EXISTING CONTOUR
- PROPOSED CONTOUR
- ROW
- EXISTING STORM SEWER
- PROPOSED STORM SEWER

PARTIAL DESIGN POINT SUMMARY (SEE SHEETS 1–7 FOR ALL DESIGN POINTS)				
D.P.		5 YEAR cfs	100 YEAR cfs	NOTES
C1		2.9	15.7	OVERLAND FLOW
C5		4.5	27.5	FUTURE SCHOOL SITE
C35		88.7	228.4	POND INFLOW FROM 'C' BASINS
D1		10.7	31.8	FLOW AT END SECTION
D22a		73.2	213.4	SWALE FLOW, SWALE DESIGN FOR 260cfs
D26		25.8	51.4	FLOW FROM FUTURE BRADLEY RD.
D26a		47.4	208.6	FLOW TO ETRIB
D32		87.4	189.3	PIPE FLOW
D33		169.8	413.4	TOTAL POND C INFLOW
D34		24.4	219.7	POND C OUTFLOW

N

0 250 500

SCALE: 1"=250'



CORE ENGINEERING GROUP
15004 1ST AVENUE S.
BURNSVILLE, MN 55306
PHONE: (612) 470-1000
CONTACT: RICHARD L. SCHINDLER, P.E.
EMAIL: Rich@ceg1.com

NO. | DESCRIPTION

PREPARED FOR:
EAGLE DEVELOPMENT CO.
212 NORTH WAHSATCH AVE. SUITE 301
COLORADO SPRINGS, COLORADO 80903
(719) 635-3200
CONTACT: JEFF MARK

PROJECT:
ANTELOPE RIDGE AT BULL HILL FIL. NO. 1
BRADLEY RD / ROLLING MEADOW DR.
EL PASO COUNTY, COLORADO

DRAWN: RLS
DESIGNED: LAB
CHECKED: RLS

OVERALL DEVELOPED CONDITIONS MAP
PRELIMINARY/FINAL DRAINAGE REPORT
ANTELOPE RIDGE AT BULL HILL PHASE 1

DATE: OCTOBER, 2025

PROJECT NO. 100.302

SHEET NUMBER 1

TOTAL SHEETS: 1

LEGEND

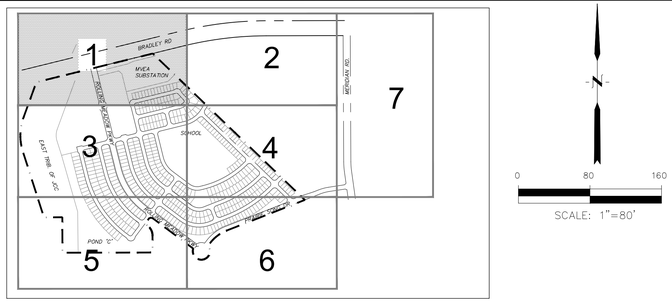
- PUD BOUNDARY
- BASIN BOUNDARY
- X — BASIN DESIGN POINT
- BASIN — XX AC — X.X | X.X — BASIN I.D. / ACREAGE / 5 YR/100 YR CFS
- DIRECTION OF FLOW
- 6690 — EXISTING CONTOUR
- 6670 — PROPOSED CONTOUR
- ROW
- EXISTING STORM SEWER
- PROPOSED STORM SEWER
- TIME OF CONCENTRATION
- HP — HIGH POINT
- LP — LOW POINT
- 6 | 8 — CROSSPAN (6' OR 8')
- A — TYPE A CURB/GUTTER

NOTES:

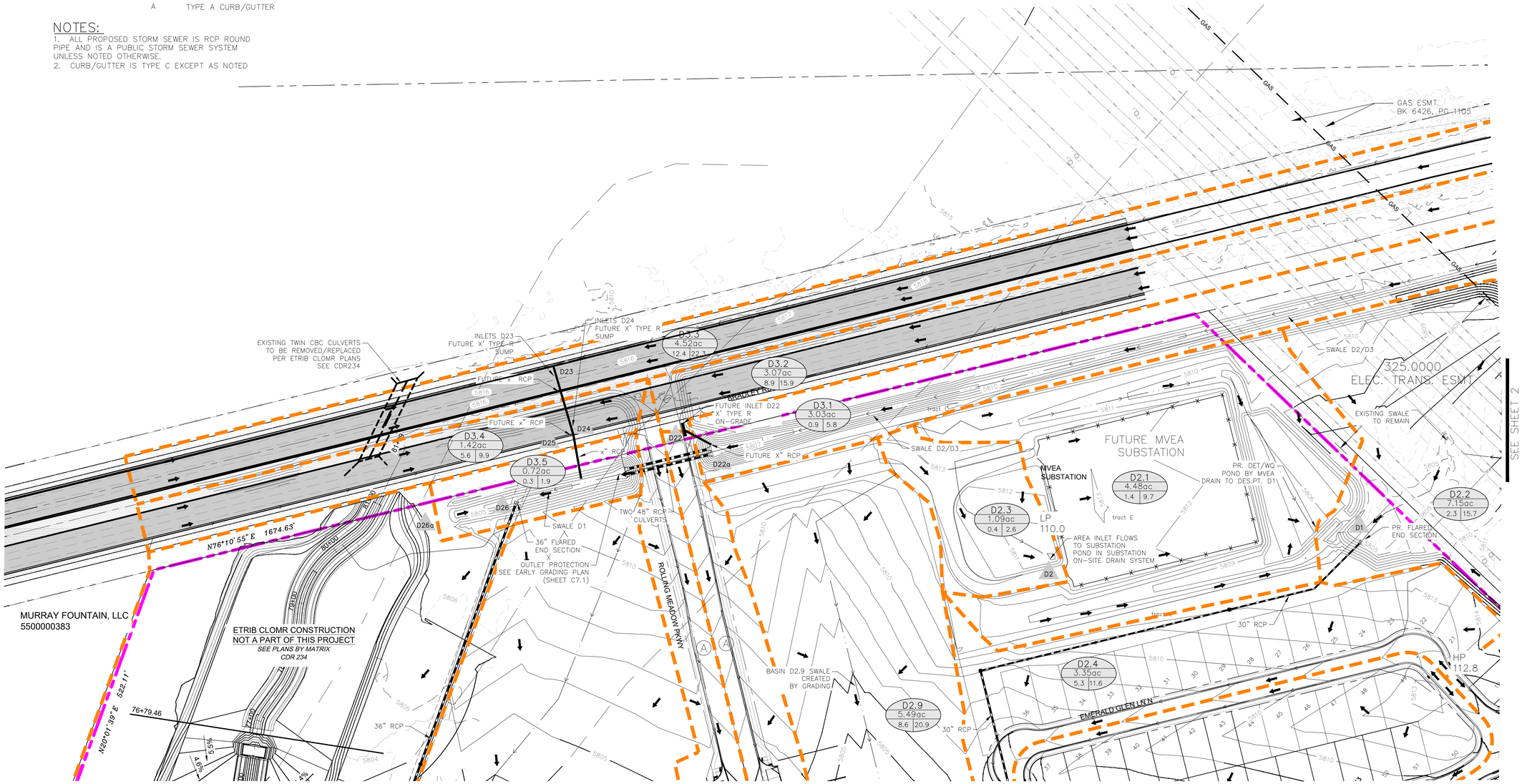
1. ALL PROPOSED STORM SEWER IS RCP ROUND PIPE AND IS A PUBLIC STORM SEWER SYSTEM UNLESS NOTED OTHERWISE.
2. CURB/GUTTER IS TYPE C EXCEPT AS NOTED

DESIGN POINT SUMMARY

D.P.		5 YEAR cfs	100 YEAR cfs	NOTES
D1		10.7	31.9	FLOW AT END SECTION
D2		0.4	2.6	OVERLAND FLOW
D3				NOT USED
D22		8.9	15.9	STREET FLOW
D22a		73.2	213.4	SWALE FLOW, SWALE DESIGN FOR 260cfs
D23		12.4	22.3	STREET FLOW
D24		5.6	9.9	STREET FLOW
D25		16.3	29.3	PIPE FLOW
D26		25.8	51.4	FLOW FROM FUTURE BRADLEY RD.
D26a		47.4	208.6	FLOW TO ETRIB



KEY MAP
NO SCALE



CORE ENGINEERING GROUP
15004 1ST AVENUE S.
BURNSVILLE, MN 55306
PHONE: (719) 570-1003
CONTACT: RICHARD L. SCHINDLER, P.E.
EMAIL: Rich@ceg1.com

PREPARED FOR:
EAGLE DEVELOPMENT CO.
212 NORTH WAHSATCH AVE. SUITE 301
COLORADO SPRINGS, COLORADO 80903
(719) 635-3200
CONTACT: JEFF MARK

NO. | DESCRIPTION

PROJECT:
ANTELOPE RIDGE AT BULL HILL FIL. NO. 1
BRADLEY RD / ROLLING MEADOW DR.
EL PASO COUNTY, COLORADO

DRAWN: RLS
DESIGNED: LAB
CHECKED: RLS

DEVELOPED CONDITIONS
PRELIMINARY DRAINAGE REPORT
ANTELOPE RIDGE AT BULL HILL PHASE 1

DATE: FEB, 2026
PROJECT NO. 100.302
SHEET NUMBER 1
TOTAL SHEETS: 7

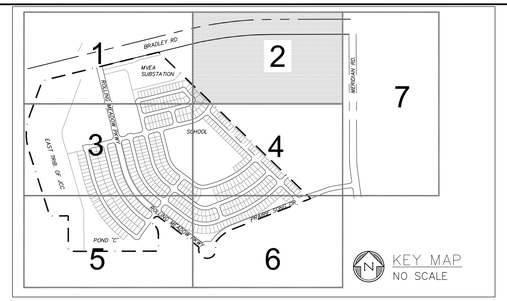
LEGEND

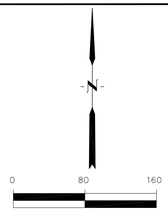
- PUD BOUNDARY
- BASIN BOUNDARY
- BASIN DESIGN POINT
- BASIN I.D. / ACREAGE / 5 YR/100 YR CFS
- DIRECTION OF FLOW
- 6690 EXISTING CONTOUR
- 6670 PROPOSED CONTOUR
- ROW
- EXISTING STORM SEWER
- PROPOSED STORM SEWER
- TIME OF CONCENTRATION
- HP HIGH POINT
- LP LOW POINT
- (6) (8) CROSSPAN (6' OR 8')
- (A) TYPE A CURB/GUTTER

DESIGN POINT SUMMARY				
D.P.		5 YEAR cfs	100 YEAR cfs	NOTES
D21		71.1	212.2	OVERLAND FLOW, SWALE DESIGNED FOR 260cfs

NOTES:

1. ALL PROPOSED STORM SEWER IS RCP ROUND PIPE AND IS A PUBLIC STORM SEWER SYSTEM UNLESS NOTED OTHERWISE.
2. CURB/GUTTER IS TYPE C EXCEPT AS NOTED







CORE ENGINEERING GROUP
15004 1ST AVENUE S.
BURNSVILLE, MN. 55306
PH: 719.570.1100
CONTACT: RICHARD L. SCHINDLER, P.E.
EMAIL: Rich@cegi.com

PREPARED FOR:
EAGLE DEVELOPMENT CO.
212 NORTH WAHSATCH AVE. SUITE 301
COLORADO SPRINGS, COLORADO 80903
(719) 635-3200
CONTACT: JEFF MARK

NO.	DESCRIPTION

PROJECT:
ANTELOPE RIDGE AT BULL HILL FIL. NO. 1
BRADLEY RD / ROLLING MEADOW DR.
EL PASO COUNTY, COLORADO

DRAWN: RLS
DESIGNED: LAB
CHECKED: RLS

DEVELOPED CONDITIONS PRELIMINARY DRAINAGE REPORT ANTELOPE RIDGE AT BULL HILL PHASE 1

DATE: FEB, 2026

PROJECT NO. 100.302

SHEET NUMBER 2

TOTAL SHEETS: 7

T:\PROJECTS\100.00\Drainage\100.00dev conditions.dwg Feb 10, 2026 - 6:40pm

LEGEND

- PUD BOUNDARY
- BASIN BOUNDARY
- BASIN DESIGN POINT (X)
- BASIN I.D. / ACREAGE / 5 YR/100 YR CFS (BASIN, XX AC, X.X | X.X)
- DIRECTION OF FLOW
- 6690 EXISTING CONTOUR
- 6670 PROPOSED CONTOUR
- ROW
- EXISTING STORM SEWER
- PROPOSED STORM SEWER
- TIME OF CONCENTRATION
- HP HIGH POINT
- LP LOW POINT
- (6) (8) CROSSPAN (6' OR 8')
- (A) TYPE A CURB/GUTTER

NOTES:

1. ALL PROPOSED STORM SEWER IS RCP ROUND PIPE AND IS A PUBLIC STORM SEWER SYSTEM UNLESS NOTED OTHERWISE.
2. CURB/GUTTER IS TYPE C EXCEPT AS NOTED

DESIGN POINT SUMMARY

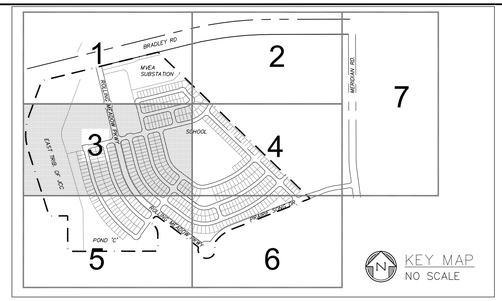
D.P.		5 YEAR cfs	100 YEAR cfs	NOTES
C5		4.5	27.5	OVERLAND FLOW
C6		7.0	17.1	STREET FLOW
C6a		9.4	36.3	PIPE FLOW
C7		20.1	72.2	PIPE FLOW
C11		27.0	86.9	PIPE FLOW
C12		5.8	21.2	STREET FLOW
C13		9.9	20.9	STREET FLOW
D1		10.7	31.8	FLOW AT END SECTION
D2		0.4	2.6	OVERLAND FLOW
D3		10.7	31.9	PIPE FLOW

DESIGN POINT SUMMARY

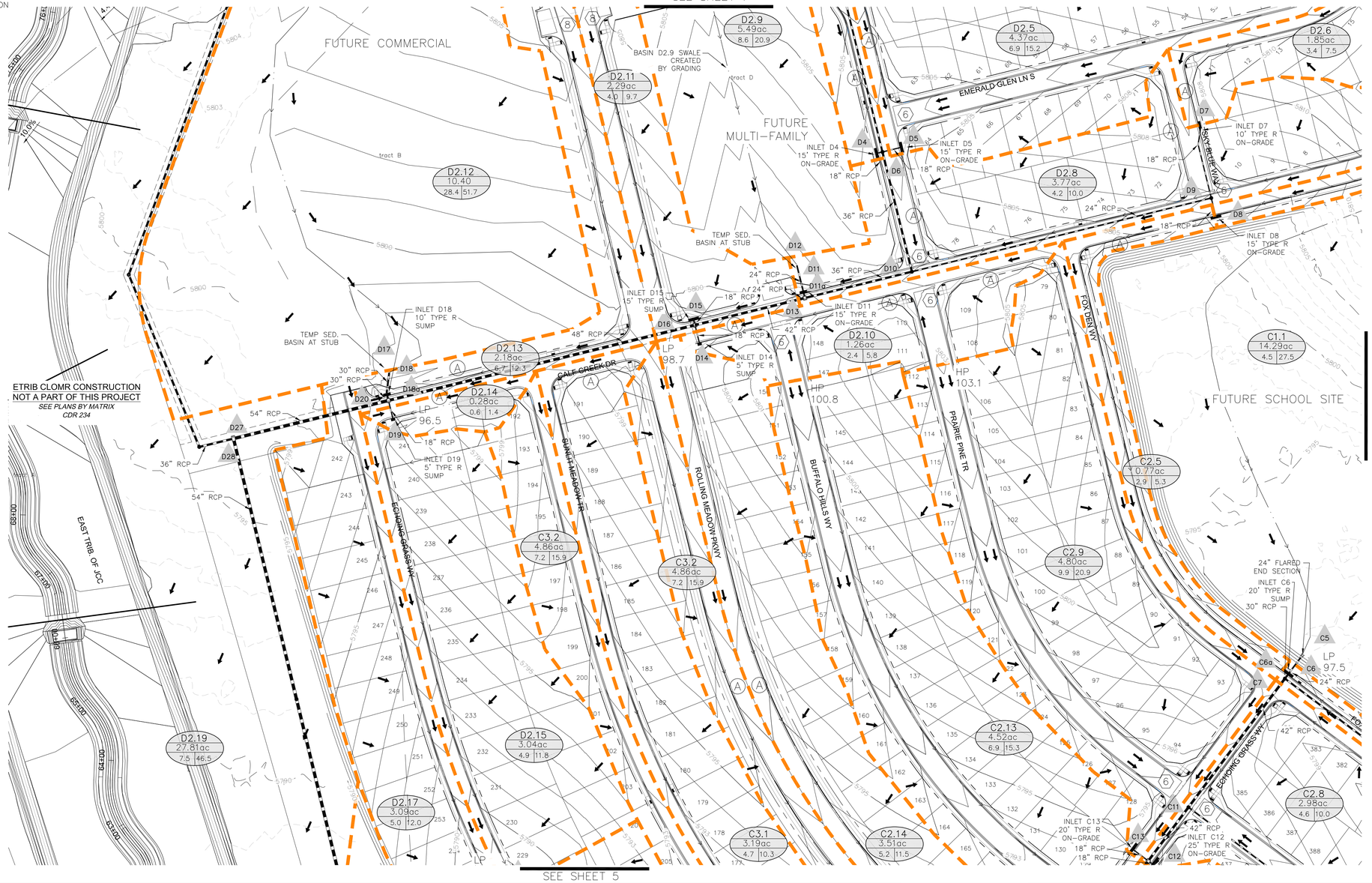
D.P.		5 YEAR cfs	100 YEAR cfs	NOTES
D4		5.3	11.6	STREET FLOW
D5		6.9	15.2	STREET FLOW
D6		21.0	53.9	PIPE FLOW
D7		3.4	7.5	STREET FLOW
D8		5.5	14.8	STREET FLOW
D9		8.5	18.1	PIPE FLOW
D10		25.7	63.8	PIPE FLOW
D11		4.2	15.8	STREET FLOW
D11a		12.8	33.3	PIPE FLOW
D12		8.6	20.9	STREET FLOW

DESIGN POINT SUMMARY

D.P.		5 YEAR cfs	100 YEAR cfs	NOTES
D13		34.5	84.1	PIPE FLOW
D14		2.4	5.8	STREET FLOW
D15		4.0	14.2	STREET FLOW
D16		35.3	92.0	PIPE FLOW
D17		10.0	30.0	PIPE FLOW
D18		6.7	12.3	STREET FLOW
D18a		16.7	42.3	PIPE FLOW
D19		0.6	1.4	STREET FLOW
D20		59.8	130.8	PIPE FLOW
D27		18.4	21.7	STORM SEWER STUB
D28		79.1	169.0	PIPE FLOW



0 80 160
SCALE: 1"=80'



CORE ENGINEERING GROUP
15004 1ST AVENUE S.
BURNSVILLE, MN. 55306
PH: 719.570.1100
CONTACT: RICHARD L. SCHINDLER, P.E.
EMAIL: Rich@cegi.com

PREPARED FOR:
EAGLE DEVELOPMENT CO.
212 NORTH WAHSATCH AVE. SUITE 301
COLORADO SPRINGS, COLORADO 80903
(719) 635-3200
CONTACT: JEFF MARK

NO. | DESCRIPTION

PROJECT:
ANTELOPE RIDGE AT BULL HILL FIL. NO. 1
BRADLEY RD / ROLLING MEADOW DR.
EL PASO COUNTY, COLORADO

DRAWN: RLS
DESIGNED: LAB
CHECKED: RLS

DEVELOPED CONDITIONS
PRELIMINARY DRAINAGE REPORT
ANTELOPE RIDGE AT BULL HILL PHASE 1

DATE: FEB, 2026

PROJECT NO. 100.302

SHEET NUMBER 3

TOTAL SHEETS: 7

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LEGEND

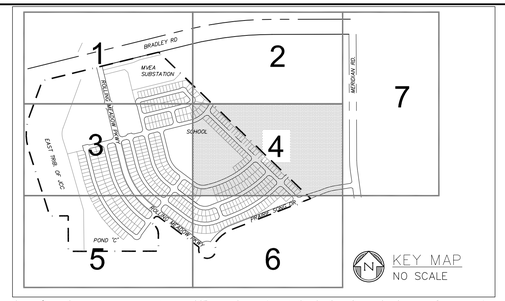
- PUD BOUNDARY
- BASIN BOUNDARY
- BASIN DESIGN POINT
- BASIN I.D. / ACREAGE / 5 YR/100 YR CFS
- DIRECTION OF FLOW
- 6690 EXISTING CONTOUR
- 6670 PROPOSED CONTOUR
- ROW
- EXISTING STORM SEWER
- PROPOSED STORM SEWER
- TIME OF CONCENTRATION
- HP HIGH POINT
- LP LOW POINT
- (6) (8) CROSSPAN (6' OR 8')
- (A) TYPE A CURB/GUTTER

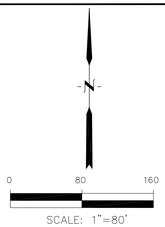
DESIGN POINT SUMMARY

D.P.		5 YEAR cfs	100 YEAR cfs	NOTES
C1		2.9	15.7	OVERLAND FLOW
C2		4.5	14.1	STREET FLOW
C3		7.4	29.8	PIPE FLOW
C4		7.1	15.2	STREET FLOW
C4a		13.3	38.5	PIPE FLOW

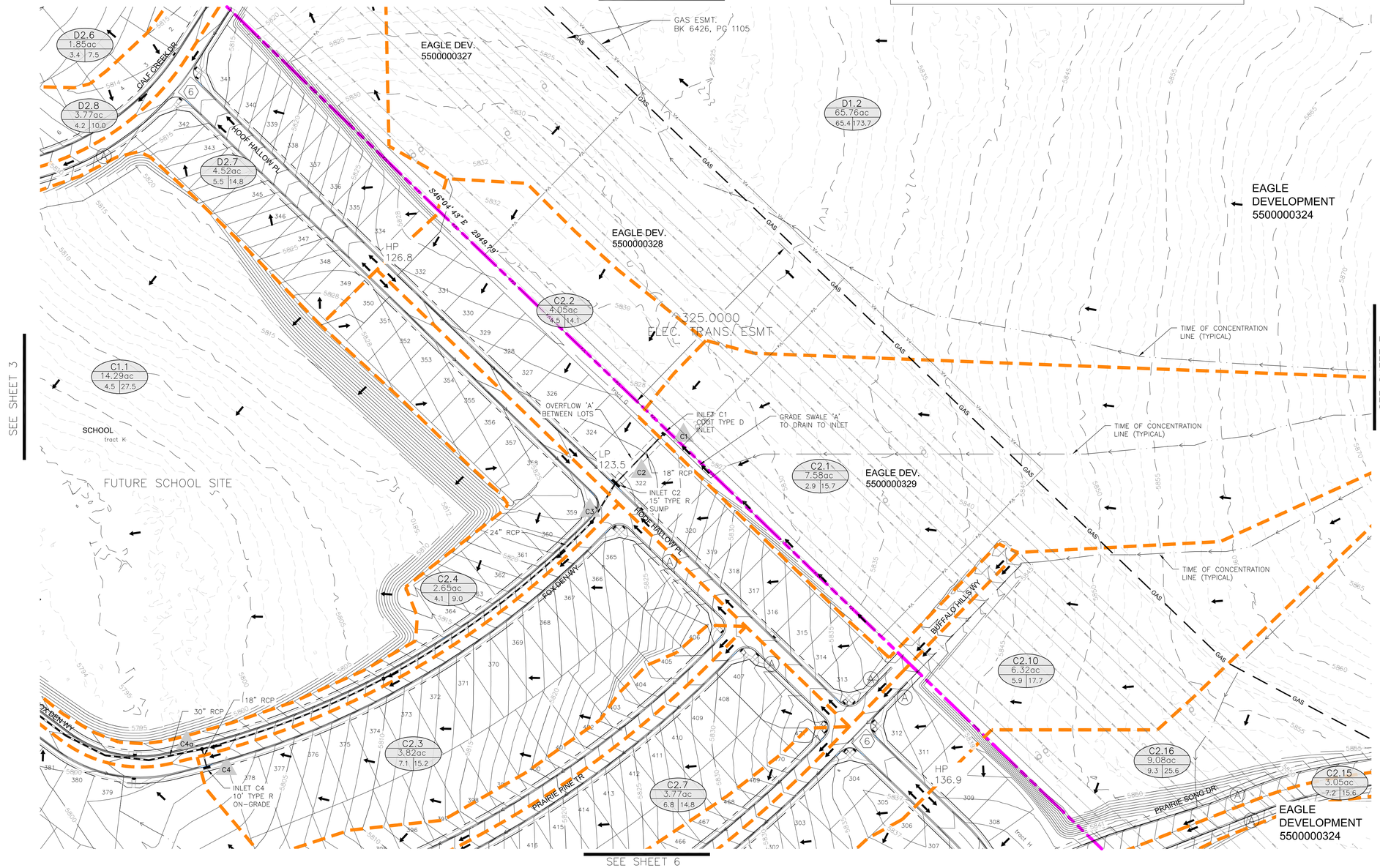
NOTES:

1. ALL PROPOSED STORM SEWER IS RCP ROUND PIPE AND IS A PUBLIC STORM SEWER SYSTEM UNLESS NOTED OTHERWISE.
2. CURB/GUTTER IS TYPE C EXCEPT AS NOTED





SEE SHEET 2



CORE ENGINEERING GROUP
15004 1ST AVENUE S.
BURNSVILLE, MN. 55306
PH: 719.570.1100
CONTACT: RICHARD L. SCHINDLER, P.E.
EMAIL: Rich@cegl.com

DESCRIPTION

NO.

PREPARED FOR:
EAGLE DEVELOPMENT CO.
212 NORTH WAHSATCH AVE. SUITE 301
COLORADO SPRINGS, COLORADO 80903
(719) 635-3200
CONTACT: JEFF MARK

PROJECT:
ANTELOPE RIDGE AT BULL HILL FIL. NO. 1
BRADLEY RD / ROLLING MEADOW DR.
EL PASO COUNTY, COLORADO

DRAWN: RLS
DESIGNED: LAB
CHECKED: RLS

DEVELOPED CONDITIONS
PRELIMINARY DRAINAGE REPORT
ANTELOPE RIDGE AT BULL HILL PHASE 1

DATE: FEB, 2026

PROJECT NO. 100.302

SHEET NUMBER 4

TOTAL SHEETS: 7

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LEGEND

- PUD BOUNDARY
- BASIN BOUNDARY
- BASIN DESIGN POINT
- BASIN I.D. / ACREAGE / 5 YR/100 YR CFS
- DIRECTION OF FLOW
- EXISTING CONTOUR (6690)
- PROPOSED CONTOUR (6670)
- ROW
- EXISTING STORM SEWER
- PROPOSED STORM SEWER
- TIME OF CONCENTRATION
- HP HIGH POINT
- LP LOW POINT
- (6) (8) CROSSPAN (6' OR 8')
- (A) TYPE A CURB/GUTTER

NOTES:

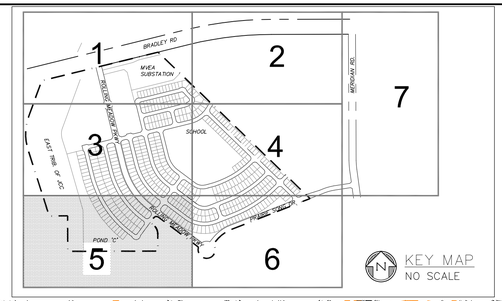
1. ALL PROPOSED STORM SEWER IS RCP ROUND PIPE AND IS A PUBLIC STORM SEWER SYSTEM UNLESS NOTED OTHERWISE.
2. CURB/GUTTER IS TYPE C EXCEPT AS NOTED

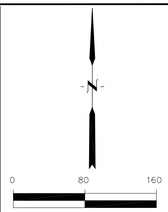
DESIGN POINT SUMMARY

D.P.		5 YEAR cfs	100 YEAR cfs	NOTES
C14		36.5	107.0	PIPE FLOW
C16		5.4	12.0	STREET FLOW
C17		10.7	19.8	PIPE FLOW
C18		47.2	126.8	PIPE FLOW
C19		6.9	18.7	STREET FLOW
C20		50.4	142.1	PIPE FLOW
C21		15.3	53.1	STREET FLOW
C26		31.3	81.0	PIPE FLOW
C27		5.5	9.8	STREET FLOW
C28		36.8	90.8	PIPE FLOW
C29		78.5	207.1	PIPE FLOW
C31		4.7	10.3	STREET FLOW

DESIGN POINT SUMMARY

D.P.		5 YEAR cfs	100 YEAR cfs	NOTES
C32		8.7	21.9	STREET FLOW
C33		1.0	2.3	STREET FLOW
C34		13.7	30.1	PIPE FLOW
C35		89.2	230.7	POND INFLOW FROM SOUTH PIPES
D29		8.1	19.6	STREET FLOW
D30		5.0	12.5	STREET FLOW
D31		13.0	31.6	PIPE FLOW
D32		87.4	189.3	PIPE FLOW
D33		170.3	415.3	TOTAL POND C INFLOW
D34		24.4	219.7	POND C OUTFLOW





SEE SHEET 3

ETRIB CLOMR CONSTRUCTION NOT A PART OF THIS PROJECT
SEE PLANS BY MATRIX CDR 234

UTILITY ESMT. REC.217152003

POND 'C' tract N

60" RCP
POND C OUTLET STRUCTURE

SEE EARLY GRADING FOR POND OUTLET PIPE

FUTURE UTILITY ESMT

BLH NO. 2, LLC
5500000383

EAGLE DEVELOPMENT
5500000324

SUNSET MEADOW TR

ECHO RING GRASS WY

BUFFALO HILLS WY

ROLLING MEADOW DOWN

PRAIRIE PINE TR

SEE SHEET 6

CORE ENGINEERING GROUP
15004 1ST AVENUE S.
BURNSVILLE, MN. 55306
PH: 719.570.1100
CONTACT: RICHARD L. SCHINDLER, P.E.
EMAIL: Rich@cegl.com

PREPARED FOR:
EAGLE DEVELOPMENT CO.
212 NORTH WAHSATCH AVE. SUITE 301
COLORADO SPRINGS, COLORADO 80903
(719) 635-3200
CONTACT: JEFF MARK

NO. DESCRIPTION

PROJECT:
ANTELOPE RIDGE AT BULL HILL FIL. NO. 1
BRADLEY RD / ROLLING MEADOW DR.
EL PASO COUNTY, COLORADO

DRAWN: RLS
DESIGNED: LAB
CHECKED: RLS

DEVELOPED CONDITIONS PRELIMINARY DRAINAGE REPORT ANTELOPE RIDGE AT BULL HILL PHASE 1

DATE: FEB, 2026

PROJECT NO. 100.302

SHEET NUMBER 5

TOTAL SHEETS: 7

LEGEND

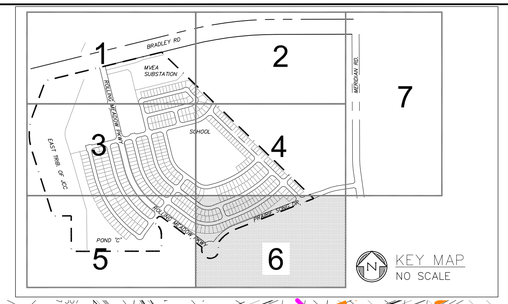
- PUD BOUNDARY
- BASIN BOUNDARY
- BASIN DESIGN POINT
- BASIN I.D. / ACREAGE / 5 YR/100 YR CFS
- DIRECTION OF FLOW
- 6690 EXISTING CONTOUR
- 6670 PROPOSED CONTOUR
- ROW
- EXISTING STORM SEWER
- PROPOSED STORM SEWER
- TIME OF CONCENTRATION
- HP HIGH POINT
- LP LOW POINT
- (6) (8) CROSSPAN (6' OR 8')
- (A) TYPE A CURB/GUTTER

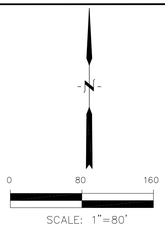
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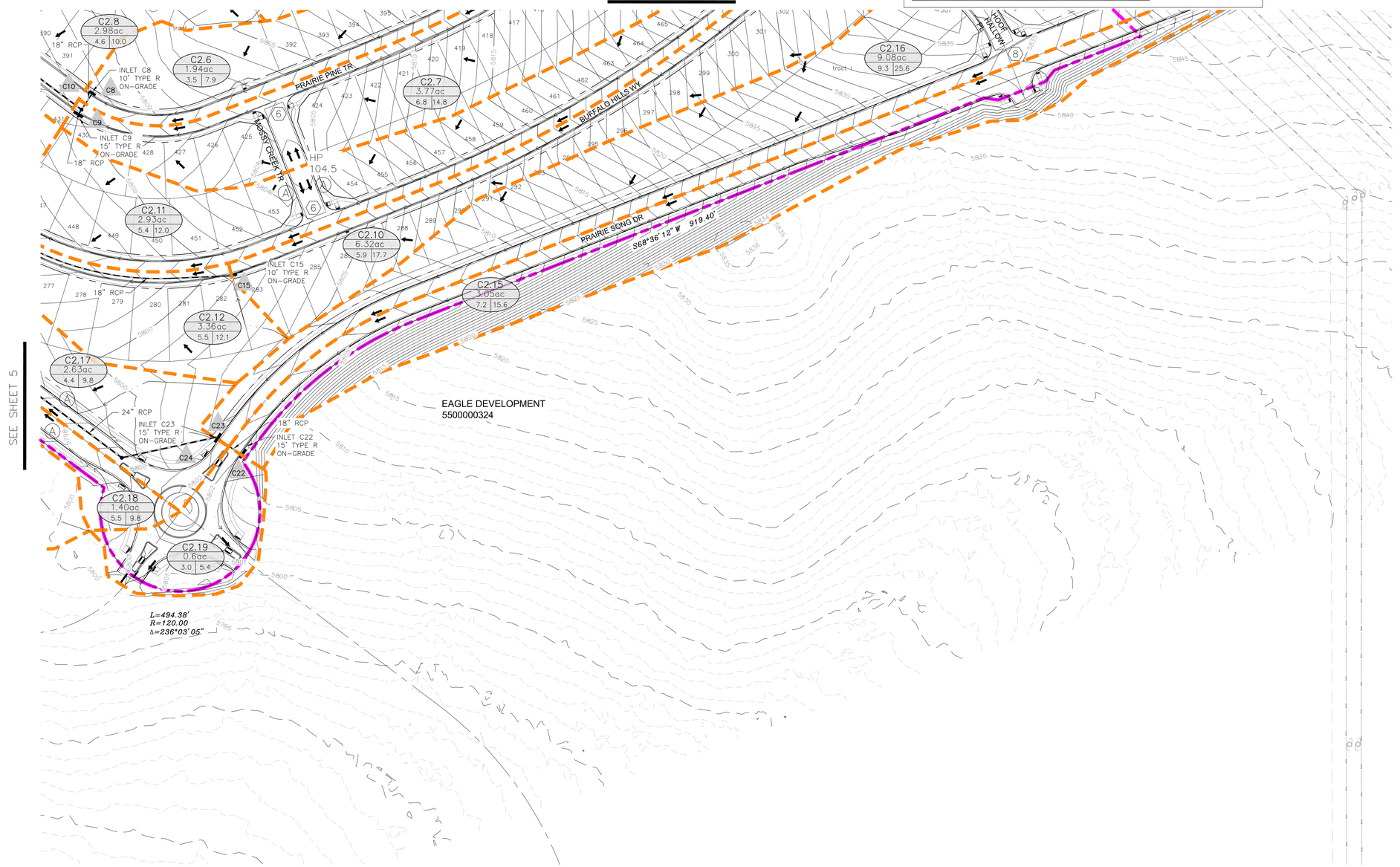
1. ALL PROPOSED STORM SEWER IS RCP ROUND PIPE AND IS A PUBLIC STORM SEWER SYSTEM UNLESS NOTED OTHERWISE.
2. CURB/GUTTER IS TYPE C EXCEPT AS NOTED

DESIGN POINT SUMMARY

D.P.		5 YEAR cfs	100 YEAR cfs	NOTES
C8		3.5	7.9	STREET FLOW
C9		6.8	14.8	STREET FLOW
C10		10.3	18.0	PIPE FLOW
C15		5.9	17.7	STREET FLOW
C22		7.2	15.6	STREET FLOW
C23		9.3	25.6	STREET FLOW
C24		16.0	27.9	PIPE FLOW







CORE ENGINEERING GROUP
15004 1ST AVENUE S.
BURNSVILLE, MN. 55306
PH: 719.570.7100
CONTACT PERSON: L. SCHINDLER, P.E.
EMAIL: Rich@cegi.com

PREPARED FOR:
EAGLE DEVELOPMENT CO.
212 NORTH WAHSATCH AVE. SUITE 301
COLORADO SPRINGS, COLORADO 80903
(719) 635-3200
CONTACT: JEFF MARK

PROJECT:
ANTELOPE RIDGE AT BULL HILL FIL. NO. 1
BRADLEY RD / ROLLING MEADOW DR.
EL PASO COUNTY, COLORADO

NO. DESCRIPTION

DRAWN: RLS
DESIGNED: LAB
CHECKED: RLS

DEVELOPED CONDITIONS PRELIMINARY DRAINAGE REPORT ANTELOPE RIDGE AT BULL HILL PHASE 1

DATE: FEB, 2026

PROJECT NO. 100.302

SHEET NUMBER 6

TOTAL SHEETS: 7

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LEGEND

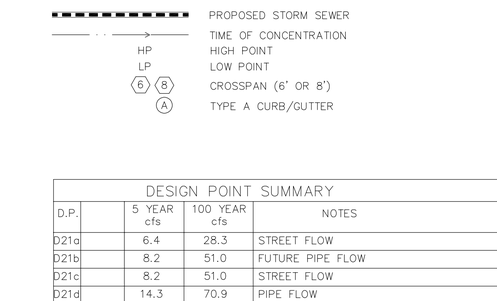
- PLAT BOUNDARY
- BASIN BOUNDARY
- BASIN DESIGN POINT
- BASIN I.D. / ACREAGE / 5 YR/100 YR CFS
- DIRECTION OF FLOW
- 6690 EXISTING CONTOUR
- 6670 PROPOSED CONTOUR
- ROW
- EXISTING STORM SEWER
- PROPOSED STORM SEWER
- TIME OF CONCENTRATION
- HP HIGH POINT
- LP LOW POINT
- 6 8 CROSSPAN (6' OR 8')
- A TYPE A CURB/GUTTER

NOTES:

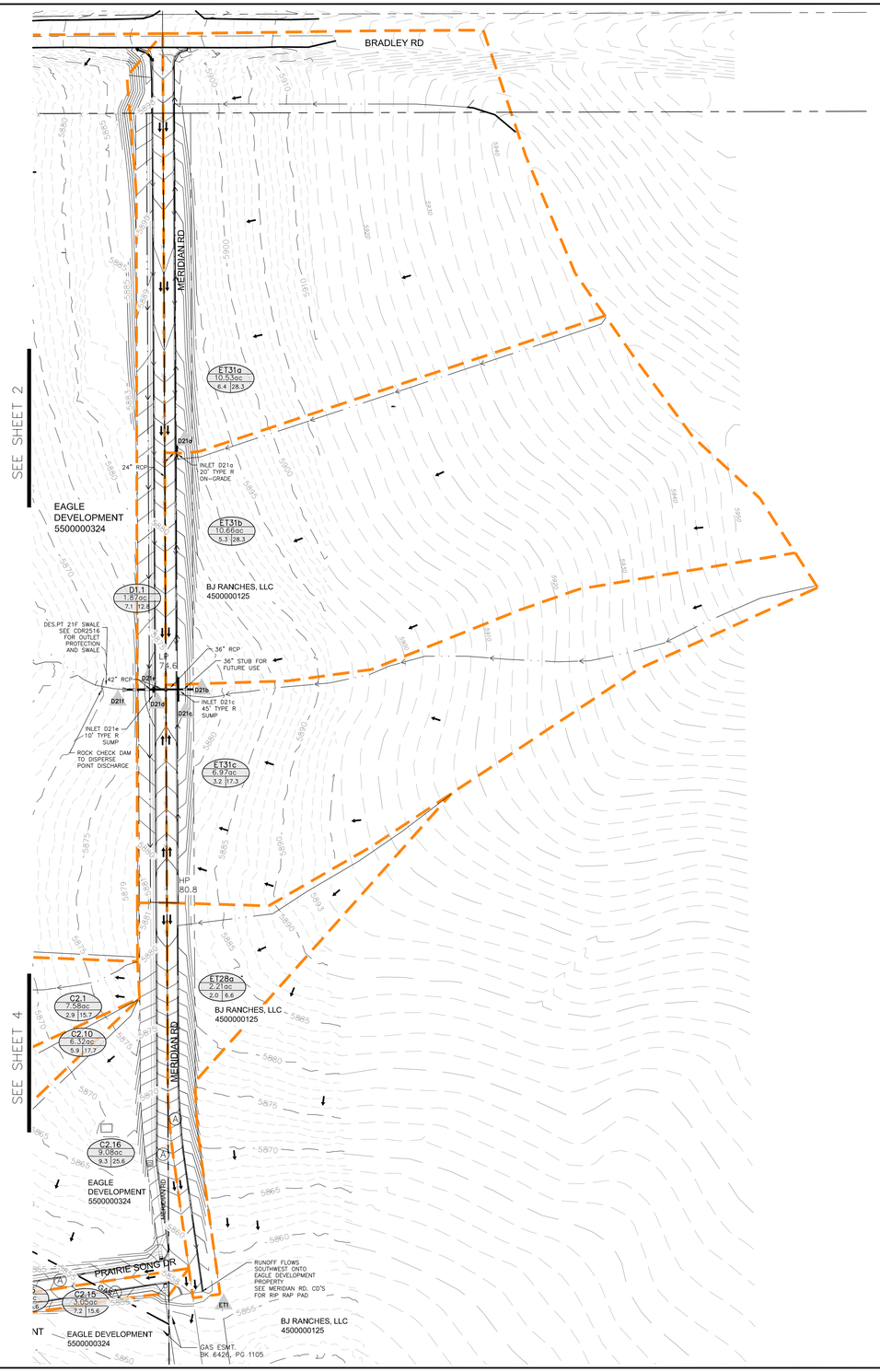
1. ALL PROPOSED STORM SEWER IS RCP ROUND PIPE AND IS A PUBLIC STORM SEWER SYSTEM UNLESS NOTED OTHERWISE.
2. CURB/GUTTER IS TYPE C EXCEPT AS NOTED

DESIGN POINT SUMMARY

D.P.		5 YEAR cfs	100 YEAR cfs	NOTES
D21a		6.4	28.3	STREET FLOW
D21b		8.2	51.0	FUTURE PIPE FLOW
D21c		8.2	51.0	STREET FLOW
D21d		14.3	70.9	PIPE FLOW
D21e		7.1	12.8	STREET FLOW
D21f		19.2	79.7	PIPE FLOW



KEY MAP
NO SCALE



CORE ENGINEERING GROUP
15004 1ST AVENUE S.
BURNSVILLE, MN. 55306
PH: 719.570.1100
CONTACT: RICHARD L. SCHINDLER, P.E.
EMAIL: Rich@cegl.com

NO. | DESCRIPTION

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CONTACT: JEFF MARK

PROJECT:
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BRADLEY RD / ROLLING MEADOW DR.
EL PASO COUNTY, COLORADO

DRAWN: RLS
DESIGNED: LAB
CHECKED: RLS

DEVELOPED CONDITIONS
PRELIMINARY/FINAL DRAINAGE REPORT
ANTELOPE RIDGE AT BULL HILL FIL. NO. 1

DATE: FEB, 2026

PROJECT NO. 100.302

SHEET NUMBER 7

TOTAL SHEETS: 7

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