

**FINAL DRAINAGE REPORT  
FOR  
THE VILLAS AT CLAREMONT RANCH**

July 2022

Prepared for:

Phi Real Estate Services, LLC  
200 W. City Center Dr. Ste 200  
Pueblo, CO 81003

Prepared By:



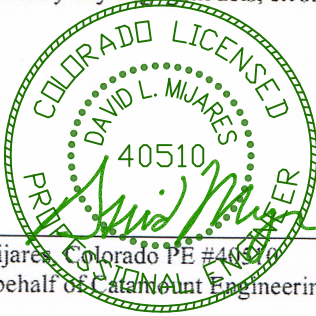
321 W. Henrietta Ave, Suite A  
Woodland Park, CO 80863  
719-426-2124

PCD NO. SF-22-028

FINAL DRAINAGE REPORT  
THE VILLAS AT CLAREMONT RANCH

**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 the criteria established 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.



\_\_\_\_\_  
David L. Mijares, Colorado PE #40510  
For and on behalf of Catalant Engineering

Date 12/14/22

**Developer's Statement:**

Premiere Homes Inc. the developer has read and will comply with all of the requirements specified in this drainage report and plan.

\_\_\_\_\_  
Phi Real Estate Services, LLC  
Business Name

By: [Signature]

Title: MANAGER

Address: 200 W. City Center Dr. Ste 200  
Pueblo, CO 81003

**El Paso County:**

Filed in accordance with the requirements of the El Paso County land Development Code and the Drainage Criteria manual Volumes 1 and 2, and the El Paso County Engineering Criteria Manual, latest revision.

\_\_\_\_\_  
Josh Palmer, PE  
County Engineer/ECM Administrator

Date \_\_\_\_\_

Conditions:

# **FINAL DRAINAGE REPORT for THE VILLAS AT CLAREMONT RANCH**

## **PURPOSE**

The purpose of this drainage report is to identify existing drainage patterns, quantify developed storm water runoff, and establish outfall scenarios from the proposed development. Additionally, this analysis will establish compliance with previous drainage studies and provide for water quality and detention of developed runoff.

## **GENERAL LOCATION AND DESCRIPTION**

The subject 10.17 acres is proposed to be platted into 83 residential townhome lots and is located within the southwest ¼ of Section 4, Township 14 South, Range 65 West of the 6<sup>th</sup> principal meridian El Paso County, Colorado. The parcel was previously platted as tracts G and A, Claremont Ranch Filing No. 7

The parcel is bounded on the north by the East Fork of Sand Creek, on the east by the Claremont Ranch Filing No. 7 single family residential development, on the south by Meadowbrook Parkway and undeveloped tract F, and on the west by Tract I and Marksheffel Road.

The site has been previously stripped and contains little volunteer vegetation besides erosion control cover. The existing terrain generally slopes to the west at a 2% grade. A swale has been formed adjacent to the Marksheffel embankment conveying undeveloped flow overland to the east Fork of Sand Creek. The site lies within the Sand Creek Drainage Basin.

Soils in the development parcel consist predominantly of Blendon sandy loam (Hydrologic Group 'B' soils) and also contains Blakeland loamy sand and Ellicott loamy coarse sand (Hydrologic Group 'A' soils) as determined by the Natural Resources Conservation Service Web Soil Survey. Hydrologic Group B soils were used in analysis.

No portion of the development lies within an F.E.M.A. designated floodplain per FIRM 08041C0756 G, effective 12/07/2018. The revised F.E.M.A. Flood Insurance Rate Map has been provided in the appendix.

## **EXISTING DRAINAGE CONDITIONS**

The site was previously studied in the Final Drainage Report for Claremont Ranch Filing No. 7. Development of Filing No. 7 required analysis and implementation of improvements within the adjacent Lower East Fork of Sand Creek. Improvements were implemented per the Sand Creek Drainage Basin Planning Study and Preliminary Design Report; City of Colorado Springs, El Paso County, Colorado (DBPS), prepared by Kiowa Engineering Corp., revised March 1996. As upstream detention proposed in the DBPS has not been implemented the more conservative FEMA 100-YR Flow was utilized in channel evaluation and improvement. The FEMA analysis assumes

a 100-YR flow of 4,500 cfs through the adjacent reach, while the DBPS estimates a flow of 3,310 cfs with upstream detention. The adjacent Lower East Fork Sand Creek improvements are detailed in the Final Drainage Report for Claremont Ranch Filing no. 7.

The Villas at Claremont Ranch were platted as Tracts 'G' and 'A' with development of Claremont Ranch Filing No. 7 and was identified as 12.21 acre commercial development (basin 7) in the final drainage report. Anticipated runoff from Basin 7 was  $Q_5=9.5$  cfs,  $Q_{100}=24.4$  in the interim condition and  $Q_5=56.0$  cfs,  $Q_{100}=96.7$  in the fully developed condition. The Villas at Claremont Ranch lies entirely with the Sand Creek Drainage Basin Planning Study area.

Basin 6 Claremont Ranch Filing No. 7 consists of undeveloped tract F south of Meadowbrook Parkway. The 11.18 acre basin (10.17 acres within the proposed Villas at Claremont Ranch) is proposed for commercial use and generates anticipated runoff of was  $Q_5=10.1$  cfs,  $Q_{100}=25.8$  in the interim condition and  $Q_5=60.4$  cfs,  $Q_{100}=90.5$  in the fully developed condition. A permanent public 24" culvert crossing was installed with development of Meadowbrook Parkway to convey flows north to Sand Creek. Interim flows will be conveyed in existing swale section developed with Filing No. 7 improvements within the 70' utility and drainage easement located along the west side of the proposed Villas at Claremont Ranch Development. Developed flows will not be accepted onto the Villas at Claremont Ranch and any development scenarios for Tract F will require water quality implementation and full spectrum detention prior to site release across Meadowbrook Parkway. Interim flows defined in the Final Drainage Report for Filing No. 7 will be accepted.

## **DEVELOPED DRAINAGE BASINS**

Developed basins proposed to receive an increase in impervious areas will be routed to an on-site extended detention basin providing full spectrum detention prior to release to the East Fork of Sand Creek. Basins routed through the proposed EDB will be collected in proposed private roadway sections and collected in a private inlet system. Collected runoff will be conveyed in a private storm system to the EDB. A summary of peak developed runoff for the basins and design points are depicted in the Developed Drainage Plan in the appendix.

Basin 1 consists of perimeter landscape areas directly tributary to the East Fork of Sand Creek and will not be collected in the proposed extended detention basin. Basin 1 contains 2.25 acres and generates runoff of ( $Q_2=0.2$  cfs,  $Q_5=0.6$  cfs,  $Q_{10}=1.2$  cfs,  $Q_{25}=2.0$  cfs,  $Q_{50}=2.6$  cfs, and  $Q_{100}=3.3$  cfs). Runoff from Basin 1 will either sheet flow directly to the reach of Sand Creek or be combined with interim condition runoff from Basin 6 (Claremont Ranch Filing No. 7) of  $Q_5=10.1$  cfs,  $Q_{100}=25.8$  to the existing riprap rundown to Sand Creek. The swale and rundown installed with filing 7 improvements was developed to convey interim flows from both Basin 6 (tract F, Claremont Ranch Filing No. 7) and Basin 7 (tracts G and A, Claremont Ranch Filing No. 7) with a combined flow of  $Q_5=19.6$  cfs,  $Q_{100}=50.2$ . No impervious improvements are proposed within Basin 1. Runoff from pervious area of Basin 1 will be conveyed across pervious surfaces in an unimproved trapezoidal grass swale with a 40' bottom width at a depth of 0.40' to outfall directly to Sand Creek. See Appendix for channel section A-A calculation

Unresolved Review #3 comment:

State which WQ treatment exclusion applies to this basin.

Review #4 clarification:

WQ treatment is required for all soil disturbances, not just for impervious surfaces, unless a WQ exclusion applies. Thus state which WQ exclusion you believe applies to Basins 1, 1.1, and 10.

Unresolved:  
Per previous paragraph  
flows from Basin 6 Filing 7  
are 10.1 & 25.8 cfs.

Sub-Basin 1.1 (0.76 Acres,  $Q_2=0.2$  cfs,  $Q_5=0.5$  cfs,  $Q_{10}=0.8$  cfs,  $Q_{25}=1.3$  cfs,  $Q_{50}=1.7$  cfs, and  $Q_{100}=2.1$  cfs) will be collected into a grass lined (V ditch) swale with 4:1 side slopes, conveying the flows South to Design Point 10. At Design Point 10 ( $Q_5=10.6$  cfs,  $Q_{10}=27.9$  cfs) flows are combined with offsite interim flows identified in the final drainage report for filing no. 7 basin 6 of  $Q_5=10.6$  cfs,  $Q_{10}=27.9$  cfs and conveyed in a trapezoidal channel section to outfall in Sand Creek. No impervious improvements are proposed within Basin 1. Runoff from pervious area of Basin 1 will be conveyed across pervious surfaces in an unimproved trapezoidal grass swale with a 40' bottom width at a depth of 0.40' to outfall directly to Sand Creek.

Basin 10 consists of rear yards of the residential portion of Filing No. 7 tributary to the Villas at Claremont development. Runoff from these perimeter landscape areas directly tributary to the East Fork of Sand Creek, will be conveyed by a proposed grass lined swale offsite, and will not be collected in the proposed extended detention basin. Basin 10 contains 0.54 acres and generates runoff of ( $Q_2=0.1$  cfs,  $Q_5=0.3$  cfs,  $Q_{10}=0.5$  cfs,  $Q_{25}=0.8$  cfs,  $Q_{50}=1.1$  cfs, and  $Q_{100}=1.4$  cfs). No improvements are proposed within Basin 10 affecting existing off-site facilities. Runoff from pervious area of Basin 10 will be conveyed across pervious surfaces in an unimproved trapezoidal grass swale.

#### BASINS TRIBUTARY TO EDB

Basins 2 through 8 consist of the landscape areas, residential townhome lots, and private street improvements tributary to the proposed extended detention basin. Basin 9 consists of rear lots developed within the residential portion of Filing No. 7 tributary to the extended detention basin.

Basin 2 (1.92 Acres,  $Q_2=1.3$  cfs,  $Q_5=1.9$  cfs,  $Q_{10}=2.7$  cfs,  $Q_{25}=3.8$  cfs,  $Q_{50}=4.6$  cfs, and  $Q_{100}=5.6$  cfs) consists of lots and landscape area along the north and east of the development. Flows from basin 2 will be conveyed in a grass swale along the northeast of the development to outfall directly to the proposed detention pond. Swale sizing calculations have been presented in the appendix.

Basin 3 (0.76 Acres,  $Q_2=1.1$  cfs,  $Q_5=1.5$  cfs,  $Q_{10}=2.0$  cfs,  $Q_{25}=2.5$  cfs,  $Q_{50}=2.9$  cfs, and  $Q_{100}=3.4$  cfs) consists of townhome lots and roadway improvements tributary to the proposed private 5' type R sump inlet at Design Point 2. Calculations for Carrside Grove street capacity and inlet analysis are provided in the appendix.

Basin 4 (1.00 Acres,  $Q_2=1.2$  cfs,  $Q_5=1.7$  cfs,  $Q_{10}=2.2$  cfs,  $Q_{25}=2.7$  cfs,  $Q_{50}=3.2$  cfs, and  $Q_{100}=3.7$  cfs) consists of townhome lots, landscape corridors, and roadway improvements tributary to the proposed private 5' type R sump inlet at Design Point 3. Calculations for Carrside Grove street capacity and inlet analysis are provided in the appendix.

Basin 5 (0.80 Acres,  $Q_2=1.2$  cfs,  $Q_5=1.7$  cfs,  $Q_{10}=2.2$  cfs,  $Q_{25}=2.7$  cfs,  $Q_{50}=3.2$  cfs, and  $Q_{100}=3.7$  cfs) consists of townhome lots, landscape corridors, and roadway improvements tributary to the proposed private 5' type R sump inlet at Design Point 4. Calculations for Fieldside Way street capacity and inlet analysis are provided in the appendix.

Basin 6 (1.95 Acres,  $Q_2=2.1$  cfs,  $Q_5=3.0$  cfs,  $Q_{10}=3.9$  cfs,  $Q_{25}=5.0$  cfs,  $Q_{50}=6.0$  cfs, and  $Q_{100}=7.0$  cfs) consists of townhome lots, landscape corridors, and roadway improvements tributary to the

Does not match inlet size in spreadsheet

proposed private 10' type R sump inlet at Design Point 5. Calculations for Fieldside Way street capacity and inlet analysis are provided in the appendix.

Basin 7 (0.65 Acres,  $Q_2=1.0$  cfs,  $Q_5=1.4$  cfs,  $Q_{10}=1.7$  cfs,  $Q_{25}=2.2$  cfs,  $Q_{50}=2.6$  cfs, and  $Q_{100}=3.0$  cfs) consists of townhome lots, landscape corridors, and roadway improvements tributary to the proposed private 5' type R sump inlet at Design Point 7. Calculations for Greengate Way street capacity and inlet analysis are provided in the appendix.

Basin 8 (0.62 Acres,  $Q_2=1.2$  cfs,  $Q_5=1.6$  cfs,  $Q_{10}=2.0$  cfs,  $Q_{25}=2.4$  cfs,  $Q_{50}=2.9$  cfs, and  $Q_{100}=3.3$  cfs) consists of a small landscape area and private roadway improvements tributary to the proposed private 5' type R sump inlet at Design Point 6. Calculations for Greengate Way street capacity and inlet analysis are provided in the appendix.

Basin 9 (0.13 Acres,  $Q_2=0.0$  cfs,  $Q_5=0.1$  cfs,  $Q_{10}=0.1$  cfs,  $Q_{25}=0.2$  cfs,  $Q_{50}=0.2$  cfs, and  $Q_{100}=0.3$  cfs) consists of a northern portion of rear yards of the residential portion of Filing No. 7 tributary to the Villas at Claremont development. Runoff from this area will sheet flow across the proposed landscape tract and be conveyed in a vegetated swale to the proposed EDB. Swale sizing calculations are included in the appendix.

## CONVEYANCE

Internal landscape and residential corridor areas, located within Basins 4 and 6 will utilize 2-foot-wide sidewalk chases to convey landscaped area stormwater swale flows into the adjacent street curb flow lines. A separate hydrologic analysis has been performed for the designated internal areas (Sub-Basin 1.1, 2.1, 4.1 and 6.1, respectively), and has been included in the Appendix.

Sub-Basin 1.1 (0.76 Acres,  $Q_2=0.2$  cfs,  $Q_5=0.5$  cfs,  $Q_{10}=0.8$  cfs,  $Q_{25}=1.3$  cfs,  $Q_{50}=1.7$  cfs, and  $Q_{100}=2.1$  cfs) will be collected into a grass lined (V ditch) swale with 4:1 side slopes, conveying the flows south to Design Point 10.

Sub-Basin 2.1 (0.19 Acres,  $Q_2=0.6$  cfs,  $Q_5=0.7$  cfs,  $Q_{10}=0.9$  cfs,  $Q_{25}=1.1$  cfs,  $Q_{50}=1.2$  cfs, and  $Q_{100}=1.4$  cfs) will be collected into a (dual) curb cuts 2' wide x 5.5' long sidewalk and outfall to 2.0' x 2.0' D50=6" dual drainage pads (outfall calculations provided in appendix).

Sub-Basin 4.1 (0.32 Acres,  $Q_2=0.4$  cfs,  $Q_5=0.5$  cfs,  $Q_{10}=0.7$  cfs,  $Q_{25}=0.9$  cfs,  $Q_{50}=1.0$  cfs, and  $Q_{100}=1.2$  cfs) will be collected into a 2' wide x 5.5' long sidewalk curb chase and outfall north into Carside Grove curb flow lines and be conveyed to a low point near a proposed private 10' storm inlet located at Design Point 3.

Sub-Basin 6.1 (0.45 Acres,  $Q_2=0.4$  cfs,  $Q_5=0.6$  cfs,  $Q_{10}=0.8$  cfs,  $Q_{25}=1.1$  cfs,  $Q_{50}=1.3$  cfs, and  $Q_{100}=1.6$  cfs) will be collected into a 2' wide x 5.5' long sidewalk curb chase and outfall north into Fieldside View curb flow lines and be conveyed to a low point near a proposed private 10' storm inlet located at Design Point 5.

Flows at DP-7 will be collected in a 5' Type R inlet and outfall in an 18" RCP at 0.50% to the inlet at DP-6. Combined flows at DP-A of  $Q_5=3.0$  cfs,  $Q_{100}=6.4$  will be conveyed north in an 18" RCP at 0.61% to the proposed manhole at DP-B.

Flows from DP-5 will be collected in a 10' Type R inlet and outfall in an 18" RCP at 0.50% to the inlet at DP-4. Flows from DP-4 will be collected in a 5' Type R inlet. Combined flows from DP-4 and DP-5 will be conveyed in an 18" RCP at 0.50% to the manhole at DP-B ( $Q_5=6.8$  cfs,  $Q_{100}=15.3$ )

UNRESOLVED: 10' per inlet spreadsheet

Combined outflow from the manhole at DP-B will be conveyed in a 30" RCP storm sewer at 0.50% to the manhole at DP-C and combined with flows intercepted in the 5' Type R inlet at DP-3. Combined flows from DP-C of  $Q_5=8.6$  cfs,  $Q_{100}=19.0$  cfs will be conveyed in a 30" RCP at 0.50% to the 10' Type R inlet at DP-D. Combined flows at DP-D of  $Q_5=9.9$  cfs,  $Q_{100}=21.9$  will be conveyed in a 30" RCP at 0.50% to pond outfall within the proposed EDB.

Swale calculations are provided in the appendix. All swales indicate velocities below 5.0 ft/second and maintain a minimum of 1.0' freeboard. Calculations were performed utilizing hydraflow extension for AutoCAD Civil 3D.

Opposing inlet pairs are proposed for Design Points 2 and 3; 4 and 5; and 6 and 7. Inlet pairs are designed to allow flow equalization for the major storm event when flow could overtop the crown of the street. No ponding is proposed beyond the back of curb elevation.

## EXTENDED DETENTION BASIN

Proposed EDB 'B will require a WQCV of 0.139 acre-feet, an EURV Volume of 0.314 acre-feet and a total storage volume of 0.760 acre-ft. The pond provides 0.761 acre-ft of storage below the emergency outfall. The EDB will be designed to meet current Urban Drainage design criteria for forebay, outfall structure, and micropool (*See Calculations in Appendix*). Proposed EDB 'B will outfall through an 18" RCP storm sewer directly to the East Branch of Sand Creek. The Basin outfalls developed runoff of ( $Q_5=1.2$  cfs,  $Q_{100}=4.2$  cfs) to Design Point E. The emergency spillway will consist of a 20' wide trapezoidal weir constructed of soil riprap conveying the undetained 100-YR flow from Design Point 1 of 25.0 cfs at a maximum depth of 0.34'. Emergency overflow will be conveyed directly to the East Branch of Sand Creek. See Appendix for calculations. The CENTRAL MARKSHEFFEL METROPOLITAN DISTRICT will maintain the private pond facility.

The improved trail adjacent to Sand Creek has not been installed adjacent to the pond. The area will be graded to represent anticipated trail installation but will be constructed from pond overflow through channel toe with soil riprap with seeded topsoil cover. Future installation of trail segment is anticipated to be concrete trail along top of channel embankment. Spillway is intended only for emergency outflow path to adjacent channel. Major storm event is conveyed through outlet structure and conveyed through pipe system to channel bottom.

The pond maintenance access is provided from proposed parking located north of the intersection of Belton Heights and Carrside Grove. The southerly portion of access above all proposed water surface elevations is combined with required sanitary sewer access and will be constructed to

Utility District Standards which exceed county requirements. The portion of the pond within the pond will be constructed of an all-weather stable surface of roadbase, gravel, or rock and maintains a maximum 10% grade per ECM 3.3.3.K.

Calculations in the Mile High Flood District UD-detention spreadsheet indicate that developed outflow during intermediate storm events exceed historic intermediate storm event release in order to comply with time constrained release of 97% of 5-YR event. The adjacent reach of Sand Creek is designed to accommodate 100-YR event conveyance and will not be negatively impacted by intermediate release rates. DBPS recommended improvements were installed for the adjacent reach and have been included in the appendix.

Trickle Channel calculations have been provided in the appendix.

The area of the development tributary to proposed EDB ‘B’ includes the following:

Tract/Use	Area	% Impervious
Lots	5.12	65%
Hardscape	0.80	89%
Landscape	1.91	0%
Total Area	7.83	52.7% Avg % Impervious

## **DRAINAGE METHODOLOGY**

This drainage report was prepared in accordance to the criteria established in the El Paso County CDM Vol 1 and 2 with Vol 1 updates.

The rational method for drainage basin study areas of less than 100 acres was utilized in the analysis. For the Rational Method, flows were calculated for the 2, 5, 10, 25, 50, and 100-year recurrence intervals. The average runoff coefficients, ‘C’ values, are taken from Table 6-6 and the Intensity-Duration-Frequency curves are taken from Figure 6-5 of the City Drainage Criteria Manual. Time of concentration for overland flow and storm drain or gutter flow are calculated per Chapter 6 Section 3.2 of the City Drainage Criteria Manual. Calculations for the Rational Method are shown in the Appendix of this report.

Mile High Flood District methodology was utilized for determination of street capacity and inlet sizing. Calculations are shown in the appendix of this report. Hydraulic Grade Line Calculations have been provided within this report.

The analysis, presented in the appendix, provides more detailed calculations for the system in accordance with the requirements of the El Paso County DCM criteria. The storm sewer plan and profile drawings have been submitted concurrently with this analysis.

## **WATER QUALITY/4-STEP PROCESS**



## **4-STEP PROCESS**

### **STEP 1: EMPLOY RUNOFF REDUCTION PRACTICES**

The development addresses Low Impact Development strategies primarily through the utilization of landscape swales within rear lots directing runoff from rooflines and patios through swales with minimal longitudinal grade prior to outfall to the private street system.

### **STEP 2: STABILIZE DRAINAGEWAYS**

The ultimate recipient of runoff from the site is the East Branch of Sand Creek. The adjacent reach of Sand Creek was improved to ultimate DBPW recommendations with the development of Filing No. 7.

### **STEP 3: PROVIDE WATER QUALITY CAPTURE VOLUME**

On-site flow is directed to a proposed extended detention basin providing water quality capture volume and attenuated release rates prior to release off-site. Release from the extended detention basin is less than assumed in the Final Drainage Report for Filing No. 7 as development was assumed to be commercial in nature and no detention scenario was initially proposed.

### **STEP 4: CONSIDER NEED FOR INDUSTRIAL AND COMMERCIAL BMP'S**

A Grading, Erosion Control, and Stormwater Quality Plan and narrative have been submitted concurrently for the development and will be subject to county approval prior to any soil disturbance. The erosion control plan included specific source control BMP's as well defined overall site management practices for the construction period. No industrial or commercial uses are proposed with the Villas at Claremont Ranch development. No temporary batch plant operations are proposed with residential development.

## COST ESTIMATE

### Private Improvements Non-reimbursable

5' TYPE R INLET	2 EA	@\$	6,138/EA	\$ 12,276
10' TYPE R INLET	4 EA	@\$	8,447/EA	\$ 33,788
TYPE I MH	3 EA	@\$	7,082/EA	\$ 21,246
18"RCP	497 LF	@\$	70/LF	\$ 34,790
30" RCP	392 LF	@\$	104/LF	\$ 40,768
18"RCP FES	1 EA	@\$	420/EA	\$ 420
D <sub>50</sub> =6" RipRap	58 Tons	@\$	89.00/Ton	\$ 5,162
Detention Outlet Structure	1 EA	@\$	9,000/LS	\$ 9,000
Pond Grading	1500 CY	@\$	6.00/EA	\$ 9,000
Extended Detention Basin	1 LS	@\$	35,000/LS	\$ 35,000

<b>SUBTOTAL</b>	<b>\$ 201,450</b>
<i>15% CONTINGENCY</i>	<i>\$ 30,218</i>
<b>TOTAL</b>	<b>\$ 231,668</b>

## DRAINAGE FEE CALCULATION

Drainage Fees were accounted for with the original platting of the parcel as tracts G and A of Claremont Ranch Filing No. 7 (see appendix).

## DRAINAGE METHODOLOGY

This drainage report was prepared in accordance to the criteria established in the City of Colorado Springs/El Paso County Drainage Criteria Manual Volumes 1 and 2, as revised May 2015.

The rational method for drainage basin study areas of less than 100 acres was utilized in the analysis. For the Rational Method, flows were calculated for the 2, 5, 10, 25, 50, and 100-year recurrence intervals. The average runoff coefficients, 'C' values, are taken from Table 6-6 and the Intensity-Duration-Frequency curves are taken from Figure 6-5 of the City of Colorado Springs/El Paso County Drainage Criteria Manual. Time of concentration for overland flow and storm drain or gutter flow are calculated per Section 3.2 of the City Drainage Criteria Manual. Calculations for the Rational Method are shown in the Appendix of this report.

## **SUMMARY**

The Villas at Claremont Ranch Development exhibits drainage patterns consistent with those anticipated in the Final Drainage Report for Filing No. 7. Volume of water released from the site anticipated in the Filing 7 Final Drainage Report has been significantly reduced due to the parcel developing as residential rather commercial and implementation of on-site water quality and full spectrum detention facilities as required by current criteria. Private Storm system is designed to intercept the full 100-year runoff event and convey to existing east branch of sand creek. Development of the parcel is in conformance of current El Paso County criteria and will not adversely affect downstream properties or facilities.

## **REFERENCES:**

El Paso County, Colorado Engineering Division Drainage Criteria Manual Volume 1, (1990), revised Oct 2018

El Paso County, Colorado Engineering Division Drainage Criteria Manual Volume 2, November 2002

El Paso County, Colorado Engineering Division Drainage Criteria Manual Update, (2015)

El Paso County Engineering Criteria Manual, (2004), revised Oct 2020

“Claremont Ranch Subdivision Filing No. 7 Preliminary and Final Drainage Report”, prepared by Engineering and Surveying, Inc., dated May 2004.

“Final Master Development Drainage Plan and Preliminary Drainage Plan for the Claremont Ranch”, prepared by Matrix Design Group, Inc., revised July 2002.

“Sand Creek Drainage Basin Planning Study Preliminary Drainage Report”, prepared by Kiowa Engineering Corporation, revised March 21996.

Preliminary and Final Drainage Report for International Bible Society Filing No. 1” prepared by URS Consultants, dated August, 1988.

Flood Insurance rate map 08041C0756 F, as revised to reflect LOMR Case No. 08-08-0630P

Natural Resources Conservation Service Web Soil Survey

## APPENDIX



**VICINITY MAP**

SCALE: N.T.S.

# National Flood Hazard Layer FIRMMette



104°41'12"W 38°51'31"N



## Legend

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

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

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

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

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

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

MAP PANELS	Digital Data Available	No Digital Data Available	Unmapped

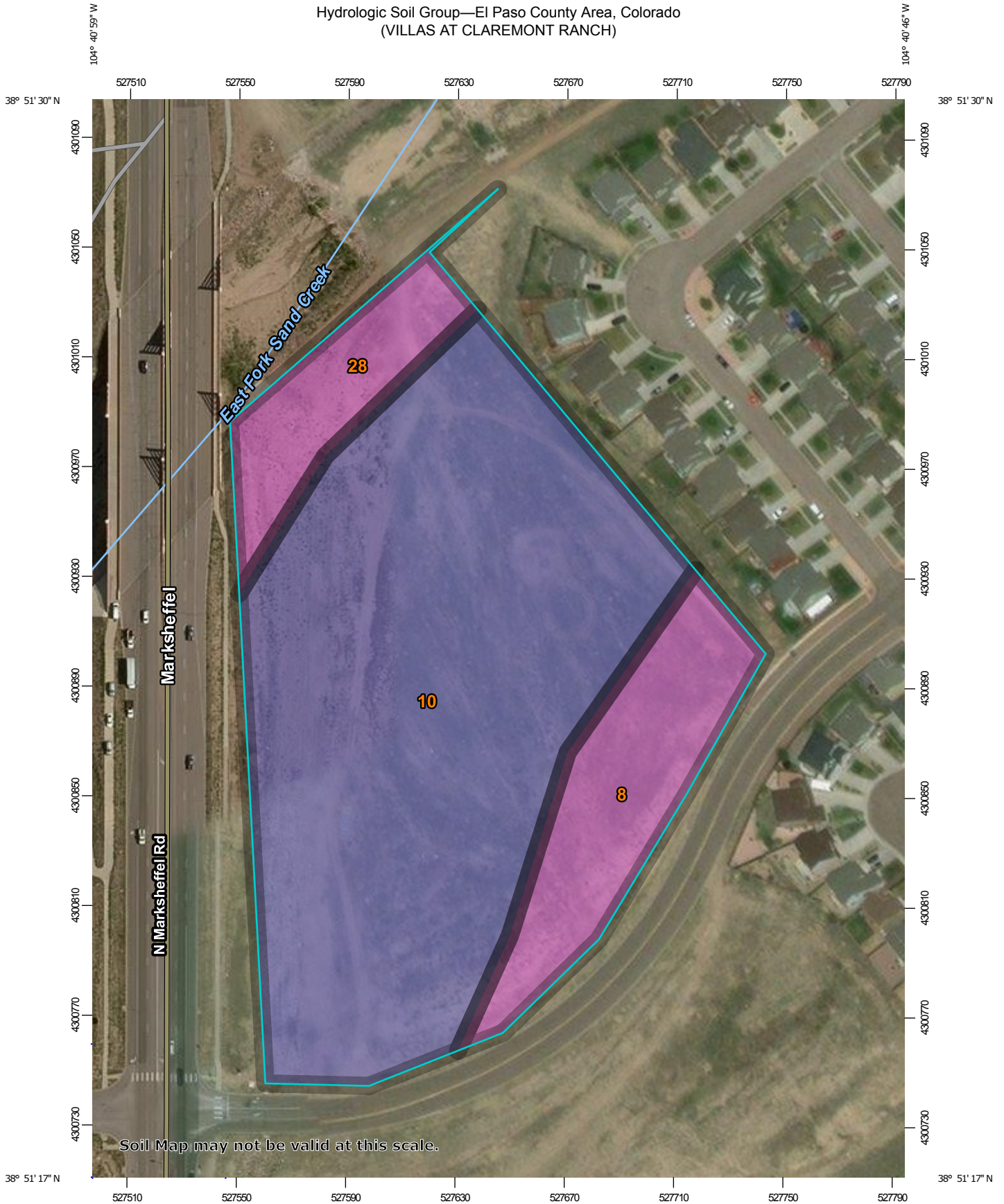
The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

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

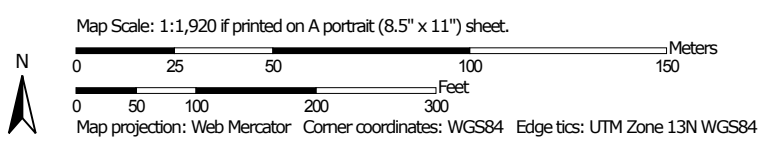
The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on **11/17/2020 at 2:43 PM** and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

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

Hydrologic Soil Group—El Paso County Area, Colorado  
(VILLAS AT CLAREMONT RANCH)



Soil Map may not be valid at this scale.






Hydrologic Soil Group—El Paso County Area, Colorado  
(VILLAS AT CLAREMONT RANCH)

### MAP LEGEND

**Area of Interest (AOI)**









 Area of Interest (AOI)

**Soils**

**Soil Rating Polygons**





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

**Soil Rating Lines**

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

**Soil Rating Points**






-  A
-  A/D
-  B
-  B/D

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

**Water Features**

 Streams and Canals

**Transportation**

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

**Background**

 Aerial Photography

### MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: El Paso County Area, Colorado  
Survey Area Data: Version 14, Sep 23, 2016

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

Date(s) aerial images were photographed: Apr 15, 2011—Mar 9, 2017

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

## Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
8	Blakeland loamy sand, 1 to 9 percent slopes	A	1.6	16.2%
10	Blendon sandy loam, 0 to 3 percent slopes	B	7.1	74.2%
28	Ellicott loamy coarse sand, 0 to 5 percent slopes	A	0.9	9.6%
<b>Totals for Area of Interest</b>			<b>9.6</b>	<b>100.0%</b>

## Description

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

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

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

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

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

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

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

## Rating Options

*Aggregation Method:* Dominant Condition

*Component Percent Cutoff:* None Specified

*Tie-break Rule:* Higher

**CLAREMONT RANCH SUBDIVISION  
FILING NO. 7  
PRELIMINARY & FINAL DRAINAGE REPORT**

**May 2004**

Prepared for:

SWAT X, LLC.  
20 Boulder Crescent, 2<sup>nd</sup> Floor  
Colorado Springs, CO 80903  
(719) 471-1742

Prepared by:

Engineering and Surveying, Inc.  
20 Boulder Crescent, 2<sup>nd</sup> Floor  
Colorado Springs, CO 80903  
(719) 955-5485

Project #01-006

**DRAINAGE AND BRIDGE FEES**

The Claremont Ranch Subdivision, Filing No. 7, site is located entirely within the Sand Creek Drainage Basin. The 2004 Drainage and Bridge Fees per El Paso County for this site are listed below.

Drainage Fee: \$ 15,000/Impervious acre

Bridge Fee: \$ 1,336/Impervious acre

The impervious area for this subdivision was calculated from the site plan since this is a residential project.

The total platted acreage for the site is 17.79 acres consisting of 16.61 residential acres with an impervious rating of 44% and 1.18 open space acres at 7% impervious. Therefore, the calculated impervious area is 7.38 acres (42%).

Drainage Fee: \$ 15,000/Impervious acre x 42% Impervious = \$ 6,222/ac.

Bridge Fee: \$ 1,336/Impervious acre x 42% Impervious = \$ 554/ac.

Total fees due per platted acreage = \$ 6,776/ac.

The total fee obligation for Claremont Ranch Subdivision Filing No. 7 is summarized as follows:

<b>Drainage fees for subdivision: \$ 6,222/ac x 17.79 ac =</b>	<b>\$ 110,689.38</b>
<b>Bridge fees for subdivision: \$ 554/ac x 17.79 ac =</b>	<b>\$ <u>9,855.66</u></b>
<b>Total fees for subdivision: \$ 6,776/ac x 17.79 ac =</b>	<b>\$ 120,545.04</b>

Bridge Fees in the amount of \$9,855.66 are due with final platting of Filing No. 7.

**Claremont Ranch Filings #1-7 – Overall Drainage Fee Calculations:**

Filing #	Required Drainage Fees	Sand Creek & Sub-tributary Improvement Construction Costs
1	\$316,744.50	\$376,000.00
2	\$197,274.00	\$355,850.00
3	\$200,700.00	\$0.00
4	\$293,100.00	\$433,250.00
5	\$140,285.00	\$517,145.00
6	\$283,228.50	\$0.00
7	<b>\$110,689.38</b>	<b>\$282,000.00</b>
<b>Total</b>	<b>\$1,542,011.38</b>	<b>\$1,964,245.00</b>

The developer can use the difference between reimbursable construction costs and required drainage fees as credits to be applied toward future Sand Creek Basin Drainage Fees or the developer can apply to the County for reimbursement from the Basin.

**Claremont Ranch will have a drainage credit of \$422,233.62 based on the above table, therefore there are no Drainage Fees are due for Claremont Ranch Filing No. 7.**

### **SUMMARY**

The Claremont Ranch Subdivision Filing No. 7 site contains 52.7 acres within the Sand Creek Drainage Basin. 17.8 acres of this Filing will be developed as single-family dwelling units, 20.2 acres as commercial development and the remaining 14.7 acres as high density single-family units. The development of the site will require drainage facilities to accommodate developed flows and meet El Paso County drainage criteria. Proposed drainage facilities will adequately convey developed runoff from the site to the East Fork of Sand Creek. All drainage facilities described herein and shown on the included drainage plan are subject to change due to final design considerations.

The drainage analysis has been prepared in accordance with the current City of Colorado Springs/El Paso County Drainage Criteria Manual. The site will continue to maintain historic drainage patterns. No on-site detention will be required due to the fact that regional detention will be provided as outlined in the DBPS prepared by Kiowa Engineering.

Supporting information is included in the Appendix.

## DRAINAGE BASIN HYDROLOGY

### RATIONAL METHOD

CLAREMONT RANCH #7

BASIN:	7
AREA(ac.):	12.21
SOIL TYPE:	A

**RUNOFF COEFFICIENT, C**

ZONE/DEVELOPMENT TYPE	AREA (ft <sup>2</sup> )	AREA (ac)	C <sub>5</sub>	C <sub>100</sub>	% AREA
Commercial	531685.18	12.21	0.90	0.90	100.0%
		12.21			100%

COMPOSITE:                      C<sub>5</sub>=              0.90  
    C<sub>100</sub>=            0.90

**TIME OF CONCENTRATION: Tc in Minutes:**

Travel Type	L(ft)	h(ft)	s (%)	v <sub>5</sub> (fps)	Tc (5 year)	v <sub>100</sub> (fps)	Tc (100 year)
Overland	300	16	5.3		3.73		3.73
Swale	350	8	2.3	3	1.94	3.5	1.67
<b>Tc Total:</b>					5.67		5.40

**Intensity, i (inches/hr) from Fig 5-1**

i <sub>5</sub>	i <sub>100</sub>
5.1 in/hr	8.8 in/hr

**PEAK FLOW: Q=CiA in cfs**

Q <sub>5</sub>	Q <sub>100</sub>
56.0 cfs	96.7 cfs

# DRAINAGE BASIN HYDROLOGY

## RATIONAL METHOD

CLAREMONT RANCH #7

*Interim Flows - assumes grading & re-vegetation but no development.*

BASIN:	6a
AREA(ac.):	11.18
SOIL TYPE:	A

### RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA (ft <sup>2</sup> )	AREA (ac)	C <sub>5</sub>	C <sub>100</sub>	% AREA
Pasture/Meadow	486879.86	11.18	0.25	0.35	100.0%
		11.18			100%

COMPOSITE:

C <sub>5</sub> =	0.25
C <sub>100</sub> =	0.35

### TIME OF CONCENTRATION: Tc in Minutes:

Travel Type	L(ft)	h (ft)	s (%)	v <sub>5</sub> (fps)	Tc (5 year)	v <sub>100</sub> (fps)	Tc (100 year)
Overland	200	26	13.0		9.64		8.51
Swale	600	20	3.3	3	3.33	3.5	2.86
<b>Tc Total:</b>					12.98		11.36

### Intensity, i (inches/hr) from Fig 5-1

<u>i<sub>5</sub></u>	<u>i<sub>100</sub></u>
3.6 in/hr	6.6 in/hr

### PEAK FLOW: Q=CiA in cfs

<u>Q<sub>5</sub></u>	<u>Q<sub>100</sub></u>
10.1 cfs	25.8 cfs



**PROPOSED BASINS**

PROPOSED DRAINAGE BASINS

BASIN	AREA TOTAL (Acres)	CONVEYANCE TC						TT			INTENSITY						TOTAL FLOWS												
		C <sub>2</sub>	C <sub>5</sub>	C <sub>10</sub>	C <sub>25</sub>	C <sub>50</sub>	C <sub>100</sub>	Length (ft)	Height (ft)	TI (min)	Length (ft)	Height (ft)	C <sub>v</sub>	Slope (%)	Velocity (fps)	TC (min)	TOTAL (min)	I <sub>2</sub> (in/hr)	I <sub>5</sub> (in/hr)	I <sub>10</sub> (in/hr)	I <sub>25</sub> (in/hr)	I <sub>50</sub> (in/hr)	I <sub>100</sub> (in/hr)	Q <sub>2</sub> (c.f.s.)	Q <sub>5</sub> (c.f.s.)	Q <sub>10</sub> (c.f.s.)	Q <sub>25</sub> (c.f.s.)	Q <sub>50</sub> (c.f.s.)	Q <sub>100</sub> (c.f.s.)
<b>1</b>	2.25	<b>0.05</b>	<b>0.12</b>	<b>0.20</b>	<b>0.30</b>	<b>0.34</b>	<b>0.39</b>	100	4	12.0	1030	12	7	1.2%	0.8	22.7	34.7	1.8	2.3	2.6	3.0	3.4	3.8	<b>0.2</b>	<b>0.6</b>	<b>1.2</b>	<b>2.0</b>	<b>2.6</b>	<b>3.3</b>
LANDSCAPED	2.25	0.05	0.12	0.20	0.30	0.34	0.39																						
<b>2</b>	1.92	<b>0.25</b>	<b>0.30</b>	<b>0.37</b>	<b>0.45</b>	<b>0.48</b>	<b>0.52</b>	100	4	9.8	451	10	7	2.2%	1.0	7.2	17.0	2.7	3.3	3.9	4.4	5.0	5.6	<b>1.3</b>	<b>1.9</b>	<b>2.7</b>	<b>3.8</b>	<b>4.6</b>	<b>5.6</b>
HARDSCAPE	0.51	0.79	0.81	0.83	0.85	0.87	0.88																						
LANDSCAPED	1.41	0.05	0.12	0.20	0.30	0.34	0.39																						
<b>3</b>	0.76	<b>0.41</b>	<b>0.45</b>	<b>0.49</b>	<b>0.54</b>	<b>0.57</b>	<b>0.59</b>	46	2.5	4.8	440	7	20	1.6%	2.5	2.9	7.7	3.6	4.5	5.3	6.0	6.8	7.6	<b>1.1</b>	<b>1.5</b>	<b>2.0</b>	<b>2.5</b>	<b>2.9</b>	<b>3.4</b>
LOTS	0.76	0.41	0.45	0.49	0.54	0.57	0.59																						
<b>4</b>	1.00	<b>0.41</b>	<b>0.45</b>	<b>0.49</b>	<b>0.54</b>	<b>0.57</b>	<b>0.59</b>	49	2	5.5	197	3	7	1.5%	0.9	3.8	10.2	3.3	4.1	4.8	5.5	6.1	6.9	<b>1.3</b>	<b>1.8</b>	<b>2.3</b>	<b>2.9</b>	<b>3.5</b>	<b>4.1</b>
LOTS	1.00	0.41	0.45	0.49	0.54	0.57	0.59				138	2	20	1.4%	2.4	1.0													
<b>5</b>	0.80	<b>0.41</b>	<b>0.45</b>	<b>0.49</b>	<b>0.54</b>	<b>0.57</b>	<b>0.59</b>	51	2	5.7	176	2.5	20	1.4%	2.4	1.2	6.9	3.7	4.7	5.5	6.2	7.0	7.9	<b>1.2</b>	<b>1.7</b>	<b>2.1</b>	<b>2.7</b>	<b>3.2</b>	<b>3.7</b>
LOTS	0.80	0.41	0.45	0.49	0.54	0.57	0.59																						
<b>6</b>	1.95	<b>0.36</b>	<b>0.40</b>	<b>0.45</b>	<b>0.50</b>	<b>0.54</b>	<b>0.56</b>	91	2	9.9	441	10	20	2.3%	3.0	2.4	12.3	3.0	3.8	4.5	5.1	5.7	6.4	<b>2.1</b>	<b>3.0</b>	<b>3.9</b>	<b>5.0</b>	<b>6.0</b>	<b>7.0</b>
LOTS	1.66	0.41	0.45	0.49	0.54	0.57	0.59																						
LANDSCAPED	0.29	0.05	0.12	0.20	0.30	0.34	0.39																						
<b>7</b>	0.65	<b>0.41</b>	<b>0.45</b>	<b>0.49</b>	<b>0.54</b>	<b>0.57</b>	<b>0.59</b>	54	2	5.9	136	2	20	1.5%	2.4	0.9	6.9	3.7	4.7	5.5	6.3	7.0	7.9	<b>1.0</b>	<b>1.4</b>	<b>1.7</b>	<b>2.2</b>	<b>2.6</b>	<b>3.0</b>
LOTS	0.65	0.41	0.45	0.49	0.54	0.57	0.59																						
<b>8</b>	0.62	<b>0.54</b>	<b>0.58</b>	<b>0.61</b>	<b>0.65</b>	<b>0.68</b>	<b>0.70</b>	100	4	6.4	230	5	20	2.2%	2.9	1.3	7.7	3.6	4.5	5.3	6.0	6.8	7.6	<b>1.2</b>	<b>1.6</b>	<b>2.0</b>	<b>2.4</b>	<b>2.9</b>	<b>3.3</b>
HARDSCAPE	0.29	0.79	0.81	0.83	0.85	0.87	0.88																						
LANDSCAPED	0.08	0.05	0.12	0.20	0.30	0.34	0.39																						
LOTS	0.25	0.41	0.45	0.49	0.54	0.57	0.59																						
<b>9</b>	0.13	<b>0.05</b>	<b>0.12</b>	<b>0.20</b>	<b>0.30</b>	<b>0.34</b>	<b>0.39</b>	87	3	11.8	451	10	15	2.2%	2.2	3.4	15.1	2.8	3.5	4.1	4.7	5.3	5.9	<b>0.0</b>	<b>0.1</b>	<b>0.1</b>	<b>0.2</b>	<b>0.2</b>	<b>0.3</b>
ONSITE REAR YARD	0.13	0.05	0.12	0.20	0.30	0.34	0.39																						
<b>10</b>	0.54	<b>0.05</b>	<b>0.12</b>	<b>0.20</b>	<b>0.30</b>	<b>0.34</b>	<b>0.39</b>	64	4	8.3	456	9	15	2.0%	2.1	3.6	11.9	3.1	3.9	4.5	5.2	5.8	6.5	<b>0.1</b>	<b>0.3</b>	<b>0.5</b>	<b>0.8</b>	<b>1.1</b>	<b>1.4</b>
OFFSITE	0.54	0.05	0.12	0.20	0.30	0.34	0.39																						

Calculated by: DLM  
 Date: 10/1/2017

**PROPOSED DESIGN POINTS**

DESIGN POINT	AREA TOTAL (Acres)	WEIGHTED						TT	INTENSITY						TOTAL FLOWS					
		C <sub>2</sub>	C <sub>5</sub>	C <sub>10</sub>	C <sub>25</sub>	C <sub>50</sub>	C <sub>100</sub>	TOTAL (min)	I <sub>2</sub> (in/hr)	I <sub>5</sub> (in/hr)	I <sub>10</sub> (in/hr)	I <sub>25</sub> (in/hr)	I <sub>50</sub> (in/hr)	I <sub>100</sub> (in/hr)	Q <sub>2</sub> (c.f.s.)	Q <sub>5</sub> (c.f.s.)	Q <sub>10</sub> (c.f.s.)	Q <sub>25</sub> (c.f.s.)	Q <sub>50</sub> (c.f.s.)	Q <sub>100</sub> (c.f.s.)
7 BASIN 7	0.65	0.41	0.45	0.49	0.54	0.57	0.59	6.9	3.7	4.7	5.5	6.3	7.0	7.9	1.0	1.4	1.7	2.2	2.6	3.0
6 BASIN 8	0.62	0.54	0.58	0.61	0.65	0.68	0.70	7.7	3.6	4.5	5.3	6.0	6.8	7.6	1.2	1.6	2.0	2.4	2.9	3.3
5 BASIN 6	1.95	0.36	0.40	0.45	0.50	0.54	0.56	12.3	3.0	3.8	4.5	5.1	5.7	6.4	2.1	3.0	3.9	5.0	6.0	7.0
4 BASIN 5	0.80	0.41	0.45	0.49	0.54	0.57	0.59	6.9	3.7	4.7	5.5	6.2	7.0	7.9	1.2	1.7	2.1	2.7	3.2	3.7
3 BASIN 4	1.00	0.41	0.45	0.49	0.54	0.57	0.59	10.2	3.3	4.1	4.8	5.5	6.1	6.9	1.3	1.8	2.3	2.9	3.5	4.1
2 BASIN 3	0.76	0.41	0.45	0.49	0.54	0.57	0.59	7.7	3.6	4.5	5.3	6.0	6.8	7.6	1.1	1.5	2.0	2.5	2.9	3.4
1 BASIN 2 BASIN 9 DP-D	7.83 1.92 0.13 5.78	0.36 0.25 0.05 0.41	0.41 0.30 0.12 0.45	0.45 0.37 0.20 0.49	0.51 0.45 0.30 0.54	0.54 0.48 0.34 0.57	0.57 0.52 0.39 0.59	17.0	2.7	3.3	3.9	4.4	5.0	5.6	7.5	10.6	13.8	17.9	21.3	25.0
8	0.32	0.40	0.42	0.43	0.45	0.47	0.48	5.7	4.0	5.0	5.8	6.6	7.4	8.3	0.5	0.7	0.8	1.0	1.1	1.3
9 BASIN 9 DP-8	0.45 0.13 0.32	0.30 0.05 0.40	0.33 0.12 0.42	0.37 0.20 0.43	0.41 0.30 0.45	0.43 0.34 0.47	0.45 0.39 0.48	15.1 15.1 5.7	2.8	3.5	4.1	4.7	5.3	5.9	0.4	0.5	0.7	0.9	1.0	1.2
E Pond Outfall															1.1					5.2

Calculated by: DLM  
Date: 10/1/2017

**PROPOSED DESIGN POINTS**

DESIGN POINT	AREA TOTAL (Acres)	WEIGHTED						TT	INTENSITY						TOTAL FLOWS					
		C <sub>2</sub>	C <sub>5</sub>	C <sub>10</sub>	C <sub>25</sub>	C <sub>50</sub>	C <sub>100</sub>	TOTAL (min)	I <sub>2</sub> (in/hr)	I <sub>5</sub> (in/hr)	I <sub>10</sub> (in/hr)	I <sub>25</sub> (in/hr)	I <sub>50</sub> (in/hr)	I <sub>100</sub> (in/hr)	Q <sub>2</sub> (c.f.s.)	Q <sub>5</sub> (c.f.s.)	Q <sub>10</sub> (c.f.s.)	Q <sub>25</sub> (c.f.s.)	Q <sub>50</sub> (c.f.s.)	Q <sub>100</sub> (c.f.s.)
<b>A</b>	<b>1.27</b>	<b>0.47</b>	<b>0.51</b>	<b>0.55</b>	<b>0.60</b>	<b>0.62</b>	<b>0.64</b>	6.9	3.7	4.7	5.5	6.3	7.0	7.9	2.3	3.0	3.8	4.7	5.6	6.4
DP-6	0.62	0.54	0.58	0.61	0.65	0.68	0.70													
DP-7	0.65	0.41	0.45	0.49	0.54	0.57	0.59													
<b>B</b>	<b>4.02</b>	<b>0.40</b>	<b>0.45</b>	<b>0.49</b>	<b>0.54</b>	<b>0.57</b>	<b>0.59</b>	12.3	3.0	3.8	4.5	5.1	5.7	6.4	5.0	6.8	8.7	11.1	13.1	15.3
DP-5	1.95	0.36	0.40	0.45	0.50	0.54	0.56													
DP-4	0.80	0.41	0.45	0.49	0.54	0.57	0.59													
DP-A	1.27	0.47	0.51	0.55	0.60	0.62	0.64													
<b>C</b>	<b>5.02</b>	<b>0.41</b>	<b>0.45</b>	<b>0.49</b>	<b>0.54</b>	<b>0.57</b>	<b>0.59</b>	12.3	3.0	3.8	4.5	5.1	5.7	6.4	6.2	8.6	10.9	13.8	16.4	19.0
DP3	1.00	0.41	0.45	0.49	0.54	0.57	0.59													
DP-B	4.02	0.40	0.45	0.49	0.54	0.57	0.59													
<b>D</b>	<b>5.78</b>	<b>0.41</b>	<b>0.45</b>	<b>0.49</b>	<b>0.54</b>	<b>0.57</b>	<b>0.59</b>	12.3	3.0	3.8	4.5	5.1	5.7	6.4	7.2	9.9	12.6	15.9	18.9	21.9
DP-2	0.76	0.41	0.45	0.49	0.54	0.57	0.59													
DP-C	5.02	0.41	0.45	0.49	0.54	0.57	0.59													

Calculated by: DLM  
 Date: 10/1/2017

**SUB BASIN CALCULATIONS**

BASIN	AREA TOTAL (Acres)	CONVEYANCE TC						Length (ft)	Height (ft)	TI (min)	CONVEYANCE TC				TOTAL (min)	INTENSITY						TOTAL FLOWS								
		C <sub>2</sub>	C <sub>5</sub>	C <sub>10</sub>	C <sub>25</sub>	C <sub>50</sub>	C <sub>100</sub>				Length (ft)	Height (ft)	C <sub>v</sub>	Slope (%)		Velocity (fps)	TC (min)	I <sub>2</sub> (in/hr)	I <sub>5</sub> (in/hr)	I <sub>10</sub> (in/hr)	I <sub>25</sub> (in/hr)	I <sub>50</sub> (in/hr)	I <sub>100</sub> (in/hr)	Q <sub>2</sub> (c.f.s.)	Q <sub>5</sub> (c.f.s.)	Q <sub>10</sub> (c.f.s.)	Q <sub>25</sub> (c.f.s.)	Q <sub>50</sub> (c.f.s.)	Q <sub>100</sub> (c.f.s.)	
<b>1.1</b>	<b>0.76</b>	<b>0.09</b>	<b>0.16</b>	<b>0.23</b>	<b>0.33</b>	<b>0.37</b>	<b>0.42</b>	36	2	6.2	332	10	7	3.0%	1.2	4.6	10.8	3.2	4.0	4.7	5.4	6.0	6.7	<b>0.2</b>	<b>0.5</b>	<b>0.8</b>	<b>1.3</b>	<b>1.7</b>	<b>2.1</b>	
HARDSCAPE	0.04	0.79	0.81	0.83	0.85	0.87	0.88																							
LANDSCAPED	0.72	0.05	0.12	0.20	0.30	0.34	0.39																							
<b>2.1</b>	<b>0.19</b>	<b>0.67</b>	<b>0.70</b>	<b>0.73</b>	<b>0.76</b>	<b>0.79</b>	<b>0.80</b>	38	2	2.7	102	4	7	3.9%	1.4	1.2	4.0	4.4	5.5	6.4	7.4	8.3	9.3	<b>0.6</b>	<b>0.7</b>	<b>0.9</b>	<b>1.1</b>	<b>1.2</b>	<b>1.4</b>	
HARDSCAPE	0.16	0.79	0.81	0.83	0.85	0.87	0.88																							
LANDSCAPED	0.03	0.05	0.12	0.20	0.30	0.34	0.39																							
<b>4.1</b>	<b>0.32</b>	<b>0.33</b>	<b>0.38</b>	<b>0.43</b>	<b>0.49</b>	<b>0.52</b>	<b>0.55</b>	47	2	5.9	190	3	7	1.6%	0.9	3.6	9.5	3.4	4.2	4.9	5.6	6.3	7.1	<b>0.4</b>	<b>0.5</b>	<b>0.7</b>	<b>0.9</b>	<b>1.0</b>	<b>1.2</b>	
LOTS	0.25	0.41	0.45	0.49	0.54	0.57	0.59																							
LANDSCAPED	0.07	0.05	0.12	0.20	0.30	0.34	0.39																							
<b>6.1</b>	<b>0.45</b>	<b>0.33</b>	<b>0.38</b>	<b>0.43</b>	<b>0.49</b>	<b>0.52</b>	<b>0.55</b>	89	2	10.0	136	2	7	1.5%	0.8	2.7	12.7	3.0	3.8	4.4	5.0	5.7	6.3	<b>0.4</b>	<b>0.6</b>	<b>0.8</b>	<b>1.1</b>	<b>1.3</b>	<b>1.6</b>	
LOTS	0.35	0.41	0.45	0.49	0.54	0.57	0.59																							
LANDSCAPED	0.10	0.05	0.12	0.20	0.30	0.34	0.39																							

Calculated by: SLP  
 Date: 12/13/2022

# INLET MANAGEMENT

Worksheet Protected

<b>INLET NAME</b>	BASIN 2	DP-3	DP-4
Site Type (Urban or Rural)	URBAN	URBAN	URBAN
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)	1.5	1.8	1.7
Major $Q_{Known}$ (cfs)	3.4	4.1	3.8

### 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	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

<b>Minor Total Design Peak Flow, <math>Q</math> (cfs)</b>	<b>1.5</b>	<b>1.8</b>	<b>1.7</b>
<b>Major Total Design Peak Flow, <math>Q</math> (cfs)</b>	<b>3.4</b>	<b>4.1</b>	<b>3.8</b>
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

# INLET MANAGEMENT

Worksheet Protected

INLET NAME	DP-5	DP-6	DP-7
Site Type (Urban or Rural)	URBAN	URBAN	URBAN
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)	3.0	1.6	1.4
Major $Q_{known}$ (cfs)	7.0	3.3	3.0
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)			

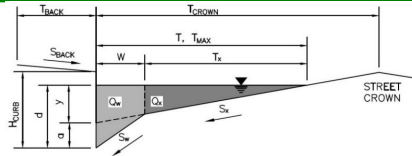
## CALCULATED OUTPUT

<b>Minor Total Design Peak Flow, <math>Q</math> (cfs)</b>	<b>3.0</b>	<b>1.6</b>	<b>1.4</b>
<b>Major Total Design Peak Flow, <math>Q</math> (cfs)</b>	<b>7.0</b>	<b>3.3</b>	<b>3.0</b>
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

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

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

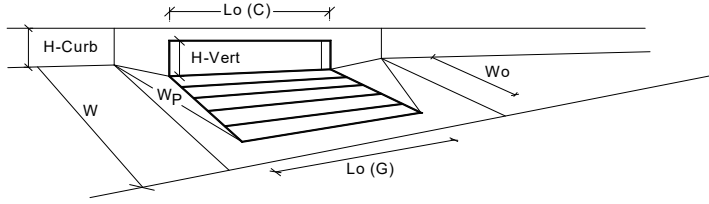
**Project:** THE VILLAS AT CLAREMONT RANCH  
**Inlet ID:** BASIN 2



<b>Gutter Geometry:</b>						
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} = 5.0$ ft					
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	$S_{BACK} = 0.020$ ft/ft					
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	$n_{BACK} = 0.015$					
Height of Curb at Gutter Flow Line	$H_{CURB} = 6.00$ inches					
Distance from Curb Face to Street Crown	$T_{CROWN} = 13.2$ ft					
Gutter Width	$W = 1.17$ 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)	$n_{STREET} = 0.015$					
Max. Allowable Spread for Minor & Major Storm	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="text-align: center;">Minor Storm</td> <td style="text-align: center;">Major Storm</td> <td rowspan="2" style="text-align: right; padding-left: 10px;">ft</td> </tr> <tr> <td style="text-align: center;"><math>T_{MAX} = 13.0</math></td> <td style="text-align: center;"><math>13.0</math></td> </tr> </table>	Minor Storm	Major Storm	ft	$T_{MAX} = 13.0$	$13.0$
Minor Storm	Major Storm	ft				
$T_{MAX} = 13.0$	$13.0$					
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="text-align: center;">Minor Storm</td> <td style="text-align: center;">Major Storm</td> <td rowspan="2" style="text-align: right; padding-left: 10px;">inches</td> </tr> <tr> <td style="text-align: center;"><math>d_{MAX} = 6.0</math></td> <td style="text-align: center;"><math>6.0</math></td> </tr> </table>	Minor Storm	Major Storm	inches	$d_{MAX} = 6.0$	$6.0$
Minor Storm	Major Storm	inches				
$d_{MAX} = 6.0$	$6.0$					
Check boxes are not applicable in SUMP conditions	<input type="checkbox"/> <input type="checkbox"/>					
MINOR STORM Allowable Capacity is not applicable to Sump Condition						
MAJOR STORM Allowable Capacity is not applicable to Sump Condition						
<b>Q<sub>allow</sub> =</b>	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="text-align: center;">Minor Storm</td> <td style="text-align: center;">Major Storm</td> <td rowspan="2" style="text-align: right; padding-left: 10px;">cfs</td> </tr> <tr> <td style="text-align: center;"><b>SUMP</b></td> <td style="text-align: center;"><b>SUMP</b></td> </tr> </table>	Minor Storm	Major Storm	cfs	<b>SUMP</b>	<b>SUMP</b>
Minor Storm	Major Storm	cfs				
<b>SUMP</b>	<b>SUMP</b>					

# INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.02 (August 2022)



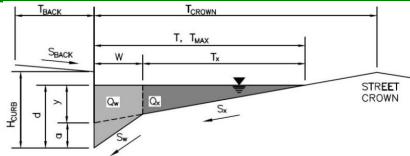
<b>Design Information (Input)</b>		<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="padding: 2px;">CDOT Type R Curb Opening</td> </tr> </table>		CDOT Type R Curb Opening																																																																																																																																																																																																																																							
CDOT Type R Curb Opening																																																																																																																																																																																																																																											
Type of Inlet	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">MINOR</th> <th style="padding: 2px;">MAJOR</th> </tr> <tr> <td style="padding: 2px;">Type =</td> <td style="padding: 2px;">CDOT Type R Curb Opening</td> </tr> <tr> <td style="padding: 2px;"><math>a_{local}</math> =</td> <td style="padding: 2px;">3.00</td> <td style="padding: 2px;">3.00</td> <td style="padding: 2px;">inches</td> </tr> <tr> <td style="padding: 2px;">No =</td> <td style="padding: 2px;">1</td> <td style="padding: 2px;">1</td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;">Ponding Depth =</td> <td style="padding: 2px;">4.0</td> <td style="padding: 2px;">6.0</td> <td style="padding: 2px;">inches</td> </tr> <tr> <td colspan="4" style="text-align: center;"> <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">MINOR</th> <th style="padding: 2px;">MAJOR</th> </tr> <tr> <td style="padding: 2px;"><math>L_o</math> (G) =</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">feet</td> </tr> <tr> <td style="padding: 2px;"><math>W_o</math> =</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">feet</td> </tr> <tr> <td style="padding: 2px;"><math>A_{ratio}</math> =</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;"><math>C_f</math> (G) =</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;"><math>C_w</math> (G) =</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;"><math>C_o</math> (G) =</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;"></td> </tr> <tr> <td colspan="4" style="text-align: center;"> <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">MINOR</th> <th style="padding: 2px;">MAJOR</th> </tr> <tr> <td style="padding: 2px;"><math>L_o</math> (C) =</td> <td style="padding: 2px;">5.00</td> <td style="padding: 2px;">5.00</td> <td style="padding: 2px;">feet</td> </tr> <tr> <td style="padding: 2px;"><math>H_{vert}</math> =</td> <td style="padding: 2px;">6.00</td> <td style="padding: 2px;">6.00</td> <td style="padding: 2px;">inches</td> </tr> <tr> <td style="padding: 2px;"><math>H_{throat}</math> =</td> <td style="padding: 2px;">6.00</td> <td style="padding: 2px;">6.00</td> <td style="padding: 2px;">inches</td> </tr> <tr> <td style="padding: 2px;">Theta =</td> <td style="padding: 2px;">63.40</td> <td style="padding: 2px;">63.40</td> <td style="padding: 2px;">degrees</td> </tr> <tr> <td style="padding: 2px;"><math>W_o</math> =</td> <td style="padding: 2px;">1.17</td> <td style="padding: 2px;">1.17</td> <td style="padding: 2px;">feet</td> </tr> <tr> <td style="padding: 2px;"><math>C_f</math> (C) =</td> <td style="padding: 2px;">0.10</td> <td style="padding: 2px;">0.10</td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;"><math>C_w</math> (C) =</td> <td style="padding: 2px;">3.60</td> <td style="padding: 2px;">3.60</td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;"><math>C_o</math> (C) =</td> <td style="padding: 2px;">0.67</td> <td style="padding: 2px;">0.67</td> <td style="padding: 2px;"></td> </tr> <tr> <td colspan="4" style="text-align: center;"> <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">MINOR</th> <th style="padding: 2px;">MAJOR</th> </tr> <tr> <td style="padding: 2px;"><math>d_{Grate}</math> =</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">ft</td> </tr> <tr> <td style="padding: 2px;"><math>d_{Curb}</math> =</td> <td style="padding: 2px;">0.24</td> <td style="padding: 2px;">0.40</td> <td style="padding: 2px;">ft</td> </tr> <tr> <td style="padding: 2px;">RF<sub>Grate</sub> =</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;">RF<sub>Curb</sub> =</td> <td style="padding: 2px;">1.00</td> <td style="padding: 2px;">1.00</td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;">RF<sub>combination</sub> =</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;"></td> </tr> <tr> <td colspan="4" style="text-align: center;"> <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">MINOR</th> <th style="padding: 2px;">MAJOR</th> </tr> <tr> <td style="padding: 2px;"><math>Q_s</math> =</td> <td style="padding: 2px;">2.6</td> <td style="padding: 2px;">5.9</td> <td style="padding: 2px;">cfs</td> </tr> <tr> <td style="padding: 2px;"><math>Q_{PEAK REQUIRED}</math> =</td> <td style="padding: 2px;">1.5</td> <td style="padding: 2px;">3.4</td> <td style="padding: 2px;">cfs</td> </tr> </table> </td> </tr> </table> </td> </tr> <tr> <td>Local Depression (additional to continuous gutter depression 'a' from above)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Number of Unit Inlets (Grate or Curb Opening)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Water Depth at Flowline (outside of local depression)</td> <td></td> <td></td> <td></td> </tr> <tr> <td colspan="4"><b>Grate Information</b></td> </tr> <tr> <td>Length of a Unit Grate</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Width of a Unit Grate</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Open Area Ratio for a Grate (typical values 0.15-0.90)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Clogging Factor for a Single Grate (typical value 0.50 - 0.70)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Grate Weir Coefficient (typical value 2.15 - 3.60)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Grate Orifice Coefficient (typical value 0.60 - 0.80)</td> <td></td> <td></td> <td></td> </tr> <tr> <td colspan="4"><b>Curb Opening Information</b></td> </tr> <tr> <td>Length of a Unit Curb Opening</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Height of Vertical Curb Opening in Inches</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Height of Curb Orifice Throat in Inches</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Angle of Throat (see USDCM Figure ST-5)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Side Width for Depression Pan (typically the gutter width of 2 feet)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Clogging Factor for a Single Curb Opening (typical value 0.10)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Curb Opening Weir Coefficient (typical value 2.3-3.7)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)</td> <td></td> <td></td> <td></td> </tr> <tr> <td colspan="4"><b>Low Head Performance Reduction (Calculated)</b></td> </tr> <tr> <td>Depth for Grate Midwidth</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Depth for Curb Opening Weir Equation</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Grated Inlet Performance Reduction Factor for Long Inlets</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Curb Opening Performance Reduction Factor for Long Inlets</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Combination Inlet Performance Reduction Factor for Long Inlets</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Total Inlet Interception Capacity (assumes clogged condition)</td> <td></td> <td></td> <td></td> </tr> <tr> <td colspan="4" style="color: blue; font-weight: bold;">Inlet Capacity IS GOOD for Minor and Major Storms (&gt;Q Peak)</td> </tr> </table> </td></tr></table></td></tr></table>			MINOR	MAJOR	Type =	CDOT Type R Curb Opening	$a_{local}$ =	3.00	3.00	inches	No =	1	1		Ponding Depth =	4.0	6.0	inches	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">MINOR</th> <th style="padding: 2px;">MAJOR</th> </tr> <tr> <td style="padding: 2px;"><math>L_o</math> (G) =</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">feet</td> </tr> <tr> <td style="padding: 2px;"><math>W_o</math> =</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">feet</td> </tr> <tr> <td style="padding: 2px;"><math>A_{ratio}</math> =</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;"><math>C_f</math> (G) =</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;"><math>C_w</math> (G) =</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;"><math>C_o</math> (G) =</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;"></td> </tr> <tr> <td colspan="4" style="text-align: center;"> <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">MINOR</th> <th style="padding: 2px;">MAJOR</th> </tr> <tr> <td style="padding: 2px;"><math>L_o</math> (C) =</td> <td style="padding: 2px;">5.00</td> <td style="padding: 2px;">5.00</td> <td style="padding: 2px;">feet</td> </tr> <tr> <td style="padding: 2px;"><math>H_{vert}</math> =</td> <td style="padding: 2px;">6.00</td> <td style="padding: 2px;">6.00</td> <td style="padding: 2px;">inches</td> </tr> <tr> <td style="padding: 2px;"><math>H_{throat}</math> =</td> <td style="padding: 2px;">6.00</td> <td style="padding: 2px;">6.00</td> <td style="padding: 2px;">inches</td> </tr> <tr> <td style="padding: 2px;">Theta =</td> <td style="padding: 2px;">63.40</td> <td style="padding: 2px;">63.40</td> <td style="padding: 2px;">degrees</td> </tr> <tr> <td style="padding: 2px;"><math>W_o</math> =</td> <td style="padding: 2px;">1.17</td> <td style="padding: 2px;">1.17</td> <td style="padding: 2px;">feet</td> </tr> <tr> <td style="padding: 2px;"><math>C_f</math> (C) =</td> <td style="padding: 2px;">0.10</td> <td style="padding: 2px;">0.10</td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;"><math>C_w</math> (C) =</td> <td style="padding: 2px;">3.60</td> <td style="padding: 2px;">3.60</td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;"><math>C_o</math> (C) =</td> <td style="padding: 2px;">0.67</td> <td style="padding: 2px;">0.67</td> <td style="padding: 2px;"></td> </tr> <tr> <td colspan="4" style="text-align: center;"> <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">MINOR</th> <th style="padding: 2px;">MAJOR</th> </tr> <tr> <td style="padding: 2px;"><math>d_{Grate}</math> =</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">ft</td> </tr> <tr> <td style="padding: 2px;"><math>d_{Curb}</math> =</td> <td style="padding: 2px;">0.24</td> <td style="padding: 2px;">0.40</td> <td style="padding: 2px;">ft</td> </tr> <tr> <td style="padding: 2px;">RF<sub>Grate</sub> =</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;">RF<sub>Curb</sub> =</td> <td style="padding: 2px;">1.00</td> <td style="padding: 2px;">1.00</td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;">RF<sub>combination</sub> =</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;"></td> </tr> <tr> <td colspan="4" style="text-align: center;"> <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">MINOR</th> <th style="padding: 2px;">MAJOR</th> </tr> <tr> <td style="padding: 2px;"><math>Q_s</math> =</td> <td style="padding: 2px;">2.6</td> <td style="padding: 2px;">5.9</td> <td style="padding: 2px;">cfs</td> </tr> <tr> <td style="padding: 2px;"><math>Q_{PEAK REQUIRED}</math> =</td> <td style="padding: 2px;">1.5</td> <td style="padding: 2px;">3.4</td> <td style="padding: 2px;">cfs</td> </tr> </table> </td> </tr> </table> </td> </tr> <tr> <td>Local Depression (additional to continuous gutter depression 'a' from above)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Number of Unit Inlets (Grate or Curb Opening)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Water Depth at Flowline (outside of local depression)</td> <td></td> <td></td> <td></td> </tr> <tr> <td colspan="4"><b>Grate Information</b></td> </tr> <tr> <td>Length of a Unit Grate</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Width of a Unit Grate</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Open Area Ratio for a Grate (typical values 0.15-0.90)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Clogging Factor for a Single Grate (typical value 0.50 - 0.70)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Grate Weir Coefficient (typical value 2.15 - 3.60)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Grate Orifice Coefficient (typical value 0.60 - 0.80)</td> <td></td> <td></td> <td></td> </tr> <tr> <td colspan="4"><b>Curb Opening Information</b></td> </tr> <tr> <td>Length of a Unit Curb Opening</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Height of Vertical Curb Opening in Inches</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Height of Curb Orifice Throat in Inches</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Angle of Throat (see USDCM Figure ST-5)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Side Width for Depression Pan (typically the gutter width of 2 feet)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Clogging Factor for a Single Curb Opening (typical value 0.10)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Curb Opening Weir Coefficient (typical value 2.3-3.7)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)</td> <td></td> <td></td> <td></td> </tr> <tr> <td colspan="4"><b>Low Head Performance Reduction (Calculated)</b></td> </tr> <tr> <td>Depth for Grate Midwidth</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Depth for Curb Opening Weir Equation</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Grated Inlet Performance Reduction Factor for Long Inlets</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Curb Opening Performance Reduction Factor for Long Inlets</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Combination Inlet Performance Reduction Factor for Long Inlets</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Total Inlet Interception Capacity (assumes clogged condition)</td> <td></td> <td></td> <td></td> </tr> <tr> <td colspan="4" style="color: blue; font-weight: bold;">Inlet Capacity IS GOOD for Minor and Major Storms (&gt;Q Peak)</td> </tr> </table> </td></tr></table>				MINOR	MAJOR	$L_o$ (G) =	N/A	N/A	feet	$W_o$ =	N/A	N/A	feet	$A_{ratio}$ =	N/A	N/A		$C_f$ (G) =	N/A	N/A		$C_w$ (G) =	N/A	N/A		$C_o$ (G) =	N/A	N/A		<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">MINOR</th> <th style="padding: 2px;">MAJOR</th> </tr> <tr> <td style="padding: 2px;"><math>L_o</math> (C) =</td> <td style="padding: 2px;">5.00</td> <td style="padding: 2px;">5.00</td> <td style="padding: 2px;">feet</td> </tr> <tr> <td style="padding: 2px;"><math>H_{vert}</math> =</td> <td style="padding: 2px;">6.00</td> <td style="padding: 2px;">6.00</td> <td style="padding: 2px;">inches</td> </tr> <tr> <td style="padding: 2px;"><math>H_{throat}</math> =</td> <td style="padding: 2px;">6.00</td> <td style="padding: 2px;">6.00</td> <td style="padding: 2px;">inches</td> </tr> <tr> <td style="padding: 2px;">Theta =</td> <td style="padding: 2px;">63.40</td> <td style="padding: 2px;">63.40</td> <td style="padding: 2px;">degrees</td> </tr> <tr> <td style="padding: 2px;"><math>W_o</math> =</td> <td style="padding: 2px;">1.17</td> <td style="padding: 2px;">1.17</td> <td style="padding: 2px;">feet</td> </tr> <tr> <td style="padding: 2px;"><math>C_f</math> (C) =</td> <td style="padding: 2px;">0.10</td> <td style="padding: 2px;">0.10</td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;"><math>C_w</math> (C) =</td> <td style="padding: 2px;">3.60</td> <td style="padding: 2px;">3.60</td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;"><math>C_o</math> (C) =</td> <td style="padding: 2px;">0.67</td> <td style="padding: 2px;">0.67</td> <td style="padding: 2px;"></td> </tr> <tr> <td colspan="4" style="text-align: center;"> <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">MINOR</th> <th style="padding: 2px;">MAJOR</th> </tr> <tr> <td style="padding: 2px;"><math>d_{Grate}</math> =</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">ft</td> </tr> <tr> <td style="padding: 2px;"><math>d_{Curb}</math> =</td> <td style="padding: 2px;">0.24</td> <td style="padding: 2px;">0.40</td> <td style="padding: 2px;">ft</td> </tr> <tr> <td style="padding: 2px;">RF<sub>Grate</sub> =</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;">RF<sub>Curb</sub> =</td> <td style="padding: 2px;">1.00</td> <td style="padding: 2px;">1.00</td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;">RF<sub>combination</sub> =</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;"></td> </tr> <tr> <td colspan="4" style="text-align: center;"> <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">MINOR</th> <th style="padding: 2px;">MAJOR</th> </tr> <tr> <td style="padding: 2px;"><math>Q_s</math> =</td> <td style="padding: 2px;">2.6</td> <td style="padding: 2px;">5.9</td> <td style="padding: 2px;">cfs</td> </tr> <tr> <td style="padding: 2px;"><math>Q_{PEAK REQUIRED}</math> =</td> <td style="padding: 2px;">1.5</td> <td style="padding: 2px;">3.4</td> <td style="padding: 2px;">cfs</td> </tr> </table> </td> </tr> </table> </td> </tr> <tr> <td>Local Depression (additional to continuous gutter depression 'a' from above)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Number of Unit Inlets (Grate or Curb Opening)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Water Depth at Flowline (outside of local depression)</td> <td></td> <td></td> <td></td> </tr> <tr> <td colspan="4"><b>Grate Information</b></td> </tr> <tr> <td>Length of a Unit Grate</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Width of a Unit Grate</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Open Area Ratio for a Grate (typical values 0.15-0.90)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Clogging Factor for a Single Grate (typical value 0.50 - 0.70)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Grate Weir Coefficient (typical value 2.15 - 3.60)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Grate Orifice Coefficient (typical value 0.60 - 0.80)</td> <td></td> <td></td> <td></td> </tr> <tr> <td colspan="4"><b>Curb Opening Information</b></td> </tr> <tr> <td>Length of a Unit Curb Opening</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Height of Vertical Curb Opening in Inches</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Height of Curb Orifice Throat in Inches</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Angle of Throat (see USDCM Figure ST-5)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Side Width for Depression Pan (typically the gutter width of 2 feet)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Clogging Factor for a Single Curb Opening (typical value 0.10)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Curb Opening Weir Coefficient (typical value 2.3-3.7)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)</td> <td></td> <td></td> <td></td> </tr> <tr> <td colspan="4"><b>Low Head Performance Reduction (Calculated)</b></td> </tr> <tr> <td>Depth for Grate Midwidth</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Depth for Curb Opening Weir Equation</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Grated Inlet Performance Reduction Factor for Long Inlets</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Curb Opening Performance Reduction Factor for Long Inlets</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Combination Inlet Performance Reduction Factor for Long Inlets</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Total Inlet Interception Capacity (assumes clogged condition)</td> <td></td> <td></td> <td></td> </tr> <tr> <td colspan="4" style="color: blue; font-weight: bold;">Inlet Capacity IS GOOD for Minor and Major Storms (&gt;Q Peak)</td> </tr> </table>				MINOR	MAJOR	$L_o$ (C) =	5.00	5.00	feet	$H_{vert}$ =	6.00	6.00	inches	$H_{throat}$ =	6.00	6.00	inches	Theta =	63.40	63.40	degrees	$W_o$ =	1.17	1.17	feet	$C_f$ (C) =	0.10	0.10		$C_w$ (C) =	3.60	3.60		$C_o$ (C) =	0.67	0.67		<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">MINOR</th> <th style="padding: 2px;">MAJOR</th> </tr> <tr> <td style="padding: 2px;"><math>d_{Grate}</math> =</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">ft</td> </tr> <tr> <td style="padding: 2px;"><math>d_{Curb}</math> =</td> <td style="padding: 2px;">0.24</td> <td style="padding: 2px;">0.40</td> <td style="padding: 2px;">ft</td> </tr> <tr> <td style="padding: 2px;">RF<sub>Grate</sub> =</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;">RF<sub>Curb</sub> =</td> <td style="padding: 2px;">1.00</td> <td style="padding: 2px;">1.00</td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;">RF<sub>combination</sub> =</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;"></td> </tr> <tr> <td colspan="4" style="text-align: center;"> <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">MINOR</th> <th style="padding: 2px;">MAJOR</th> </tr> <tr> <td style="padding: 2px;"><math>Q_s</math> =</td> <td style="padding: 2px;">2.6</td> <td style="padding: 2px;">5.9</td> <td style="padding: 2px;">cfs</td> </tr> <tr> <td style="padding: 2px;"><math>Q_{PEAK REQUIRED}</math> =</td> <td style="padding: 2px;">1.5</td> <td style="padding: 2px;">3.4</td> <td style="padding: 2px;">cfs</td> </tr> </table> </td> </tr> </table>				MINOR	MAJOR	$d_{Grate}$ =	N/A	N/A	ft	$d_{Curb}$ =	0.24	0.40	ft	RF <sub>Grate</sub> =	N/A	N/A		RF <sub>Curb</sub> =	1.00	1.00		RF <sub>combination</sub> =	N/A	N/A		<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">MINOR</th> <th style="padding: 2px;">MAJOR</th> </tr> <tr> <td style="padding: 2px;"><math>Q_s</math> =</td> <td style="padding: 2px;">2.6</td> <td style="padding: 2px;">5.9</td> <td style="padding: 2px;">cfs</td> </tr> <tr> <td style="padding: 2px;"><math>Q_{PEAK REQUIRED}</math> =</td> <td style="padding: 2px;">1.5</td> <td style="padding: 2px;">3.4</td> <td style="padding: 2px;">cfs</td> </tr> </table>				MINOR	MAJOR	$Q_s$ =	2.6	5.9	cfs	$Q_{PEAK REQUIRED}$ =	1.5	3.4	cfs	Local Depression (additional to continuous gutter depression 'a' from above)				Number of Unit Inlets (Grate or Curb Opening)				Water Depth at Flowline (outside of local depression)				<b>Grate Information</b>				Length of a Unit Grate				Width of a Unit Grate				Open Area Ratio for a Grate (typical values 0.15-0.90)				Clogging Factor for a Single Grate (typical value 0.50 - 0.70)				Grate Weir Coefficient (typical value 2.15 - 3.60)				Grate Orifice Coefficient (typical value 0.60 - 0.80)				<b>Curb Opening Information</b>				Length of a Unit Curb Opening				Height of Vertical Curb Opening in Inches				Height of Curb Orifice Throat in Inches				Angle of Throat (see USDCM Figure ST-5)				Side Width for Depression Pan (typically the gutter width of 2 feet)				Clogging Factor for a Single Curb Opening (typical value 0.10)				Curb Opening Weir Coefficient (typical value 2.3-3.7)				Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)				<b>Low Head Performance Reduction (Calculated)</b>				Depth for Grate Midwidth				Depth for Curb Opening Weir Equation				Grated Inlet Performance Reduction Factor for Long Inlets				Curb Opening Performance Reduction Factor for Long Inlets				Combination Inlet Performance Reduction Factor for Long Inlets				Total Inlet Interception Capacity (assumes clogged condition)				Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)			
MINOR	MAJOR																																																																																																																																																																																																																																										
Type =	CDOT Type R Curb Opening																																																																																																																																																																																																																																										
$a_{local}$ =	3.00	3.00	inches																																																																																																																																																																																																																																								
No =	1	1																																																																																																																																																																																																																																									
Ponding Depth =	4.0	6.0	inches																																																																																																																																																																																																																																								
<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">MINOR</th> <th style="padding: 2px;">MAJOR</th> </tr> <tr> <td style="padding: 2px;"><math>L_o</math> (G) =</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">feet</td> </tr> <tr> <td style="padding: 2px;"><math>W_o</math> =</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">feet</td> </tr> <tr> <td style="padding: 2px;"><math>A_{ratio}</math> =</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;"><math>C_f</math> (G) =</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;"><math>C_w</math> (G) =</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;"><math>C_o</math> (G) =</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;"></td> </tr> <tr> <td colspan="4" style="text-align: center;"> <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">MINOR</th> <th style="padding: 2px;">MAJOR</th> </tr> <tr> <td style="padding: 2px;"><math>L_o</math> (C) =</td> <td style="padding: 2px;">5.00</td> <td style="padding: 2px;">5.00</td> <td style="padding: 2px;">feet</td> </tr> <tr> <td style="padding: 2px;"><math>H_{vert}</math> =</td> <td style="padding: 2px;">6.00</td> <td style="padding: 2px;">6.00</td> <td style="padding: 2px;">inches</td> </tr> <tr> <td style="padding: 2px;"><math>H_{throat}</math> =</td> <td style="padding: 2px;">6.00</td> <td style="padding: 2px;">6.00</td> <td style="padding: 2px;">inches</td> </tr> <tr> <td style="padding: 2px;">Theta =</td> <td style="padding: 2px;">63.40</td> <td style="padding: 2px;">63.40</td> <td style="padding: 2px;">degrees</td> </tr> <tr> <td style="padding: 2px;"><math>W_o</math> =</td> <td style="padding: 2px;">1.17</td> <td style="padding: 2px;">1.17</td> <td style="padding: 2px;">feet</td> </tr> <tr> <td style="padding: 2px;"><math>C_f</math> (C) =</td> <td style="padding: 2px;">0.10</td> <td style="padding: 2px;">0.10</td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;"><math>C_w</math> (C) =</td> <td style="padding: 2px;">3.60</td> <td style="padding: 2px;">3.60</td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;"><math>C_o</math> (C) =</td> <td style="padding: 2px;">0.67</td> <td style="padding: 2px;">0.67</td> <td style="padding: 2px;"></td> </tr> <tr> <td colspan="4" style="text-align: center;"> <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">MINOR</th> <th style="padding: 2px;">MAJOR</th> </tr> <tr> <td style="padding: 2px;"><math>d_{Grate}</math> =</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">ft</td> </tr> <tr> <td style="padding: 2px;"><math>d_{Curb}</math> =</td> <td style="padding: 2px;">0.24</td> <td style="padding: 2px;">0.40</td> <td style="padding: 2px;">ft</td> </tr> <tr> <td style="padding: 2px;">RF<sub>Grate</sub> =</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;">RF<sub>Curb</sub> =</td> <td style="padding: 2px;">1.00</td> <td style="padding: 2px;">1.00</td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;">RF<sub>combination</sub> =</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;"></td> </tr> <tr> <td colspan="4" style="text-align: center;"> <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">MINOR</th> <th style="padding: 2px;">MAJOR</th> </tr> <tr> <td style="padding: 2px;"><math>Q_s</math> =</td> <td style="padding: 2px;">2.6</td> <td style="padding: 2px;">5.9</td> <td style="padding: 2px;">cfs</td> </tr> <tr> <td style="padding: 2px;"><math>Q_{PEAK REQUIRED}</math> =</td> <td style="padding: 2px;">1.5</td> <td style="padding: 2px;">3.4</td> <td style="padding: 2px;">cfs</td> </tr> </table> </td> </tr> </table> </td> </tr> <tr> <td>Local Depression (additional to continuous gutter depression 'a' from above)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Number of Unit Inlets (Grate or Curb Opening)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Water Depth at Flowline (outside of local depression)</td> <td></td> <td></td> <td></td> </tr> <tr> <td colspan="4"><b>Grate Information</b></td> </tr> <tr> <td>Length of a Unit Grate</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Width of a Unit Grate</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Open Area Ratio for a Grate (typical values 0.15-0.90)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Clogging Factor for a Single Grate (typical value 0.50 - 0.70)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Grate Weir Coefficient (typical value 2.15 - 3.60)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Grate Orifice Coefficient (typical value 0.60 - 0.80)</td> <td></td> <td></td> <td></td> </tr> <tr> <td colspan="4"><b>Curb Opening Information</b></td> </tr> <tr> <td>Length of a Unit Curb Opening</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Height of Vertical Curb Opening in Inches</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Height of Curb Orifice Throat in Inches</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Angle of Throat (see USDCM Figure ST-5)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Side Width for Depression Pan (typically the gutter width of 2 feet)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Clogging Factor for a Single Curb Opening (typical value 0.10)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Curb Opening Weir Coefficient (typical value 2.3-3.7)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)</td> <td></td> <td></td> <td></td> </tr> <tr> <td colspan="4"><b>Low Head Performance Reduction (Calculated)</b></td> </tr> <tr> <td>Depth for Grate Midwidth</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Depth for Curb Opening Weir Equation</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Grated Inlet Performance Reduction Factor for Long Inlets</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Curb Opening Performance Reduction Factor for Long Inlets</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Combination Inlet Performance Reduction Factor for Long Inlets</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Total Inlet Interception Capacity (assumes clogged condition)</td> <td></td> <td></td> <td></td> </tr> <tr> <td colspan="4" style="color: blue; font-weight: bold;">Inlet Capacity IS GOOD for Minor and Major Storms (&gt;Q Peak)</td> </tr> </table> </td></tr></table>				MINOR	MAJOR	$L_o$ (G) =	N/A	N/A	feet	$W_o$ =	N/A	N/A	feet	$A_{ratio}$ =	N/A	N/A		$C_f$ (G) =	N/A	N/A		$C_w$ (G) =	N/A	N/A		$C_o$ (G) =	N/A	N/A		<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">MINOR</th> <th style="padding: 2px;">MAJOR</th> </tr> <tr> <td style="padding: 2px;"><math>L_o</math> (C) =</td> <td style="padding: 2px;">5.00</td> <td style="padding: 2px;">5.00</td> <td style="padding: 2px;">feet</td> </tr> <tr> <td style="padding: 2px;"><math>H_{vert}</math> =</td> <td style="padding: 2px;">6.00</td> <td style="padding: 2px;">6.00</td> <td style="padding: 2px;">inches</td> </tr> <tr> <td style="padding: 2px;"><math>H_{throat}</math> =</td> <td style="padding: 2px;">6.00</td> <td style="padding: 2px;">6.00</td> <td style="padding: 2px;">inches</td> </tr> <tr> <td style="padding: 2px;">Theta =</td> <td style="padding: 2px;">63.40</td> <td style="padding: 2px;">63.40</td> <td style="padding: 2px;">degrees</td> </tr> <tr> <td style="padding: 2px;"><math>W_o</math> =</td> <td style="padding: 2px;">1.17</td> <td style="padding: 2px;">1.17</td> <td style="padding: 2px;">feet</td> </tr> <tr> <td style="padding: 2px;"><math>C_f</math> (C) =</td> <td style="padding: 2px;">0.10</td> <td style="padding: 2px;">0.10</td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;"><math>C_w</math> (C) =</td> <td style="padding: 2px;">3.60</td> <td style="padding: 2px;">3.60</td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;"><math>C_o</math> (C) =</td> <td style="padding: 2px;">0.67</td> <td style="padding: 2px;">0.67</td> <td style="padding: 2px;"></td> </tr> <tr> <td colspan="4" style="text-align: center;"> <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">MINOR</th> <th style="padding: 2px;">MAJOR</th> </tr> <tr> <td style="padding: 2px;"><math>d_{Grate}</math> =</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">ft</td> </tr> <tr> <td style="padding: 2px;"><math>d_{Curb}</math> =</td> <td style="padding: 2px;">0.24</td> <td style="padding: 2px;">0.40</td> <td style="padding: 2px;">ft</td> </tr> <tr> <td style="padding: 2px;">RF<sub>Grate</sub> =</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;">RF<sub>Curb</sub> =</td> <td style="padding: 2px;">1.00</td> <td style="padding: 2px;">1.00</td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;">RF<sub>combination</sub> =</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;"></td> </tr> <tr> <td colspan="4" style="text-align: center;"> <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">MINOR</th> <th style="padding: 2px;">MAJOR</th> </tr> <tr> <td style="padding: 2px;"><math>Q_s</math> =</td> <td style="padding: 2px;">2.6</td> <td style="padding: 2px;">5.9</td> <td style="padding: 2px;">cfs</td> </tr> <tr> <td style="padding: 2px;"><math>Q_{PEAK REQUIRED}</math> =</td> <td style="padding: 2px;">1.5</td> <td style="padding: 2px;">3.4</td> <td style="padding: 2px;">cfs</td> </tr> </table> </td> </tr> </table> </td> </tr> <tr> <td>Local Depression (additional to continuous gutter depression 'a' from above)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Number of Unit Inlets (Grate or Curb Opening)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Water Depth at Flowline (outside of local depression)</td> <td></td> <td></td> <td></td> </tr> <tr> <td colspan="4"><b>Grate Information</b></td> </tr> <tr> <td>Length of a Unit Grate</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Width of a Unit Grate</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Open Area Ratio for a Grate (typical values 0.15-0.90)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Clogging Factor for a Single Grate (typical value 0.50 - 0.70)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Grate Weir Coefficient (typical value 2.15 - 3.60)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Grate Orifice Coefficient (typical value 0.60 - 0.80)</td> <td></td> <td></td> <td></td> </tr> <tr> <td colspan="4"><b>Curb Opening Information</b></td> </tr> <tr> <td>Length of a Unit Curb Opening</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Height of Vertical Curb Opening in Inches</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Height of Curb Orifice Throat in Inches</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Angle of Throat (see USDCM Figure ST-5)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Side Width for Depression Pan (typically the gutter width of 2 feet)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Clogging Factor for a Single Curb Opening (typical value 0.10)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Curb Opening Weir Coefficient (typical value 2.3-3.7)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)</td> <td></td> <td></td> <td></td> </tr> <tr> <td colspan="4"><b>Low Head Performance Reduction (Calculated)</b></td> </tr> <tr> <td>Depth for Grate Midwidth</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Depth for Curb Opening Weir Equation</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Grated Inlet Performance Reduction Factor for Long Inlets</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Curb Opening Performance Reduction Factor for Long Inlets</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Combination Inlet Performance Reduction Factor for Long Inlets</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Total Inlet Interception Capacity (assumes clogged condition)</td> <td></td> <td></td> <td></td> </tr> <tr> <td colspan="4" style="color: blue; font-weight: bold;">Inlet Capacity IS GOOD for Minor and Major Storms (&gt;Q Peak)</td> </tr> </table>				MINOR	MAJOR	$L_o$ (C) =	5.00	5.00	feet	$H_{vert}$ =	6.00	6.00	inches	$H_{throat}$ =	6.00	6.00	inches	Theta =	63.40	63.40	degrees	$W_o$ =	1.17	1.17	feet	$C_f$ (C) =	0.10	0.10		$C_w$ (C) =	3.60	3.60		$C_o$ (C) =	0.67	0.67		<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">MINOR</th> <th style="padding: 2px;">MAJOR</th> </tr> <tr> <td style="padding: 2px;"><math>d_{Grate}</math> =</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">ft</td> </tr> <tr> <td style="padding: 2px;"><math>d_{Curb}</math> =</td> <td style="padding: 2px;">0.24</td> <td style="padding: 2px;">0.40</td> <td style="padding: 2px;">ft</td> </tr> <tr> <td style="padding: 2px;">RF<sub>Grate</sub> =</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;">RF<sub>Curb</sub> =</td> <td style="padding: 2px;">1.00</td> <td style="padding: 2px;">1.00</td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;">RF<sub>combination</sub> =</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;"></td> </tr> <tr> <td colspan="4" style="text-align: center;"> <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">MINOR</th> <th style="padding: 2px;">MAJOR</th> </tr> <tr> <td style="padding: 2px;"><math>Q_s</math> =</td> <td style="padding: 2px;">2.6</td> <td style="padding: 2px;">5.9</td> <td style="padding: 2px;">cfs</td> </tr> <tr> <td style="padding: 2px;"><math>Q_{PEAK REQUIRED}</math> =</td> <td style="padding: 2px;">1.5</td> <td style="padding: 2px;">3.4</td> <td style="padding: 2px;">cfs</td> </tr> </table> </td> </tr> </table>				MINOR	MAJOR	$d_{Grate}$ =	N/A	N/A	ft	$d_{Curb}$ =	0.24	0.40	ft	RF <sub>Grate</sub> =	N/A	N/A		RF <sub>Curb</sub> =	1.00	1.00		RF <sub>combination</sub> =	N/A	N/A		<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">MINOR</th> <th style="padding: 2px;">MAJOR</th> </tr> <tr> <td style="padding: 2px;"><math>Q_s</math> =</td> <td style="padding: 2px;">2.6</td> <td style="padding: 2px;">5.9</td> <td style="padding: 2px;">cfs</td> </tr> <tr> <td style="padding: 2px;"><math>Q_{PEAK REQUIRED}</math> =</td> <td style="padding: 2px;">1.5</td> <td style="padding: 2px;">3.4</td> <td style="padding: 2px;">cfs</td> </tr> </table>				MINOR	MAJOR	$Q_s$ =	2.6	5.9	cfs	$Q_{PEAK REQUIRED}$ =	1.5	3.4	cfs	Local Depression (additional to continuous gutter depression 'a' from above)				Number of Unit Inlets (Grate or Curb Opening)				Water Depth at Flowline (outside of local depression)				<b>Grate Information</b>				Length of a Unit Grate				Width of a Unit Grate				Open Area Ratio for a Grate (typical values 0.15-0.90)				Clogging Factor for a Single Grate (typical value 0.50 - 0.70)				Grate Weir Coefficient (typical value 2.15 - 3.60)				Grate Orifice Coefficient (typical value 0.60 - 0.80)				<b>Curb Opening Information</b>				Length of a Unit Curb Opening				Height of Vertical Curb Opening in Inches				Height of Curb Orifice Throat in Inches				Angle of Throat (see USDCM Figure ST-5)				Side Width for Depression Pan (typically the gutter width of 2 feet)				Clogging Factor for a Single Curb Opening (typical value 0.10)				Curb Opening Weir Coefficient (typical value 2.3-3.7)				Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)				<b>Low Head Performance Reduction (Calculated)</b>				Depth for Grate Midwidth				Depth for Curb Opening Weir Equation				Grated Inlet Performance Reduction Factor for Long Inlets				Curb Opening Performance Reduction Factor for Long Inlets				Combination Inlet Performance Reduction Factor for Long Inlets				Total Inlet Interception Capacity (assumes clogged condition)				Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)																							
MINOR	MAJOR																																																																																																																																																																																																																																										
$L_o$ (G) =	N/A	N/A	feet																																																																																																																																																																																																																																								
$W_o$ =	N/A	N/A	feet																																																																																																																																																																																																																																								
$A_{ratio}$ =	N/A	N/A																																																																																																																																																																																																																																									
$C_f$ (G) =	N/A	N/A																																																																																																																																																																																																																																									
$C_w$ (G) =	N/A	N/A																																																																																																																																																																																																																																									
$C_o$ (G) =	N/A	N/A																																																																																																																																																																																																																																									
<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">MINOR</th> <th style="padding: 2px;">MAJOR</th> </tr> <tr> <td style="padding: 2px;"><math>L_o</math> (C) =</td> <td style="padding: 2px;">5.00</td> <td style="padding: 2px;">5.00</td> <td style="padding: 2px;">feet</td> </tr> <tr> <td style="padding: 2px;"><math>H_{vert}</math> =</td> <td style="padding: 2px;">6.00</td> <td style="padding: 2px;">6.00</td> <td style="padding: 2px;">inches</td> </tr> <tr> <td style="padding: 2px;"><math>H_{throat}</math> =</td> <td style="padding: 2px;">6.00</td> <td style="padding: 2px;">6.00</td> <td style="padding: 2px;">inches</td> </tr> <tr> <td style="padding: 2px;">Theta =</td> <td style="padding: 2px;">63.40</td> <td style="padding: 2px;">63.40</td> <td style="padding: 2px;">degrees</td> </tr> <tr> <td style="padding: 2px;"><math>W_o</math> =</td> <td style="padding: 2px;">1.17</td> <td style="padding: 2px;">1.17</td> <td style="padding: 2px;">feet</td> </tr> <tr> <td style="padding: 2px;"><math>C_f</math> (C) =</td> <td style="padding: 2px;">0.10</td> <td style="padding: 2px;">0.10</td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;"><math>C_w</math> (C) =</td> <td style="padding: 2px;">3.60</td> <td style="padding: 2px;">3.60</td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;"><math>C_o</math> (C) =</td> <td style="padding: 2px;">0.67</td> <td style="padding: 2px;">0.67</td> <td style="padding: 2px;"></td> </tr> <tr> <td colspan="4" style="text-align: center;"> <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">MINOR</th> <th style="padding: 2px;">MAJOR</th> </tr> <tr> <td style="padding: 2px;"><math>d_{Grate}</math> =</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">ft</td> </tr> <tr> <td style="padding: 2px;"><math>d_{Curb}</math> =</td> <td style="padding: 2px;">0.24</td> <td style="padding: 2px;">0.40</td> <td style="padding: 2px;">ft</td> </tr> <tr> <td style="padding: 2px;">RF<sub>Grate</sub> =</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;">RF<sub>Curb</sub> =</td> <td style="padding: 2px;">1.00</td> <td style="padding: 2px;">1.00</td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;">RF<sub>combination</sub> =</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;"></td> </tr> <tr> <td colspan="4" style="text-align: center;"> <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">MINOR</th> <th style="padding: 2px;">MAJOR</th> </tr> <tr> <td style="padding: 2px;"><math>Q_s</math> =</td> <td style="padding: 2px;">2.6</td> <td style="padding: 2px;">5.9</td> <td style="padding: 2px;">cfs</td> </tr> <tr> <td style="padding: 2px;"><math>Q_{PEAK REQUIRED}</math> =</td> <td style="padding: 2px;">1.5</td> <td style="padding: 2px;">3.4</td> <td style="padding: 2px;">cfs</td> </tr> </table> </td> </tr> </table> </td> </tr> <tr> <td>Local Depression (additional to continuous gutter depression 'a' from above)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Number of Unit Inlets (Grate or Curb Opening)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Water Depth at Flowline (outside of local depression)</td> <td></td> <td></td> <td></td> </tr> <tr> <td colspan="4"><b>Grate Information</b></td> </tr> <tr> <td>Length of a Unit Grate</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Width of a Unit Grate</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Open Area Ratio for a Grate (typical values 0.15-0.90)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Clogging Factor for a Single Grate (typical value 0.50 - 0.70)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Grate Weir Coefficient (typical value 2.15 - 3.60)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Grate Orifice Coefficient (typical value 0.60 - 0.80)</td> <td></td> <td></td> <td></td> </tr> <tr> <td colspan="4"><b>Curb Opening Information</b></td> </tr> <tr> <td>Length of a Unit Curb Opening</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Height of Vertical Curb Opening in Inches</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Height of Curb Orifice Throat in Inches</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Angle of Throat (see USDCM Figure ST-5)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Side Width for Depression Pan (typically the gutter width of 2 feet)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Clogging Factor for a Single Curb Opening (typical value 0.10)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Curb Opening Weir Coefficient (typical value 2.3-3.7)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)</td> <td></td> <td></td> <td></td> </tr> <tr> <td colspan="4"><b>Low Head Performance Reduction (Calculated)</b></td> </tr> <tr> <td>Depth for Grate Midwidth</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Depth for Curb Opening Weir Equation</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Grated Inlet Performance Reduction Factor for Long Inlets</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Curb Opening Performance Reduction Factor for Long Inlets</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Combination Inlet Performance Reduction Factor for Long Inlets</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Total Inlet Interception Capacity (assumes clogged condition)</td> <td></td> <td></td> <td></td> </tr> <tr> <td colspan="4" style="color: blue; font-weight: bold;">Inlet Capacity IS GOOD for Minor and Major Storms (&gt;Q Peak)</td> </tr> </table>				MINOR	MAJOR	$L_o$ (C) =	5.00	5.00	feet	$H_{vert}$ =	6.00	6.00	inches	$H_{throat}$ =	6.00	6.00	inches	Theta =	63.40	63.40	degrees	$W_o$ =	1.17	1.17	feet	$C_f$ (C) =	0.10	0.10		$C_w$ (C) =	3.60	3.60		$C_o$ (C) =	0.67	0.67		<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">MINOR</th> <th style="padding: 2px;">MAJOR</th> </tr> <tr> <td style="padding: 2px;"><math>d_{Grate}</math> =</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">ft</td> </tr> <tr> <td style="padding: 2px;"><math>d_{Curb}</math> =</td> <td style="padding: 2px;">0.24</td> <td style="padding: 2px;">0.40</td> <td style="padding: 2px;">ft</td> </tr> <tr> <td style="padding: 2px;">RF<sub>Grate</sub> =</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;">RF<sub>Curb</sub> =</td> <td style="padding: 2px;">1.00</td> <td style="padding: 2px;">1.00</td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;">RF<sub>combination</sub> =</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;"></td> </tr> <tr> <td colspan="4" style="text-align: center;"> <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">MINOR</th> <th style="padding: 2px;">MAJOR</th> </tr> <tr> <td style="padding: 2px;"><math>Q_s</math> =</td> <td style="padding: 2px;">2.6</td> <td style="padding: 2px;">5.9</td> <td style="padding: 2px;">cfs</td> </tr> <tr> <td style="padding: 2px;"><math>Q_{PEAK REQUIRED}</math> =</td> <td style="padding: 2px;">1.5</td> <td style="padding: 2px;">3.4</td> <td style="padding: 2px;">cfs</td> </tr> </table> </td> </tr> </table>				MINOR	MAJOR	$d_{Grate}$ =	N/A	N/A	ft	$d_{Curb}$ =	0.24	0.40	ft	RF <sub>Grate</sub> =	N/A	N/A		RF <sub>Curb</sub> =	1.00	1.00		RF <sub>combination</sub> =	N/A	N/A		<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">MINOR</th> <th style="padding: 2px;">MAJOR</th> </tr> <tr> <td style="padding: 2px;"><math>Q_s</math> =</td> <td style="padding: 2px;">2.6</td> <td style="padding: 2px;">5.9</td> <td style="padding: 2px;">cfs</td> </tr> <tr> <td style="padding: 2px;"><math>Q_{PEAK REQUIRED}</math> =</td> <td style="padding: 2px;">1.5</td> <td style="padding: 2px;">3.4</td> <td style="padding: 2px;">cfs</td> </tr> </table>				MINOR	MAJOR	$Q_s$ =	2.6	5.9	cfs	$Q_{PEAK REQUIRED}$ =	1.5	3.4	cfs	Local Depression (additional to continuous gutter depression 'a' from above)				Number of Unit Inlets (Grate or Curb Opening)				Water Depth at Flowline (outside of local depression)				<b>Grate Information</b>				Length of a Unit Grate				Width of a Unit Grate				Open Area Ratio for a Grate (typical values 0.15-0.90)				Clogging Factor for a Single Grate (typical value 0.50 - 0.70)				Grate Weir Coefficient (typical value 2.15 - 3.60)				Grate Orifice Coefficient (typical value 0.60 - 0.80)				<b>Curb Opening Information</b>				Length of a Unit Curb Opening				Height of Vertical Curb Opening in Inches				Height of Curb Orifice Throat in Inches				Angle of Throat (see USDCM Figure ST-5)				Side Width for Depression Pan (typically the gutter width of 2 feet)				Clogging Factor for a Single Curb Opening (typical value 0.10)				Curb Opening Weir Coefficient (typical value 2.3-3.7)				Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)				<b>Low Head Performance Reduction (Calculated)</b>				Depth for Grate Midwidth				Depth for Curb Opening Weir Equation				Grated Inlet Performance Reduction Factor for Long Inlets				Curb Opening Performance Reduction Factor for Long Inlets				Combination Inlet Performance Reduction Factor for Long Inlets				Total Inlet Interception Capacity (assumes clogged condition)				Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)																																																					
MINOR	MAJOR																																																																																																																																																																																																																																										
$L_o$ (C) =	5.00	5.00	feet																																																																																																																																																																																																																																								
$H_{vert}$ =	6.00	6.00	inches																																																																																																																																																																																																																																								
$H_{throat}$ =	6.00	6.00	inches																																																																																																																																																																																																																																								
Theta =	63.40	63.40	degrees																																																																																																																																																																																																																																								
$W_o$ =	1.17	1.17	feet																																																																																																																																																																																																																																								
$C_f$ (C) =	0.10	0.10																																																																																																																																																																																																																																									
$C_w$ (C) =	3.60	3.60																																																																																																																																																																																																																																									
$C_o$ (C) =	0.67	0.67																																																																																																																																																																																																																																									
<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">MINOR</th> <th style="padding: 2px;">MAJOR</th> </tr> <tr> <td style="padding: 2px;"><math>d_{Grate}</math> =</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">ft</td> </tr> <tr> <td style="padding: 2px;"><math>d_{Curb}</math> =</td> <td style="padding: 2px;">0.24</td> <td style="padding: 2px;">0.40</td> <td style="padding: 2px;">ft</td> </tr> <tr> <td style="padding: 2px;">RF<sub>Grate</sub> =</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;">RF<sub>Curb</sub> =</td> <td style="padding: 2px;">1.00</td> <td style="padding: 2px;">1.00</td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;">RF<sub>combination</sub> =</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;">N/A</td> <td style="padding: 2px;"></td> </tr> <tr> <td colspan="4" style="text-align: center;"> <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">MINOR</th> <th style="padding: 2px;">MAJOR</th> </tr> <tr> <td style="padding: 2px;"><math>Q_s</math> =</td> <td style="padding: 2px;">2.6</td> <td style="padding: 2px;">5.9</td> <td style="padding: 2px;">cfs</td> </tr> <tr> <td style="padding: 2px;"><math>Q_{PEAK REQUIRED}</math> =</td> <td style="padding: 2px;">1.5</td> <td style="padding: 2px;">3.4</td> <td style="padding: 2px;">cfs</td> </tr> </table> </td> </tr> </table>				MINOR	MAJOR	$d_{Grate}$ =	N/A	N/A	ft	$d_{Curb}$ =	0.24	0.40	ft	RF <sub>Grate</sub> =	N/A	N/A		RF <sub>Curb</sub> =	1.00	1.00		RF <sub>combination</sub> =	N/A	N/A		<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">MINOR</th> <th style="padding: 2px;">MAJOR</th> </tr> <tr> <td style="padding: 2px;"><math>Q_s</math> =</td> <td style="padding: 2px;">2.6</td> <td style="padding: 2px;">5.9</td> <td style="padding: 2px;">cfs</td> </tr> <tr> <td style="padding: 2px;"><math>Q_{PEAK REQUIRED}</math> =</td> <td style="padding: 2px;">1.5</td> <td style="padding: 2px;">3.4</td> <td style="padding: 2px;">cfs</td> </tr> </table>				MINOR	MAJOR	$Q_s$ =	2.6	5.9	cfs	$Q_{PEAK REQUIRED}$ =	1.5	3.4	cfs																																																																																																																																																																																																				
MINOR	MAJOR																																																																																																																																																																																																																																										
$d_{Grate}$ =	N/A	N/A	ft																																																																																																																																																																																																																																								
$d_{Curb}$ =	0.24	0.40	ft																																																																																																																																																																																																																																								
RF <sub>Grate</sub> =	N/A	N/A																																																																																																																																																																																																																																									
RF <sub>Curb</sub> =	1.00	1.00																																																																																																																																																																																																																																									
RF <sub>combination</sub> =	N/A	N/A																																																																																																																																																																																																																																									
<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">MINOR</th> <th style="padding: 2px;">MAJOR</th> </tr> <tr> <td style="padding: 2px;"><math>Q_s</math> =</td> <td style="padding: 2px;">2.6</td> <td style="padding: 2px;">5.9</td> <td style="padding: 2px;">cfs</td> </tr> <tr> <td style="padding: 2px;"><math>Q_{PEAK REQUIRED}</math> =</td> <td style="padding: 2px;">1.5</td> <td style="padding: 2px;">3.4</td> <td style="padding: 2px;">cfs</td> </tr> </table>				MINOR	MAJOR	$Q_s$ =	2.6	5.9	cfs	$Q_{PEAK REQUIRED}$ =	1.5	3.4	cfs																																																																																																																																																																																																																														
MINOR	MAJOR																																																																																																																																																																																																																																										
$Q_s$ =	2.6	5.9	cfs																																																																																																																																																																																																																																								
$Q_{PEAK REQUIRED}$ =	1.5	3.4	cfs																																																																																																																																																																																																																																								
Local Depression (additional to continuous gutter depression 'a' from above)																																																																																																																																																																																																																																											
Number of Unit Inlets (Grate or Curb Opening)																																																																																																																																																																																																																																											
Water Depth at Flowline (outside of local depression)																																																																																																																																																																																																																																											
<b>Grate Information</b>																																																																																																																																																																																																																																											
Length of a Unit Grate																																																																																																																																																																																																																																											
Width of a Unit Grate																																																																																																																																																																																																																																											
Open Area Ratio for a Grate (typical values 0.15-0.90)																																																																																																																																																																																																																																											
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)																																																																																																																																																																																																																																											
Grate Weir Coefficient (typical value 2.15 - 3.60)																																																																																																																																																																																																																																											
Grate Orifice Coefficient (typical value 0.60 - 0.80)																																																																																																																																																																																																																																											
<b>Curb Opening Information</b>																																																																																																																																																																																																																																											
Length of a Unit Curb Opening																																																																																																																																																																																																																																											
Height of Vertical Curb Opening in Inches																																																																																																																																																																																																																																											
Height of Curb Orifice Throat in Inches																																																																																																																																																																																																																																											
Angle of Throat (see USDCM Figure ST-5)																																																																																																																																																																																																																																											
Side Width for Depression Pan (typically the gutter width of 2 feet)																																																																																																																																																																																																																																											
Clogging Factor for a Single Curb Opening (typical value 0.10)																																																																																																																																																																																																																																											
Curb Opening Weir Coefficient (typical value 2.3-3.7)																																																																																																																																																																																																																																											
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)																																																																																																																																																																																																																																											
<b>Low Head Performance Reduction (Calculated)</b>																																																																																																																																																																																																																																											
Depth for Grate Midwidth																																																																																																																																																																																																																																											
Depth for Curb Opening Weir Equation																																																																																																																																																																																																																																											
Grated Inlet Performance Reduction Factor for Long Inlets																																																																																																																																																																																																																																											
Curb Opening Performance Reduction Factor for Long Inlets																																																																																																																																																																																																																																											
Combination Inlet Performance Reduction Factor for Long Inlets																																																																																																																																																																																																																																											
Total Inlet Interception Capacity (assumes clogged condition)																																																																																																																																																																																																																																											
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)																																																																																																																																																																																																																																											



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

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

**Project:** THE VILLAS AT CLAREMONT RANCH  
**Inlet ID:** DP-3



**Gutter Geometry:**

Maximum Allowable Width for Spread Behind Curb  
 Side Slope Behind Curb (leave blank for no conveyance credit behind curb)  
 Manning's Roughness Behind Curb (typically between 0.012 and 0.020)  
 Height of Curb at Gutter Flow Line  
 Distance from Curb Face to Street Crown  
 Gutter Width  
 Street Transverse Slope  
 Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)  
 Street Longitudinal Slope - Enter 0 for sump condition  
 Manning's Roughness for Street Section (typically between 0.012 and 0.020)

T <sub>BACK</sub> =	10.0	ft
S <sub>BACK</sub> =	0.020	ft/ft
n <sub>BACK</sub> =	0.015	
H <sub>CURB</sub> =	6.00	inches
T <sub>CROWN</sub> =	13.2	ft
W =	1.17	ft
S <sub>x</sub> =	0.020	ft/ft
S <sub>w</sub> =	0.083	ft/ft
S <sub>o</sub> =	0.000	ft/ft
n <sub>STREET</sub> =	0.015	

Max. Allowable Spread for Minor & Major Storm  
 Max. Allowable Depth at Gutter Flowline for Minor & Major Storm  
 Check boxes are not applicable in SUMP conditions

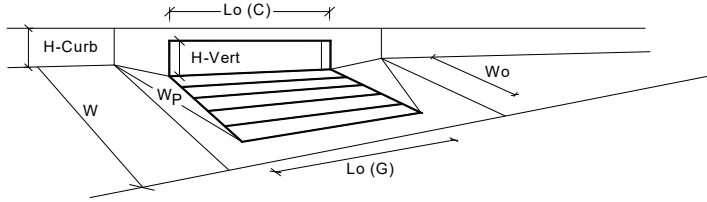
	Minor Storm	Major Storm	
T <sub>MAX</sub> =	13.0	13.0	ft
d <sub>MAX</sub> =	6.0	6.0	inches
	<input type="checkbox"/>	<input type="checkbox"/>	

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 <sub>allow</sub> =	SUMP	SUMP	cfs

# INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.02 (August 2022)

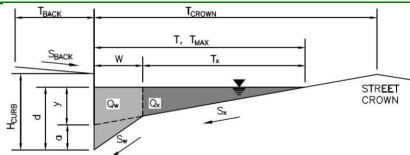


Design Information (Input)	MINOR      MAJOR	
Type of Inlet	CDOT Type R Curb Opening	
Local Depression (additional to continuous gutter depression 'a' from above)	Type =	CDOT Type R Curb Opening
Number of Unit Inlets (Grate or Curb Opening)	$a_{local}$ =	3.00 inches
Water Depth at Flowline (outside of local depression)	No =	1
<b>Grate Information</b>	Ponding Depth =	4.0 inches
Length of a Unit Grate		<input checked="" type="checkbox"/> Override Depths
Width of a Unit Grate	$L_o$ (G) =	N/A feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	$W_o$ =	N/A feet
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	$A_{ratio}$ =	N/A
Grate Weir Coefficient (typical value 2.15 - 3.60)	$C_f$ (G) =	N/A
Grate Orifice Coefficient (typical value 0.60 - 0.80)	$C_w$ (G) =	N/A
<b>Curb Opening Information</b>	$C_o$ (G) =	N/A
Length of a Unit Curb Opening		
Height of Vertical Curb Opening in Inches	$L_o$ (C) =	10.00 feet
Height of Curb Orifice Throat in Inches	$H_{vert}$ =	6.00 inches
Angle of Throat (see USDCM Figure ST-5)	$H_{throat}$ =	6.00 inches
Side Width for Depression Pan (typically the gutter width of 2 feet)	$\theta$ =	63.40 degrees
Clogging Factor for a Single Curb Opening (typical value 0.10)	$W_o$ =	1.17 feet
Curb Opening Weir Coefficient (typical value 2.3-3.7)	$C_f$ (C) =	0.10
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	$C_w$ (C) =	3.60
	$C_o$ (C) =	0.67
<b>Grate Flow Analysis (Calculated)</b>		
Clogging Coefficient for Multiple Units	Coef =	N/A
Clogging Factor for Multiple Units	Clog =	N/A
Grate Capacity as a Weir (based on MHFD - CSU 2010 Study)		
Interception without Clogging	$Q_{wi}$ =	N/A cfs
Interception with Clogging	$Q_{wa}$ =	N/A cfs
Grate Capacity as an Orifice (based on MHFD - CSU 2010 Study)		
Interception without Clogging	$Q_{oi}$ =	N/A cfs
Interception with Clogging	$Q_{oa}$ =	N/A cfs
Grate Capacity as Mixed Flow		
Interception without Clogging	$Q_{mi}$ =	N/A cfs
Interception with Clogging	$Q_{ma}$ =	N/A cfs
Resulting Grate Capacity (assumes clogged condition)	<b><math>Q_{Grate}</math></b> =	<b>N/A cfs</b>
<b>Curb Opening Flow Analysis (Calculated)</b>		
Clogging Coefficient for Multiple Units	Coef =	1.25
Clogging Factor for Multiple Units	Clog =	0.06
Curb Capacity as a Weir (based on MHFD - CSU 2010 Study)		
Interception without Clogging	$Q_{wi}$ =	4.0 cfs
Interception with Clogging	$Q_{wa}$ =	3.7 cfs
Curb Capacity as an Orifice (based on MHFD - CSU 2010 Study)		
Interception without Clogging	$Q_{oi}$ =	16.1 cfs
Interception with Clogging	$Q_{oa}$ =	15.1 cfs
Curb Opening Capacity as Mixed Flow		
Interception without Clogging	$Q_{mi}$ =	7.4 cfs
Interception with Clogging	$Q_{ma}$ =	7.0 cfs
Resulting Curb Opening Capacity (assumes clogged condition)	<b><math>Q_{Curb}</math></b> =	<b>3.7 cfs</b>
<b>Resultant Street Conditions</b>		
Total Inlet Length	$L$ =	10.00 feet
Resultant Street Flow Spread (based on street geometry from above)	$T$ =	13.0 ft. >T-Crown
Resultant Flow Depth at Street Crown	$d_{CROWN}$ =	1.9 inches
<b>Low Head Performance Reduction (Calculated)</b>		
Depth for Grate Midwidth	$d_{Grate}$ =	N/A ft
Depth for Curb Opening Weir Equation	$d_{Curb}$ =	0.24 ft
Grated Inlet Performance Reduction Factor for Long Inlets	$RF_{Grate}$ =	N/A
Curb Opening Performance Reduction Factor for Long Inlets	$RF_{Curb}$ =	0.79
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.93
Total Inlet Interception Capacity (assumes clogged condition)	<b><math>Q_s</math></b> =	<b>3.7 cfs</b>
<b>Inlet Capacity IS GOOD for Minor and Major Storms (&gt;Q Peak)</b>	$Q_{PEAK REQUIRED}$ =	1.8 cfs
		4.1 cfs

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

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

**Project:** THE VILLAS AT CLAREMONT RANCH  
**Inlet ID:** DP-4



**Gutter Geometry:**

Maximum Allowable Width for Spread Behind Curb  
 Side Slope Behind Curb (leave blank for no conveyance credit behind curb)  
 Manning's Roughness Behind Curb (typically between 0.012 and 0.020)  
 Height of Curb at Gutter Flow Line  
 Distance from Curb Face to Street Crown  
 Gutter Width  
 Street Transverse Slope  
 Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)  
 Street Longitudinal Slope - Enter 0 for sump condition  
 Manning's Roughness for Street Section (typically between 0.012 and 0.020)

$T_{BACK}$	=	10.0	ft
$S_{BACK}$	=	0.020	ft/ft
$n_{BACK}$	=	0.015	
$H_{CURB}$	=	6.00	inches
$T_{CROWN}$	=	13.2	ft
$W$	=	1.17	ft
$S_X$	=	0.020	ft/ft
$S_W$	=	0.083	ft/ft
$S_O$	=	0.000	ft/ft
$n_{STREET}$	=	0.015	

Max. Allowable Spread for Minor & Major Storm  
 Max. Allowable Depth at Gutter Flowline for Minor & Major Storm  
 Check boxes are not applicable in SUMP conditions

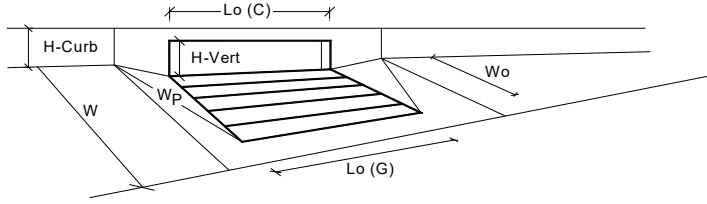
		Minor Storm	Major Storm	
$T_{MAX}$	=	13.0	13.0	ft
$d_{MAX}$	=	6.0	6.0	inches
		<input type="checkbox"/>	<input type="checkbox"/>	

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 5.02 (August 2022)

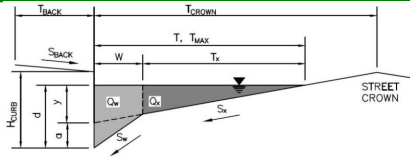


Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	1	1	
Water Depth at Flowline (outside of local depression)	4.0	6.0	inches
<b>Grate Information</b>			
Length of a Unit Grate	N/A	N/A	feet
Width of a Unit Grate	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	N/A	N/A	
<b>Curb Opening Information</b>			
Length of a Unit Curb Opening	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	1.17	1.17	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	0.67	0.67	
<b>Low Head Performance Reduction (Calculated)</b>			
Depth for Grate Midwidth	N/A	N/A	ft
Depth for Curb Opening Weir Equation	0.24	0.40	ft
Grated Inlet Performance Reduction Factor for Long Inlets	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	1.00	1.00	
Combination Inlet Performance Reduction Factor for Long Inlets	N/A	N/A	
<b>Total Inlet Interception Capacity (assumes clogged condition)</b>			
<b>Inlet Capacity IS GOOD for Minor and Major Storms (&gt;Q Peak)</b>	<b>2.6</b>	<b>5.9</b>	<b>cfs</b>
Q PEAK REQUIRED =	1.7	3.8	cfs

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

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

**Project:** THE VILLAS AT CLAREMONT RANCH  
**Inlet ID:** DP-5



**Gutter Geometry:**

Maximum Allowable Width for Spread Behind Curb  
 Side Slope Behind Curb (leave blank for no conveyance credit behind curb)  
 Manning's Roughness Behind Curb (typically between 0.012 and 0.020)  
 Height of Curb at Gutter Flow Line  
 Distance from Curb Face to Street Crown  
 Gutter Width  
 Street Transverse Slope  
 Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)  
 Street Longitudinal Slope - Enter 0 for sump condition  
 Manning's Roughness for Street Section (typically between 0.012 and 0.020)

T <sub>BACK</sub> =	10.0	ft
S <sub>BACK</sub> =	0.020	ft/ft
n <sub>BACK</sub> =	0.015	
H <sub>CURB</sub> =	6.00	inches
T <sub>CROWN</sub> =	13.2	ft
W =	1.17	ft
S <sub>X</sub> =	0.020	ft/ft
S <sub>G</sub> =	0.083	ft/ft
S <sub>O</sub> =	0.000	ft/ft
n <sub>STREET</sub> =	0.015	

Max. Allowable Spread for Minor & Major Storm  
 Max. Allowable Depth at Gutter Flowline for Minor & Major Storm  
 Check boxes are not applicable in SUMP conditions

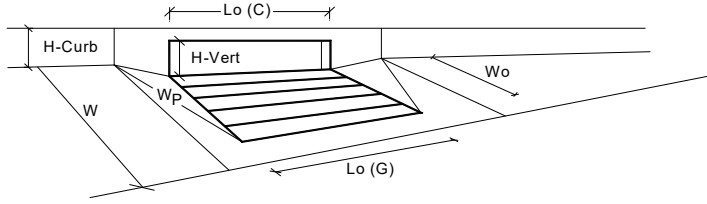
	Minor Storm	Major Storm	
T <sub>MAX</sub> =	13.0	13.0	ft
d <sub>MAX</sub> =	6.0	6.0	inches
	<input type="checkbox"/>	<input type="checkbox"/>	

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 <sub>allow</sub> =	<b>SUMP</b>	<b>SUMP</b>	cfs

# INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.02 (August 2022)

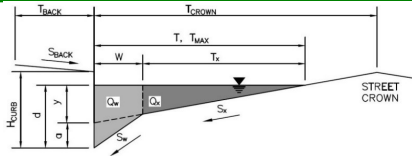


Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	1	1	
Water Depth at Flowline (outside of local depression)	4.0	6.0	inches
<b>Grate Information</b>			
Length of a Unit Grate	N/A	N/A	feet
Width of a Unit Grate	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	N/A	N/A	
<b>Curb Opening Information</b>			
Length of a Unit Curb Opening	10.00	10.00	feet
Height of Vertical Curb Opening in Inches	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	1.17	1.17	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	0.67	0.67	
<b>Low Head Performance Reduction (Calculated)</b>			
Depth for Grate Midwidth	N/A	N/A	ft
Depth for Curb Opening Weir Equation	0.24	0.40	ft
Grated Inlet Performance Reduction Factor for Long Inlets	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	0.79	0.93	
Combination Inlet Performance Reduction Factor for Long Inlets	N/A	N/A	
<b>Total Inlet Interception Capacity (assumes clogged condition)</b>			
<b>Inlet Capacity IS GOOD for Minor and Major Storms (&gt;Q Peak)</b>	<b>3.7</b>	<b>9.8</b>	<b>cfs</b>
Q <sub>PEAK REQUIRED</sub>	3.0	7.0	cfs

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

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

**Project:** THE VILLAS AT CLAREMONT RANCH  
**Inlet ID:** DP-6



**Gutter Geometry:**

Maximum Allowable Width for Spread Behind Curb  
 Side Slope Behind Curb (leave blank for no conveyance credit behind curb)  
 Manning's Roughness Behind Curb (typically between 0.012 and 0.020)  
 Height of Curb at Gutter Flow Line  
 Distance from Curb Face to Street Crown  
 Gutter Width  
 Street Transverse Slope  
 Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)  
 Street Longitudinal Slope - Enter 0 for sump condition  
 Manning's Roughness for Street Section (typically between 0.012 and 0.020)

$T_{BACK} = 5.0$  ft  
 $S_{BACK} = 0.020$  ft/ft  
 $n_{BACK} = 0.015$

$H_{CURB} = 6.00$  inches  
 $T_{CROWN} = 13.2$  ft  
 $W = 1.17$  ft  
 $S_X = 0.020$  ft/ft  
 $S_W = 0.083$  ft/ft  
 $S_O = 0.000$  ft/ft  
 $n_{STREET} = 0.015$

Max. Allowable Spread for Minor & Major Storm  
 Max. Allowable Depth at Gutter Flowline for Minor & Major Storm  
 Check boxes are not applicable in SUMP conditions

	Minor Storm	Major Storm	
$T_{MAX} =$	13.0	13.0	ft
$d_{MAX} =$	6.0	6.0	inches
	<input type="checkbox"/>	<input type="checkbox"/>	

MINOR STORM Allowable Capacity is not applicable to Sump Condition  
 MAJOR STORM Allowable Capacity is not applicable to Sump Condition

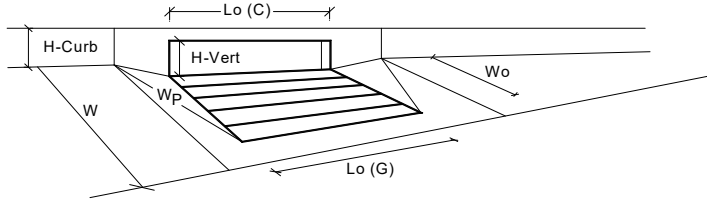
$Q_{allow} =$ 

Minor Storm	Major Storm
<b>SUMP</b>	<b>SUMP</b>

 cfs

# INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.02 (August 2022)



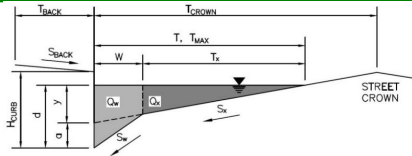
Design Information (Input)	MINOR		MAJOR	
Type of Inlet	CDOT Type R Curb Opening			
Local Depression (additional to continuous gutter depression 'a' from above)	3.00	3.00		
Number of Unit Inlets (Grate or Curb Opening)	1	1		
Water Depth at Flowline (outside of local depression)	4.0	6.0		
<b>Grate Information</b>				
Length of a Unit Grate	N/A	N/A		
Width of a Unit Grate	N/A	N/A		
Open Area Ratio for a Grate (typical values 0.15-0.90)	N/A	N/A		
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	N/A	N/A		
Grate Weir Coefficient (typical value 2.15 - 3.60)	N/A	N/A		
Grate Orifice Coefficient (typical value 0.60 - 0.80)	N/A	N/A		
<b>Curb Opening Information</b>				
Length of a Unit Curb Opening	5.00	5.00		
Height of Vertical Curb Opening in Inches	6.00	6.00		
Height of Curb Orifice Throat in Inches	6.00	6.00		
Angle of Throat (see USDCM Figure ST-5)	63.40	63.40		
Side Width for Depression Pan (typically the gutter width of 2 feet)	1.17	1.17		
Clogging Factor for a Single Curb Opening (typical value 0.10)	0.10	0.10		
Curb Opening Weir Coefficient (typical value 2.3-3.7)	3.60	3.60		
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	0.67	0.67		
<b>Low Head Performance Reduction (Calculated)</b>				
Depth for Grate Midwidth	N/A	N/A		
Depth for Curb Opening Weir Equation	0.24	0.40		
Grated Inlet Performance Reduction Factor for Long Inlets	N/A	N/A		
Curb Opening Performance Reduction Factor for Long Inlets	1.00	1.00		
Combination Inlet Performance Reduction Factor for Long Inlets	N/A	N/A		
<b>Total Inlet Interception Capacity (assumes clogged condition)</b>				
<b>Inlet Capacity IS GOOD for Minor and Major Storms (&gt;Q Peak)</b>	<b>2.6</b>	<b>5.9</b>		
<b>Q PEAK REQUIRED</b>	1.6	3.3		



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

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

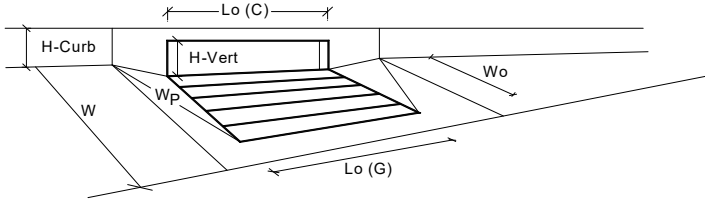
Project: **THE VILLAS AT CLAREMONT RANCH**  
 Inlet ID: **DP-7**



<b>Gutter Geometry:</b>									
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} = 5.0$ ft								
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	$S_{BACK} = 0.020$ ft/ft								
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	$n_{BACK} = 0.015$								
Height of Curb at Gutter Flow Line	$H_{CURB} = 6.00$ inches								
Distance from Curb Face to Street Crown	$T_{CROWN} = 13.2$ ft								
Gutter Width	$W = 1.17$ 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)	$n_{STREET} = 0.015$								
Max. Allowable Spread for Minor & Major Storm	<table border="1"> <tr> <td></td> <td>Minor Storm</td> <td>Major Storm</td> <td>ft</td> </tr> <tr> <td><math>T_{MAX} =</math></td> <td>13.0</td> <td>13.0</td> <td></td> </tr> </table>		Minor Storm	Major Storm	ft	$T_{MAX} =$	13.0	13.0	
	Minor Storm	Major Storm	ft						
$T_{MAX} =$	13.0	13.0							
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	<table border="1"> <tr> <td></td> <td>Minor Storm</td> <td>Major Storm</td> <td>inches</td> </tr> <tr> <td><math>d_{MAX} =</math></td> <td>6.0</td> <td>6.0</td> <td></td> </tr> </table>		Minor Storm	Major Storm	inches	$d_{MAX} =$	6.0	6.0	
	Minor Storm	Major Storm	inches						
$d_{MAX} =$	6.0	6.0							
Check boxes are not applicable in SUMP conditions	<input type="checkbox"/> <input type="checkbox"/>								
MINOR STORM Allowable Capacity is not applicable to Sump Condition									
MAJOR STORM Allowable Capacity is not applicable to Sump Condition									
	<table border="1"> <tr> <td></td> <td>Minor Storm</td> <td>Major Storm</td> <td>cfs</td> </tr> <tr> <td><math>Q_{allow} =</math></td> <td>SUMP</td> <td>SUMP</td> <td></td> </tr> </table>		Minor Storm	Major Storm	cfs	$Q_{allow} =$	SUMP	SUMP	
	Minor Storm	Major Storm	cfs						
$Q_{allow} =$	SUMP	SUMP							

# INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.02 (August 2022)

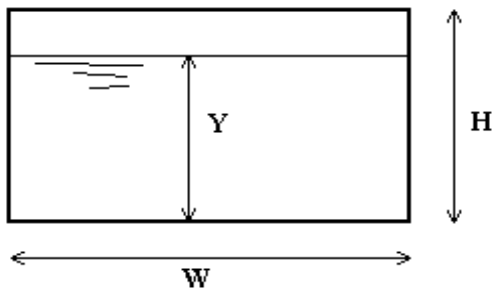


Design Information (Input)	MINOR      MAJOR	
Type of Inlet	CDOT Type R Curb Opening	
Local Depression (additional to continuous gutter depression 'a' from above)	3.00	3.00
Number of Unit Inlets (Grate or Curb Opening)	1	1
Water Depth at Flowline (outside of local depression)	4.0	6.0
<b>Grate Information</b>	MINOR	MAJOR
Length of a Unit Grate	N/A	N/A
Width of a Unit Grate	N/A	N/A
Open Area Ratio for a Grate (typical values 0.15-0.90)	N/A	N/A
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	N/A	N/A
Grate Weir Coefficient (typical value 2.15 - 3.60)	N/A	N/A
Grate Orifice Coefficient (typical value 0.60 - 0.80)	N/A	N/A
<b>Curb Opening Information</b>	MINOR	MAJOR
Length of a Unit Curb Opening	5.00	5.00
Height of Vertical Curb Opening in Inches	6.00	6.00
Height of Curb Orifice Throat in Inches	6.00	6.00
Angle of Throat (see USDCM Figure ST-5)	63.40	63.40
Side Width for Depression Pan (typically the gutter width of 2 feet)	1.17	1.17
Clogging Factor for a Single Curb Opening (typical value 0.10)	0.10	0.10
Curb Opening Weir Coefficient (typical value 2.3-3.7)	3.60	3.60
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	0.67	0.67
<b>Low Head Performance Reduction (Calculated)</b>	MINOR	MAJOR
Depth for Grate Midwidth	N/A	N/A
Depth for Curb Opening Weir Equation	0.24	0.40
Grated Inlet Performance Reduction Factor for Long Inlets	N/A	N/A
Curb Opening Performance Reduction Factor for Long Inlets	1.00	1.00
Combination Inlet Performance Reduction Factor for Long Inlets	N/A	N/A
Total Inlet Interception Capacity (assumes clogged condition)	2.6	5.9
<b>Inlet Capacity IS GOOD for Minor and Major Storms (&gt;Q Peak)</b>	1.4	3.0

## BOX CONDUIT FLOW (Normal & Critical Depth Computation)

Project: Villas at Claremont Ranch

Box ID: Sub Basin 2.1-Curb Cut

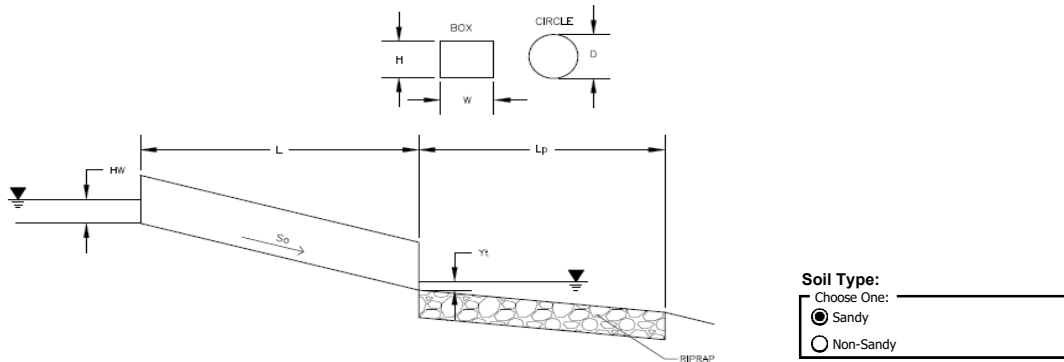


<b>Design Information (Input)</b>	
Box conduit invert slope	So = 0.0200 ft/ft
Box Manning's n-value	n = 0.0130
Box Width	W = 1.00 ft
Box Height	H = 0.50 ft
<b>Design discharge</b>	<b>Q = 1.30 cfs</b>
<b>Full-flow capacity (Calculated)</b>	
Full-flow area	Af = 0.50 sq ft
Full-flow wetted perimeter	Pf = 3.00 ft
Full-flow capacity	Qf = 2.45 cfs
<b>Calculations of Normal Flow Condition</b>	
Normal flow depth (<H)	Yn = 0.26 ft
Flow area	An = 0.26 sq ft
Wetted perimeter	Pn = 1.52 ft
Flow velocity	Vn = 5.00 fps
Discharge	Qn = 1.30 cfs
Percent Full	Flow = 53.1% of full flow
Normal Depth Froude Number	Fr <sub>n</sub> = 1.73 supercritical
<b>Calculation of Critical Flow Condition</b>	
Critical flow depth	Y <sub>c</sub> = 0.37 ft
Critical flow area	A <sub>c</sub> = 0.37 sq ft
Critical flow velocity	V <sub>c</sub> = 3.47 fps
Critical Depth Froude Number	Fr <sub>c</sub> = 1.00

## Determination of Culvert Headwater and Outlet Protection

Project: **Villas at Claremont Ranch**

Basin ID: **Outlet from curb chase SubBasin 2.1**



**Soil Type:**  
 Choose One:  Sandy  Non-Sandy

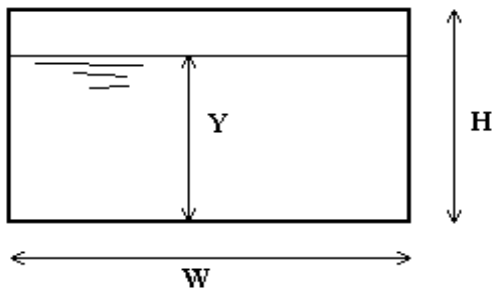
**Supercritical Flow! Using  $H_a$  to calculate protection type.**

Design Information (Input):	
Design Discharge	Q = <input style="width: 50px;" type="text" value="1.3"/> cfs
<b>Circular Culvert:</b>	
Barrel Diameter in Inches	D = <input style="width: 50px;" type="text"/>
Inlet Edge Type (Choose from pull-down list)	Square End Projection
<b>Box Culvert:</b>	
Barrel Height (Rise) in Feet	Height (Rise) = <input style="width: 50px;" type="text" value="0.5"/> ft
Barrel Width (Span) in Feet	Width (Span) = <input style="width: 50px;" type="text" value="1"/> ft
Inlet Edge Type (Choose from pull-down list)	1 : 1 Bevel w/ Headwall
Number of Barrels	No = <input style="width: 50px;" type="text" value="1"/>
Inlet Elevation	Elev IN = <input style="width: 50px;" type="text" value="0.2"/> ft
Outlet Elevation <b>OR</b> Slope	So = <input style="width: 50px;" type="text" value="0.02"/> ft/ft
Culvert Length	L = <input style="width: 50px;" type="text" value="1"/> ft
Manning's Roughness	n = <input style="width: 50px;" type="text" value="0.012"/>
Bend Loss Coefficient	$k_b$ = <input style="width: 50px;" type="text" value="0"/>
Exit Loss Coefficient	$k_x$ = <input style="width: 50px;" type="text" value="1"/>
Tailwater Surface Elevation	Elev $Y_t$ = <input style="width: 50px;" type="text"/>
Max Allowable Channel Velocity	V = <input style="width: 50px;" type="text" value="5"/> ft/s
Required Protection (Output):	
Tailwater Surface Height	$Y_t$ = <input style="width: 50px;" type="text" value="0.20"/> ft
Flow Area at Max Channel Velocity	$A_t$ = <input style="width: 50px;" type="text" value="0.26"/> ft <sup>2</sup>
Culvert Cross Sectional Area Available	A = <input style="width: 50px;" type="text" value="0.50"/> ft <sup>2</sup>
Entrance Loss Coefficient	$k_e$ = <input style="width: 50px;" type="text" value="0.20"/>
Friction Loss Coefficient	$k_f$ = <input style="width: 50px;" type="text" value="0.07"/>
Sum of All Losses Coefficients	$k_s$ = <input style="width: 50px;" type="text" value="1.27"/> ft
Culvert Normal Depth	$Y_n$ = <input style="width: 50px;" type="text" value="0.25"/> ft
Culvert Critical Depth	$Y_c$ = <input style="width: 50px;" type="text" value="0.37"/> ft
Tailwater Depth for Design	d = <input style="width: 50px;" type="text" value="0.44"/> ft
Adjusted Diameter <b>OR</b> Adjusted Rise	$H_a$ = <input style="width: 50px;" type="text" value="0.37"/> ft
Expansion Factor	$1/(2*\tan(\theta))$ = <input style="width: 50px;" type="text" value="5.22"/>
Flow/Diameter <sup>2.5</sup> <b>OR</b> Flow/(Span * Rise <sup>1.5</sup> )	$Q/WH^{1.5}$ = <input style="width: 50px;" type="text" value="3.68"/> ft <sup>0.5</sup> /s
Froude Number	Fr = <input style="width: 50px;" type="text" value="1.88"/> <span style="color: red; font-weight: bold;">Supercritical!</span>
Tailwater/Adjusted Diameter <b>OR</b> Tailwater/Adjusted Rise	$Y_t/H$ = <input style="width: 50px;" type="text" value="0.54"/>
Inlet Control Headwater	$HW_i$ = <input style="width: 50px;" type="text" value="0.60"/> ft
Outlet Control Headwater	$HW_o$ = <input style="width: 50px;" type="text" value="0.55"/> ft
<b>Design Headwater Elevation</b>	<b>HW</b> = <input style="width: 50px;" type="text" value="0.80"/> ft
<b>Headwater/Diameter <b>OR</b> Headwater/Rise Ratio</b>	<b>HW/H</b> = <input style="width: 50px;" type="text" value="1.20"/>
Minimum Theoretical Riprap Size	$d_{50}$ = <input style="width: 50px;" type="text" value="1"/> in
Nominal Riprap Size	$d_{50}$ = <input style="width: 50px;" type="text" value="6"/> in
<b>UDFCD Riprap Type</b>	<b>Type</b> = <input style="width: 50px;" type="text" value="VL"/>
<b>Length of Protection</b>	$L_p$ = <input style="width: 50px;" type="text" value="2"/> ft
<b>Width of Protection</b>	T = <input style="width: 50px;" type="text" value="2"/> ft

## BOX CONDUIT FLOW (Normal & Critical Depth Computation)

Project: Villas at Claremont Ranch

Box ID: Sub Basin 4.1

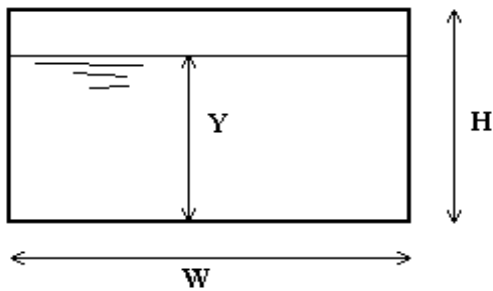


<b>Design Information (Input)</b>	
Box conduit invert slope	So = 0.0200 ft/ft
Box Manning's n-value	n = 0.0130
Box Width	W = 2.00 ft
Box Height	H = 0.50 ft
<b>Design discharge</b>	<b>Q = 1.90 cfs</b>
<b>Full-flow capacity (Calculated)</b>	
Full-flow area	Af = 1.00 sq ft
Full-flow wetted perimeter	Pf = 5.00 ft
Full-flow capacity	Qf = 5.54 cfs
<b>Calculations of Normal Flow Condition</b>	
Normal flow depth (<H)	Yn = 0.20 ft
Flow area	An = 0.39 sq ft
Wetted perimeter	Pn = 2.39 ft
Flow velocity	Vn = 4.85 fps
Discharge	Qn = 1.90 cfs
Percent Full	Flow = 34.3% of full flow
Normal Depth Froude Number	Fr <sub>n</sub> = 1.93 supercritical
<b>Calculation of Critical Flow Condition</b>	
Critical flow depth	Y <sub>c</sub> = 0.30 ft
Critical flow area	A <sub>c</sub> = 0.61 sq ft
Critical flow velocity	V <sub>c</sub> = 3.13 fps
Critical Depth Froude Number	Fr <sub>c</sub> = 1.00

## BOX CONDUIT FLOW (Normal & Critical Depth Computation)

Project: Villas at Claremont Ranch

Box ID: Sub Basin 6.1



<b>Design Information (Input)</b>	
Box conduit invert slope	So = 0.0200 ft/ft
Box Manning's n-value	n = 0.0130
Box Width	W = 2.00 ft
Box Height	H = 0.50 ft
<b>Design discharge</b>	<b>Q = 2.50 cfs</b>
<b>Full-flow capacity (Calculated)</b>	
Full-flow area	Af = 1.00 sq ft
Full-flow wetted perimeter	Pf = 5.00 ft
Full-flow capacity	Qf = 5.54 cfs
<b>Calculations of Normal Flow Condition</b>	
Normal flow depth (<H)	Yn = 0.23 ft
Flow area	An = 0.47 sq ft
Wetted perimeter	Pn = 2.47 ft
Flow velocity	Vn = 5.35 fps
Discharge	Qn = 2.50 cfs
Percent Full	Flow = 45.1% of full flow
Normal Depth Froude Number	Fr <sub>n</sub> = 1.95 supercritical
<b>Calculation of Critical Flow Condition</b>	
Critical flow depth	Y <sub>c</sub> = 0.36 ft
Critical flow area	A <sub>c</sub> = 0.73 sq ft
Critical flow velocity	V <sub>c</sub> = 3.43 fps
Critical Depth Froude Number	Fr <sub>c</sub> = 1.00

### 2.3.2 Swale Capacity

Where curb and gutter are not used to contain flow, swales are frequently used to convey runoff and disconnect impervious areas. It is very important that swale depths and side slopes be shallow for safety and maintenance reasons. Street-side drainage swales are not the same as roadside ditches. Street-side drainage swales provide mild side slopes and are frequently designed to provide water quality enhancement. For purposes of disconnecting impervious area and reducing the overall volume of runoff, swales should be considered as collectors of initial runoff for transport to other larger means of conveyance. To be effective, they need to be limited to the velocity, depth, and cross-slope geometries considered acceptable.

Equation 7-1 can be used to calculate the flow rate in a V-section swale (using the appropriate roughness value for the swale lining) with an adjusted cross slope found using:

$$S_x = \frac{S_{x1}S_{x2}}{S_{x1} + S_{x2}} \quad \text{Equation 7-13}$$

Where:

$S_x$  = adjusted side slope (ft/ft)

$S_{x1}$  = right side slope (ft/ft)

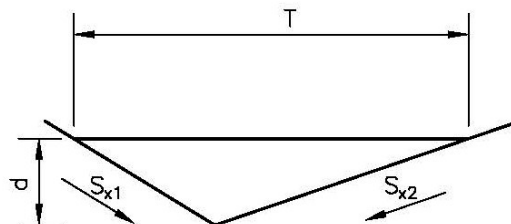
$S_{x2}$  = left side slope (ft/ft).

Figure 7-5 shows the geometric variables, and Examples 7.4 and 7.5 show V-shaped swale calculations.

For safety reasons, paved swales should be designed such that the product of velocity and depth is no more than six for the minor storm and eight for the major storm.

For grass swales, refer to the *Grass Swale Fact Sheet* in the Urban Storm Drainage Criteria Manual (USDCM) Volume 3. During the 2-year event, grass swales designed for water quality should have a Froude number of no more than 0.5, a velocity that does not exceed 1.0 ft/s, and a depth that does not exceed 1.0 foot.

Note that the slope of a roadside ditch or swale can be different than the adjacent street. The hydraulic characteristics of the swale can therefore change from one location to another.



**Figure 7-5. Typical v-shaped swale section**

# Channel Report

## SECTION A-A BASIN 1

### Trapezoidal

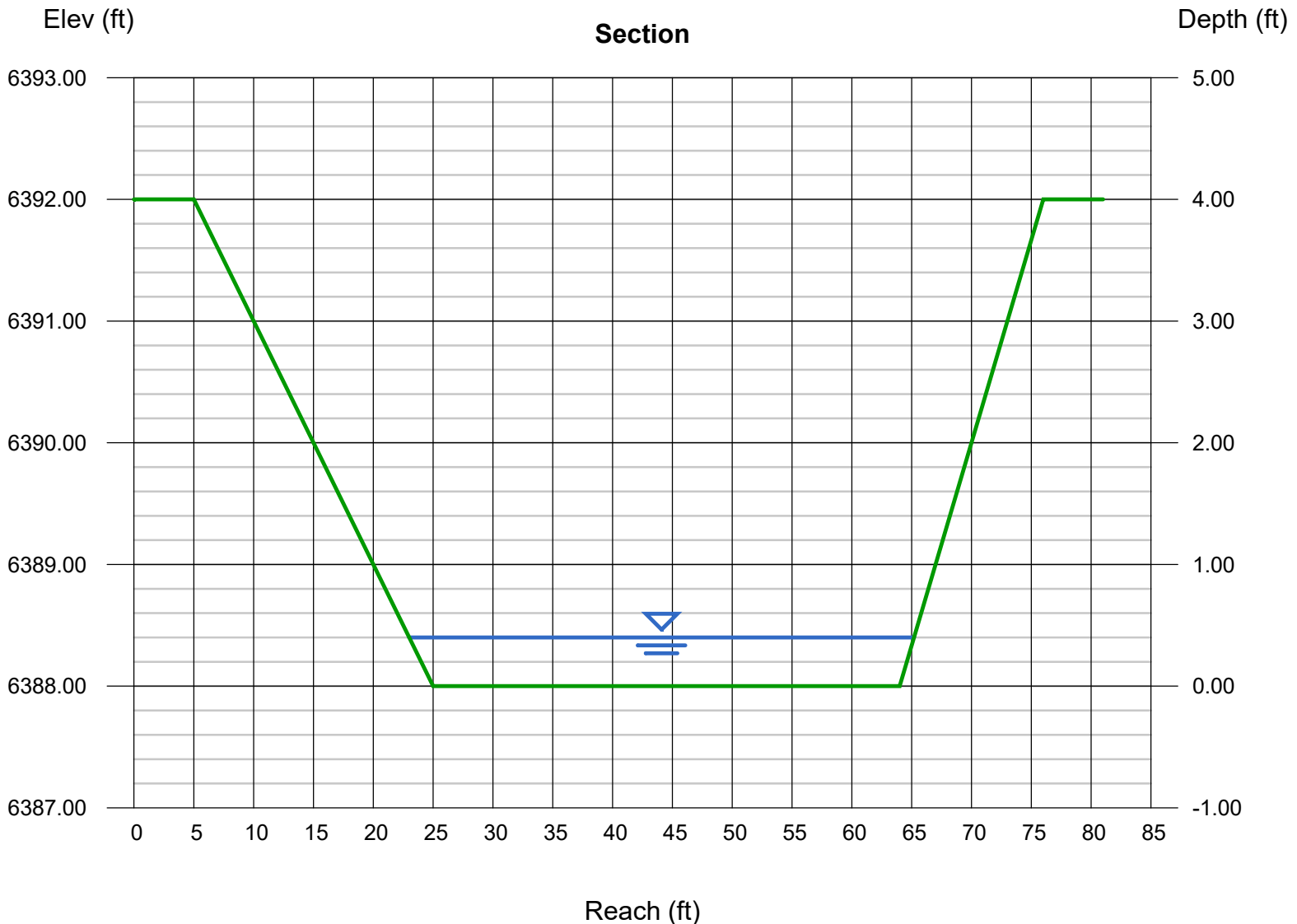
Bottom Width (ft) = 39.00  
Side Slopes (z:1) = 5.00, 3.00  
Total Depth (ft) = 4.00  
Invert Elev (ft) = 6388.00  
Slope (%) = 0.50  
N-Value = 0.030

### Highlighted

Depth (ft) = 0.40  
Q (cfs) = 30.04  
Area (sqft) = 16.24  
Velocity (ft/s) = 1.85  
Wetted Perim (ft) = 42.30  
Crit Depth, Yc (ft) = 0.27  
Top Width (ft) = 42.20  
EGL (ft) = 0.45

### Calculations

Compute by: Q vs Depth  
No. Increments = 20





# Channel Report

## BASIN 10

### Swale

#### Triangular

Side Slopes (z:1) = 4.00, 4.00

Total Depth (ft) = 1.50

Invert Elev (ft) = 1.00

Slope (%) = 0.90

N-Value = 0.033

#### Calculations

Compute by: Known Q

Known Q (cfs) = 1.40

#### Highlighted

Depth (ft) = 0.47

Q (cfs) = 1.400

Area (sqft) = 0.88

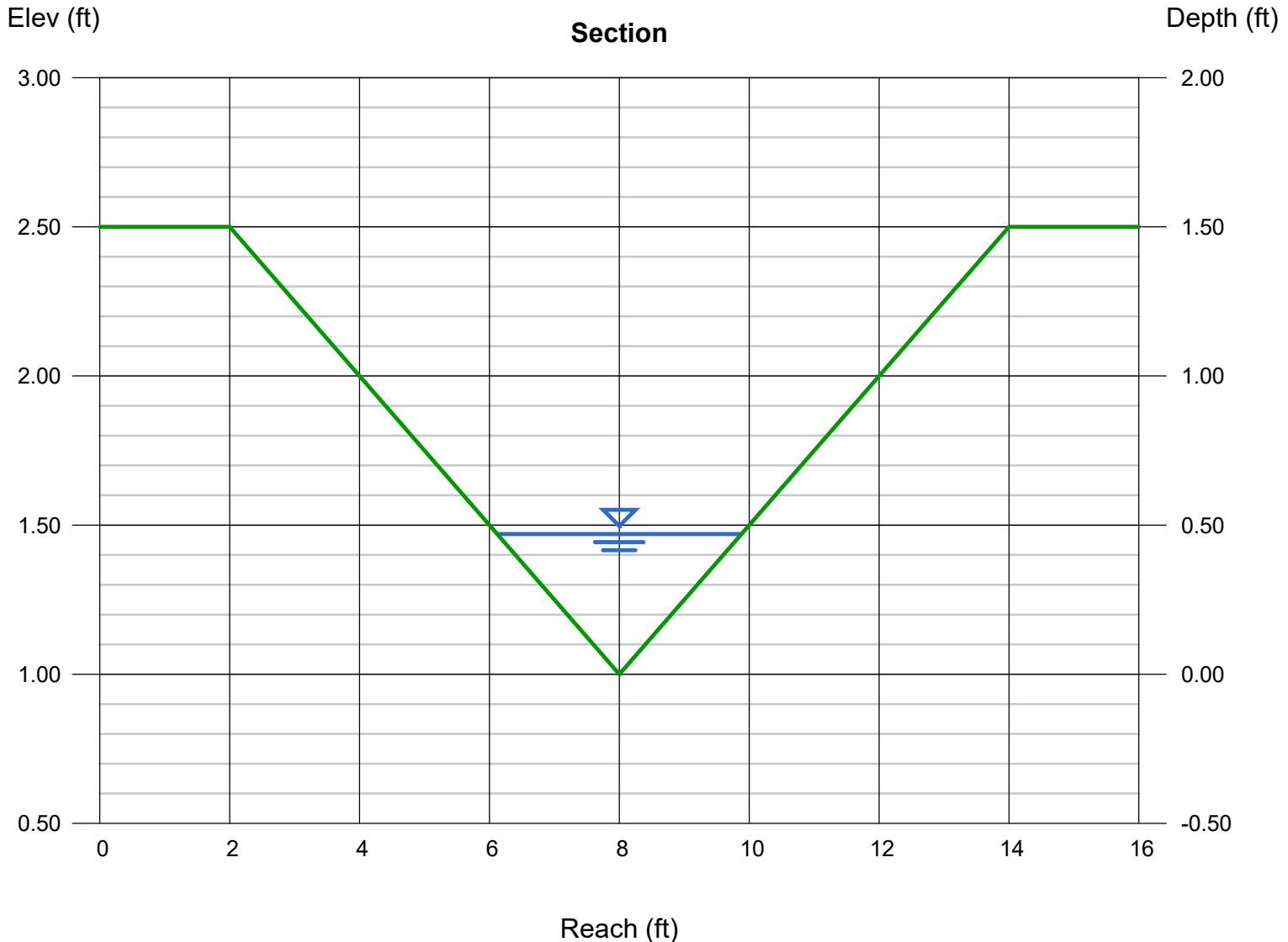
Velocity (ft/s) = 1.58

Wetted Perim (ft) = 3.88

Crit Depth,  $Y_c$  (ft) = 0.38

Top Width (ft) = 3.76

EGL (ft) = 0.51



# Channel Report

## BASIN 1.1

### Triangular

Side Slopes (z:1) = 4.00, 4.00

Total Depth (ft) = 1.50

Invert Elev (ft) = 1.00

Slope (%) = 1.84

N-Value = 0.033

### Calculations

Compute by: Known Q

Known Q (cfs) = 2.10

### Highlighted

Depth (ft) = 0.48

Q (cfs) = 2.100

Area (sqft) = 0.92

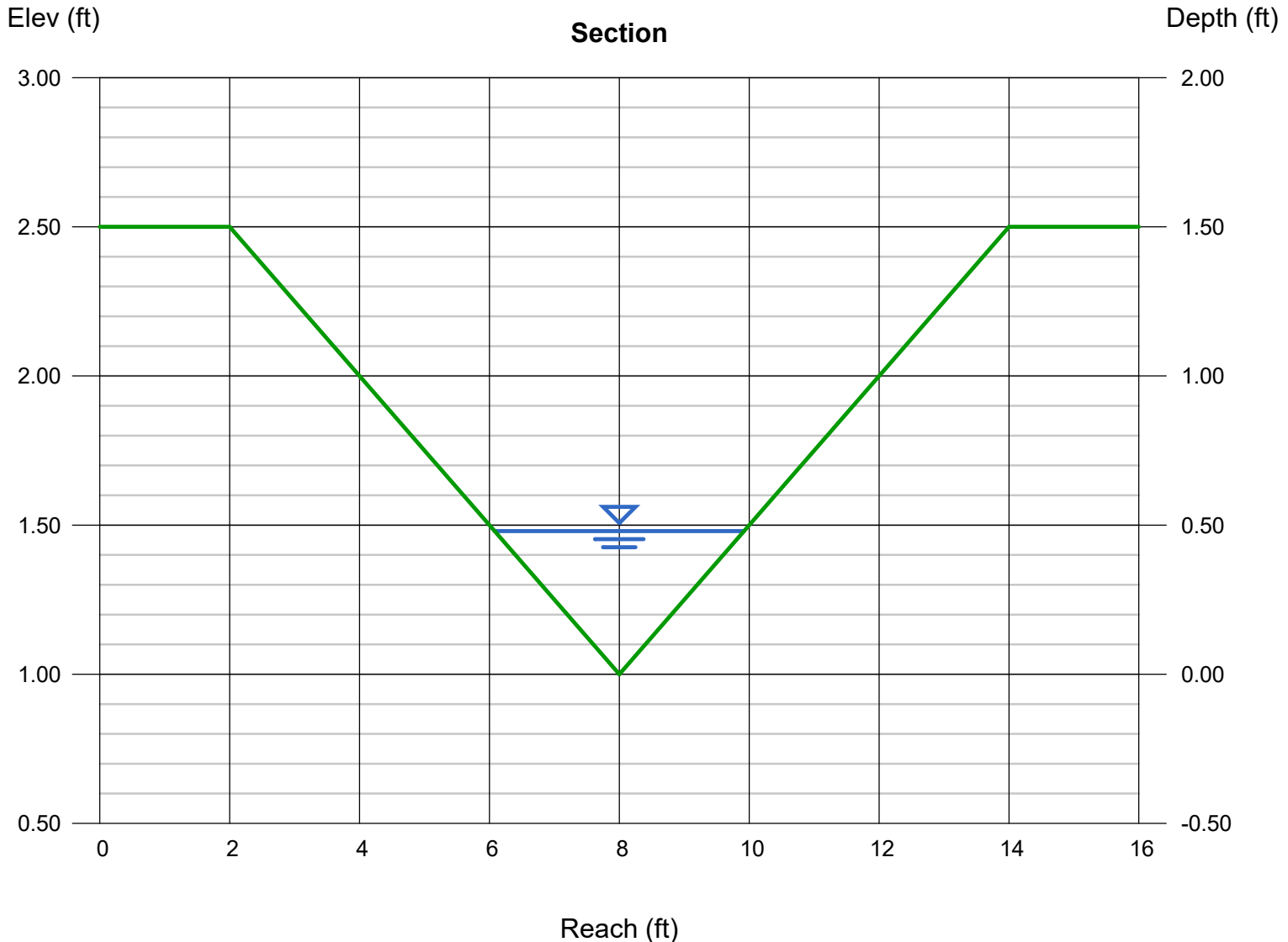
Velocity (ft/s) = 2.28

Wetted Perim (ft) = 3.96

Crit Depth,  $Y_c$  (ft) = 0.45

Top Width (ft) = 3.84

EGL (ft) = 0.56



# Channel Report

## DP-9 Swale

### Triangular

Side Slopes (z:1) = 4.00, 4.00

Total Depth (ft) = 1.50

Invert Elev (ft) = 1.00

Slope (%) = 2.00

N-Value = 0.033

### Calculations

Compute by: Known Q

Known Q (cfs) = 1.20

### Highlighted

Depth (ft) = 0.39

Q (cfs) = 1.200

Area (sqft) = 0.61

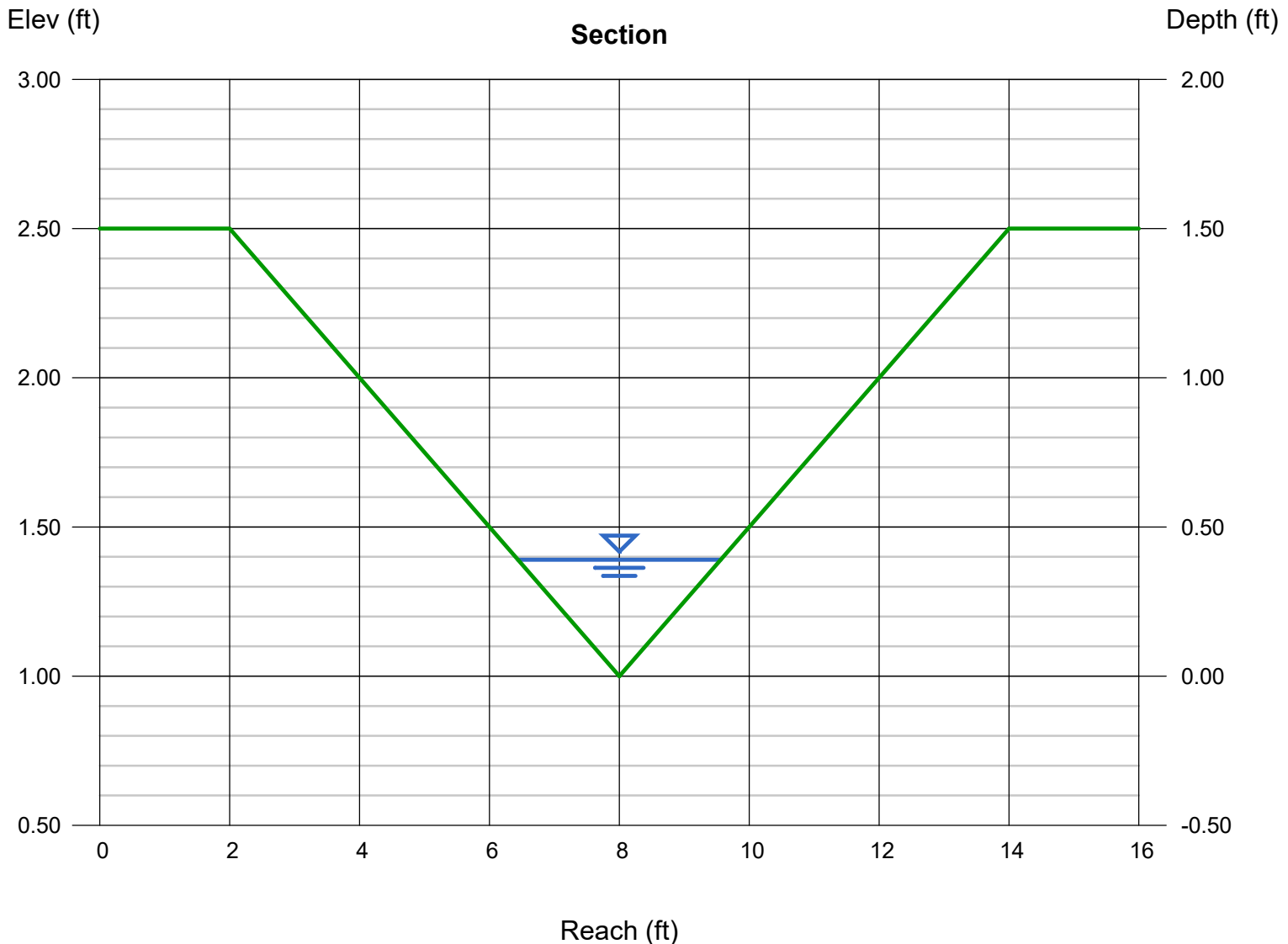
Velocity (ft/s) = 1.97

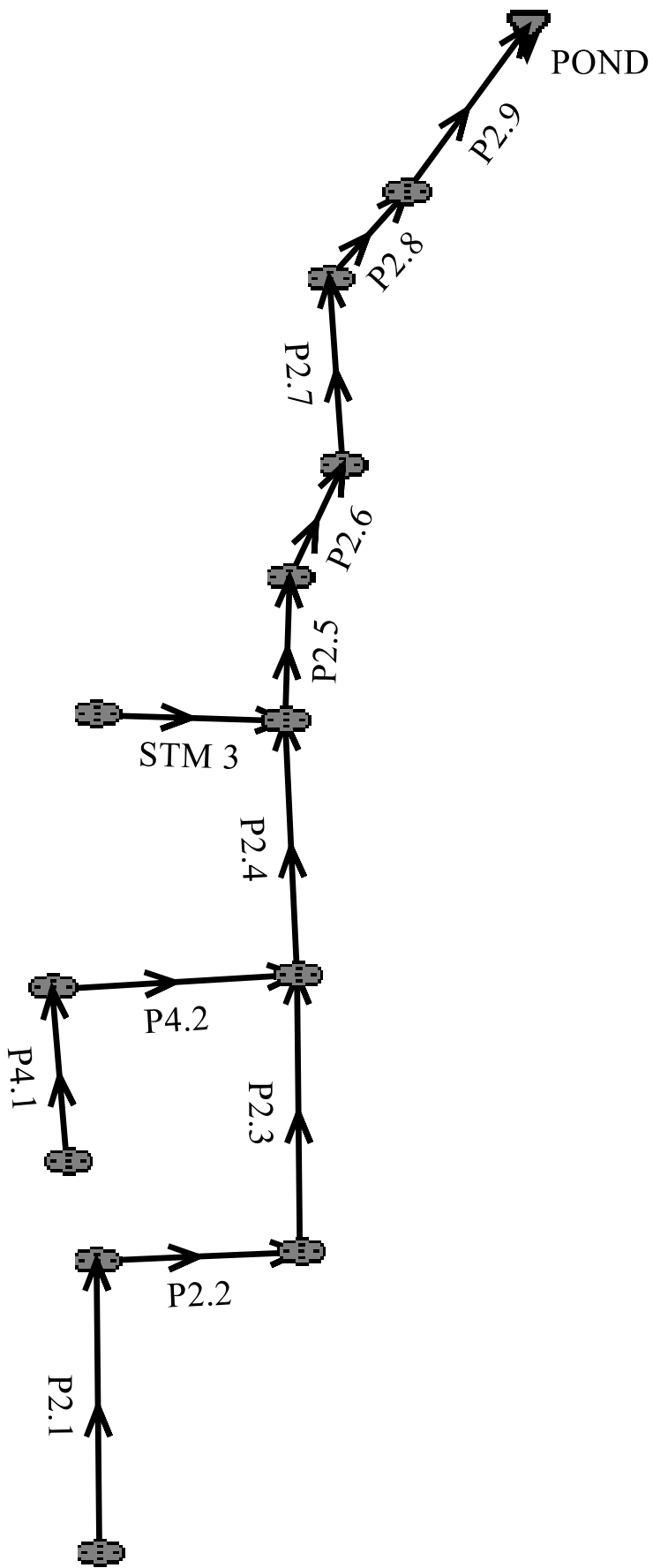
Wetted Perim (ft) = 3.22

Crit Depth,  $Y_c$  (ft) = 0.36

Top Width (ft) = 3.12

EGL (ft) = 0.45







P2.8	6392.34	20.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
P2.7	6391.43	20.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
P2.6	6391.38	17.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
P2.5	6390.89	17.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
STM 3	6391.31	4.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
P2.4	6391.81	13.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
P2.3	6393.65	6.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
P2.2	6394.05	6.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
P2.1	6394.23	3.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
P4.2	6392.26	10.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
P4.1	6392.44	5.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

## Manhole Output Summary:

Element Name	Local Contribution					Total Design Flow				Comment
	Overland Time (min)	Gutter Time (min)	Basin Tc (min)	Intensity (in/hr)	Local Contrib (cfs)	Coeff. Area	Intensity (in/hr)	Manhole Tc (min)	Peak Flow (cfs)	
POND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	Surface Water Present (Upstream)
P2.9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.50	Surface Water Present (Downstream)
P2.8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.50	
P2.7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.50	
P2.6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.60	
P2.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.60	
STM 3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.10	
P2.4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13.90	
P2.3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.40	
P2.2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.30	
P2.1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.00	
P4.2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.70	
P4.1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.60	

## Sewer Input Summary:

Element Name	Sewer Length (ft)	Elevation			Loss Coefficients			Given Dimensions		
		Downstream Invert (ft)	Slope (%)	Upstream Invert (ft)	Mannings n	Bend Loss	Lateral Loss	Cross Section	Rise (ft or in)	Span (ft or in)
P2.9	58.60	6384.72	0.5	6385.01	0.012	0.03	0.00	CIRCULAR	30.00 in	30.00 in
P2.8	9.81	6385.01	0.5	6385.06	0.012	0.05	0.00	CIRCULAR	30.00 in	30.00 in
P2.7	72.55	6385.06	0.5	6385.42	0.012	0.29	0.00	CIRCULAR	30.00 in	30.00 in

P2.6	15.91	6385.67	0.5	6385.75	0.012	0.29	0.00	CIRCULAR	30.00 in	30.00 in
P2.5	24.64	6385.76	0.5	6385.88	0.012	0.29	0.00	CIRCULAR	30.00 in	30.00 in
STM 3	16.19	6386.64	5.0	6387.45	0.012	1.32	0.00	CIRCULAR	18.00 in	18.00 in
P2.4	201.45	6386.13	0.5	6387.14	0.012	0.05	0.25	CIRCULAR	30.00 in	30.00 in
P2.3	245.18	6387.93	0.6	6389.48	0.012	1.32	0.00	CIRCULAR	18.00 in	18.00 in
P2.2	16.15	6389.98	0.6	6390.08	0.012	1.32	0.00	CIRCULAR	18.00 in	18.00 in
P2.1	38.34	6390.58	0.5	6390.77	0.012	1.32	0.00	CIRCULAR	18.00 in	18.00 in
P4.2	16.15	6387.64	3.8	6388.25	0.012	1.32	0.00	CIRCULAR	18.00 in	18.00 in
P4.1	38.34	6388.75	0.5	6388.94	0.012	1.32	0.00	CIRCULAR	18.00 in	18.00 in

## Sewer Flow Summary:

Element Name	Full Flow Capacity		Critical Flow		Normal Flow				Flow (cfs)	Surcharged Length (ft)	Comment
	Flow (cfs)	Velocity (fps)	Depth (in)	Velocity (fps)	Depth (in)	Velocity (fps)	Froude Number	Flow Condition			
P2.9	31.51	6.42	18.45	6.47	17.63	6.83	1.09	Supercritical	20.50	0.00	
P2.8	31.51	6.42	18.45	6.47	17.63	6.83	1.09	Supercritical	20.50	0.00	
P2.7	31.51	6.42	18.45	6.47	17.63	6.83	1.09	Supercritical	20.50	0.00	
P2.6	31.51	6.42	17.04	6.12	16.03	6.60	1.12	Supercritical	17.60	0.00	
P2.5	31.51	6.42	17.04	6.12	16.03	6.60	1.12	Supercritical	17.60	0.00	
STM 3	25.51	14.44	9.30	4.45	4.88	10.59	3.46	Supercritical	4.10	0.00	
P2.4	31.51	6.42	15.06	5.64	13.95	6.22	1.16	Supercritical	13.90	0.00	
P2.3	9.07	5.13	11.74	5.24	11.15	5.56	1.10	Supercritical	6.40	0.00	
P2.2	8.98	5.08	11.64	5.21	11.11	5.50	1.09	Supercritical	6.30	0.00	
P2.1	8.07	4.57	7.90	4.02	7.60	4.23	1.08	Supercritical	3.00	0.00	
P4.2	22.24	12.59	15.06	6.77	8.80	12.47	2.90	Supercritical Jump	10.70	0.34	
P4.1	8.07	4.57	10.95	4.98	11.03	4.93	0.99	Subcritical Surcharged	5.60	7.54	

- A Froude number of 0 indicates that pressurized flow occurs (adverse slope or undersized pipe).
- If the sewer is not pressurized, full flow represents the maximum gravity flow in the sewer.
- If the sewer is pressurized, full flow represents the pressurized flow conditions.

## Sewer Sizing Summary:

Element Name	Peak Flow (cfs)	Cross Section	Existing		Calculated		Used			Comment
			Rise	Span	Rise	Span	Rise	Span	Area (ft <sup>2</sup> )	
P2.9	20.50	CIRCULAR	30.00 in	30.00 in	27.00 in	27.00 in	30.00 in	30.00 in	4.91	
P2.8	20.50	CIRCULAR	30.00 in	30.00 in	27.00 in	27.00 in	30.00 in	30.00 in	4.91	
P2.7	20.50	CIRCULAR	30.00 in	30.00 in	27.00 in	27.00 in	30.00 in	30.00 in	4.91	

P2.6	17.60	CIRCULAR	30.00 in	30.00 in	27.00 in	27.00 in	30.00 in	30.00 in	4.91	
P2.5	17.60	CIRCULAR	30.00 in	30.00 in	27.00 in	27.00 in	30.00 in	30.00 in	4.91	
STM 3	4.10	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
P2.4	13.90	CIRCULAR	30.00 in	30.00 in	24.00 in	24.00 in	30.00 in	30.00 in	4.91	
P2.3	6.40	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
P2.2	6.30	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
P2.1	3.00	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
P4.2	10.70	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	
P4.1	5.60	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	

- Calculated diameter was determined by sewer hydraulic capacity rounded up to the nearest commercially available size.
- Sewer sizes should not decrease downstream.
- All hydraulics were calculated using the 'Used' parameters.

## Grade Line Summary:

Tailwater Elevation (ft): 6384.72

Element Name	Invert Elev.		Downstream Manhole Losses		HGL		EGL		
	Downstream (ft)	Upstream (ft)	Bend Loss (ft)	Lateral Loss (ft)	Downstream (ft)	Upstream (ft)	Downstream (ft)	Friction Loss (ft)	Upstream (ft)
P2.9	6384.72	6385.01	0.00	0.00	6386.19	6386.55	6386.91	0.29	6387.20
P2.8	6385.01	6385.06	0.01	0.00	6386.65	6386.65	6387.21	0.04	6387.25
P2.7	6385.06	6385.42	0.08	0.00	6386.89	6386.96	6387.33	0.28	6387.61
P2.6	6385.67	6385.75	0.06	0.00	6387.02	6387.17	6387.68	0.07	6387.75
P2.5	6385.76	6385.88	0.06	0.00	6387.39	6387.39	6387.81	0.08	6387.89
STM 3	6386.64	6387.45	0.11	0.00	6387.50	6388.68	6388.79	0.00	6388.79
P2.4	6386.13	6387.14	0.01	0.17	6387.83	6388.39	6388.07	0.82	6388.89
P2.3	6387.93	6389.48	0.27	0.00	6388.86	6390.46	6389.34	1.54	6390.89
P2.2	6389.98	6390.08	0.26	0.00	6390.91	6391.05	6391.38	0.10	6391.47
P2.1	6390.58	6390.77	0.06	0.00	6391.13	6391.43	6391.53	0.15	6391.68
P4.2	6387.64	6388.25	0.75	0.00	6389.15	6389.51	6389.71	0.51	6390.22
P4.1	6388.75	6388.94	0.21	0.00	6390.27	6390.35	6390.42	0.09	6390.51

- Bend and Lateral losses only apply when there is an outgoing sewer. The system outfall, sewer #0, is not considered a sewer.
- Bend loss = Bend K \* V<sub>fi</sub><sup>2</sup> / (2 \* g)
- Lateral loss = V<sub>fo</sub><sup>2</sup> / (2 \* g) - Junction Loss K \* V<sub>fi</sub><sup>2</sup> / (2 \* g).
- Friction loss is always Upstream EGL - Downstream EGL.

## Excavation Estimate:



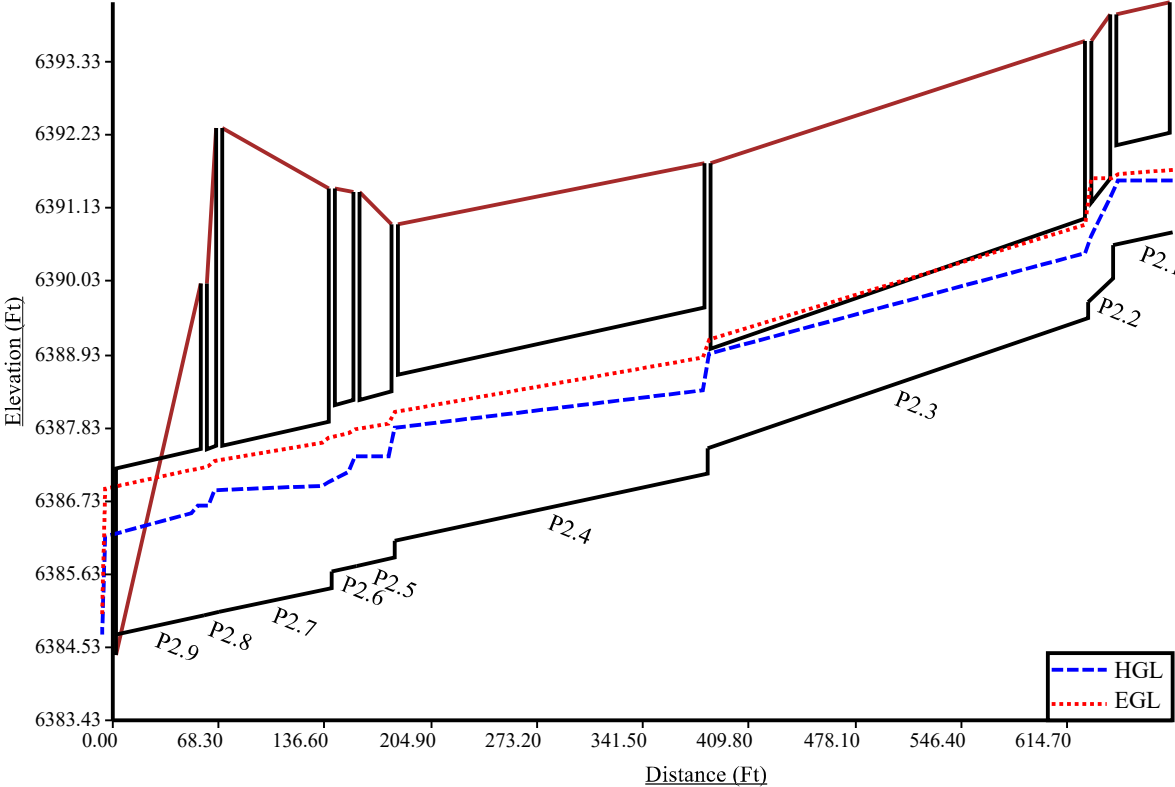
The trench side slope is 1.0 ft/ft  
The minimum trench width is 2.00 ft

Element Name	Length (ft)	Wall (in)	Bedding (in)	Bottom Width (ft)	Downstream			Upstream			Volume (cu. yd)	Comment
					Top Width (ft)	Trench Depth (ft)	Cover (ft)	Top Width (ft)	Trench Depth (ft)	Cover (ft)		
P2.9	58.60	3.50	6.00	6.08	0.00	0.48	0.00	8.48	5.78	2.20	42.93	Sewer Too Shallow
P2.8	9.81	3.50	6.00	6.08	8.48	5.78	2.20	13.06	8.07	4.49	17.78	
P2.7	72.55	3.50	6.00	6.08	13.07	8.07	4.49	10.52	6.80	3.22	144.57	
P2.6	15.91	3.50	6.00	6.08	10.02	6.55	2.97	9.76	6.42	2.84	25.39	
P2.5	24.64	3.50	6.00	6.08	9.75	6.41	2.83	8.52	5.80	2.22	36.12	
STM 3	16.19	2.50	4.00	4.92	8.00	4.79	2.54	7.22	4.40	2.15	14.66	
P2.4	201.45	3.50	6.00	6.08	8.01	5.55	1.97	7.84	5.46	1.88	256.23	Sewer Too Shallow
P2.3	245.18	2.50	4.00	4.92	7.26	4.42	2.17	7.84	4.71	2.46	219.81	
P2.2	16.15	2.50	4.00	4.92	6.84	4.21	1.96	7.44	4.51	2.26	13.58	Sewer Too Shallow
P2.1	38.34	2.50	4.00	4.92	6.44	4.01	1.76	6.42	4.00	1.75	28.79	Sewer Too Shallow
P4.2	16.15	2.50	4.00	4.92	7.85	4.72	2.47	7.52	4.55	2.30	14.78	
P4.1	38.34	2.50	4.00	4.92	6.52	4.05	1.80	6.50	4.04	1.79	29.16	Sewer Too Shallow

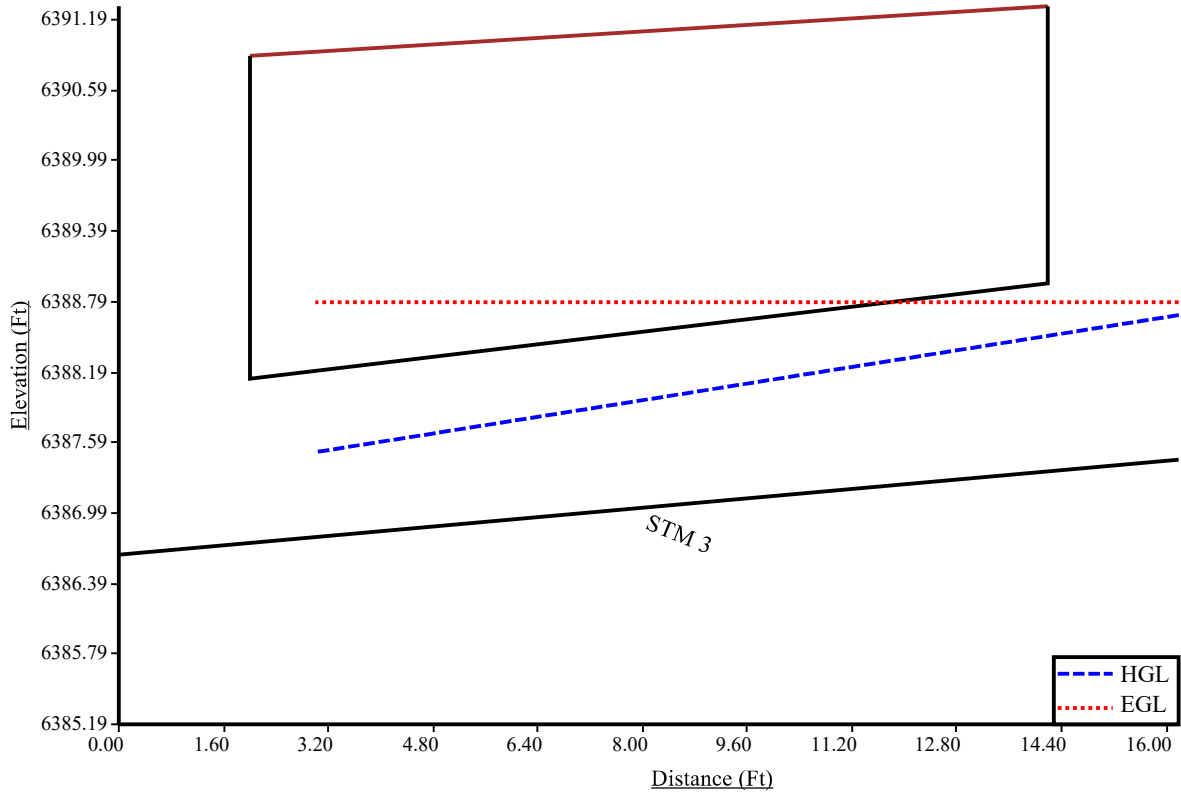
**Total earth volume for sewer trenches = 844 cubic yards.**

- The trench was estimated to have a bottom width equal to the outer pipe diameter plus 36 inches.
- If the calculated width of the trench bottom is less than the minimum acceptable width, the minimum acceptable width was used.
- The sewer wall thickness is equal to: (equivalent diameter in inches/12)+1 inches
- The sewer bedding thickness is equal to:
  - Four inches for pipes less than 33 inches.
  - Six inches for pipes less than 60 inches.
  - Eight inches for all larger sizes.

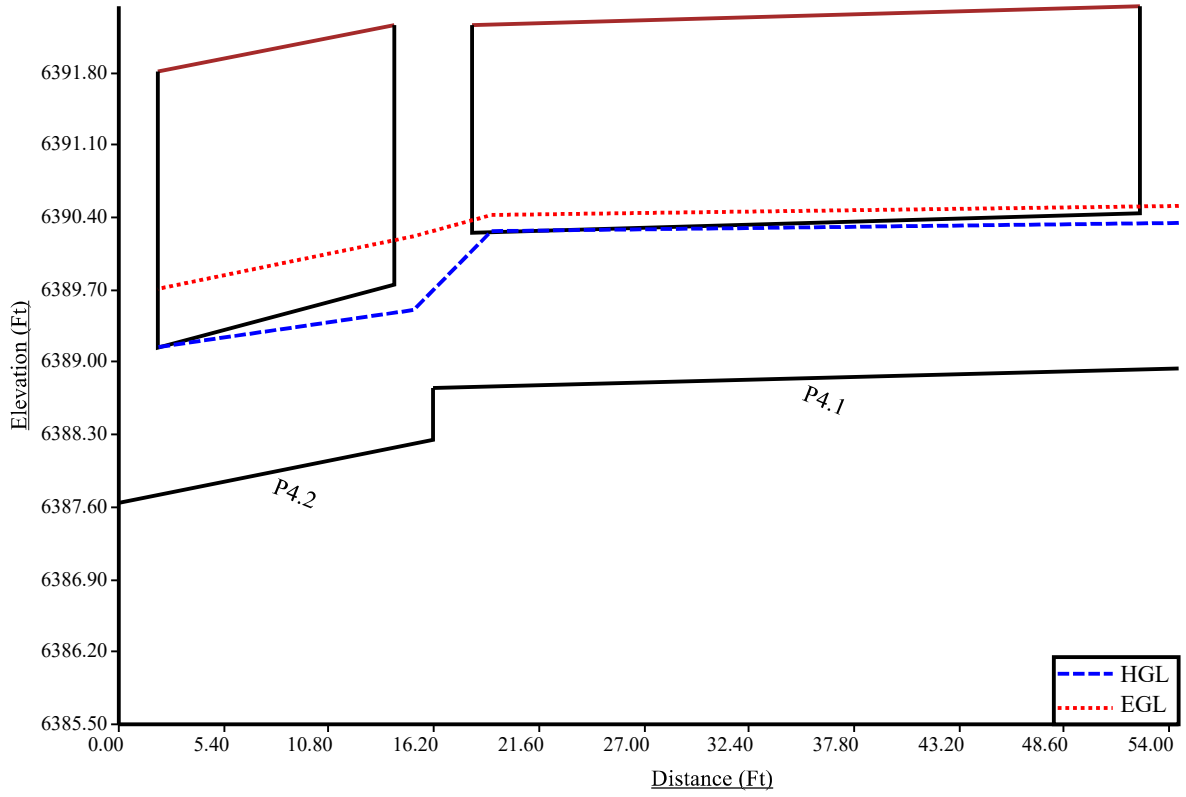
100-YR MAIN



# 100-YR (STM 3)



# 100 YR 4





FINAL OUTFALL

STORM 1





STORM 1	6387.08	7.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
------------	---------	------	------	------	------	------	------	------	------	------

## Manhole Output Summary:

Element Name	Local Contribution					Total Design Flow				Comment
	Overland Time (min)	Gutter Time (min)	Basin Tc (min)	Intensity (in/hr)	Local Contrib (cfs)	Coeff. Area	Intensity (in/hr)	Manhole Tc (min)	Peak Flow (cfs)	
POND (1)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
STORM 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.80	

## Sewer Input Summary:

Element Name	Sewer Length (ft)	Elevation			Loss Coefficients			Given Dimensions		
		Downstream Invert (ft)	Slope (%)	Upstream Invert (ft)	Mannings n	Bend Loss	Lateral Loss	Cross Section	Rise (ft or in)	Span (ft or in)
STORM 1	112.33	6377.76	4.9	6383.28	0.012	0.00	0.00	CIRCULAR	18.00 in	18.00 in

## Sewer Flow Summary:

Element Name	Full Flow Capacity		Critical Flow		Normal Flow				Flow (cfs)	Surcharged Length (ft)	Comment
	Flow (cfs)	Velocity (fps)	Depth (in)	Velocity (fps)	Depth (in)	Velocity (fps)	Froude Number	Flow Condition			
STORM 1	25.29	14.31	12.98	5.72	6.86	12.61	3.41	Supercritical Jump	7.80	0.00	

- A Froude number of 0 indicates that pressurized flow occurs (adverse slope or undersized pipe).
- If the sewer is not pressurized, full flow represents the maximum gravity flow in the sewer.
- If the sewer is pressurized, full flow represents the pressurized flow conditions.

## Sewer Sizing Summary:

Element Name	Peak Flow (cfs)	Cross Section	Existing		Calculated		Used			Comment
			Rise	Span	Rise	Span	Rise	Span	Area (ft <sup>2</sup> )	
STORM 1	7.80	CIRCULAR	18.00 in	18.00 in	12.00 in	12.00 in	18.00 in	18.00 in	1.77	

- Calculated diameter was determined by sewer hydraulic capacity rounded up to the nearest commercially available size.
- Sewer sizes should not decrease downstream.
- All hydraulics were calculated using the 'Used' parameters.

## Grade Line Summary:

Tailwater Elevation (ft): 6379.26

Element Name	Invert Elev.		Downstream Manhole Losses		HGL		EGL		
	Downstream (ft)	Upstream (ft)	Bend Loss (ft)	Lateral Loss (ft)	Downstream (ft)	Upstream (ft)	Downstream (ft)	Friction Loss (ft)	Upstream (ft)
STORM 1	6377.76	6383.28	0.00	0.00	6379.26	6384.36	6379.56	5.31	6384.87

- Bend and Lateral losses only apply when there is an outgoing sewer. The system outfall, sewer #0, is not considered a sewer.
- Bend loss =  $Bend\ K * V_{fi}^2 / (2 * g)$
- Lateral loss =  $V_{fo}^2 / (2 * g) - Junction\ Loss\ K * V_{fi}^2 / (2 * g)$ .
- Friction loss is always Upstream EGL - Downstream EGL.

## Excavation Estimate:

The trench side slope is 1.0 ft/ft

The minimum trench width is 2.00 ft

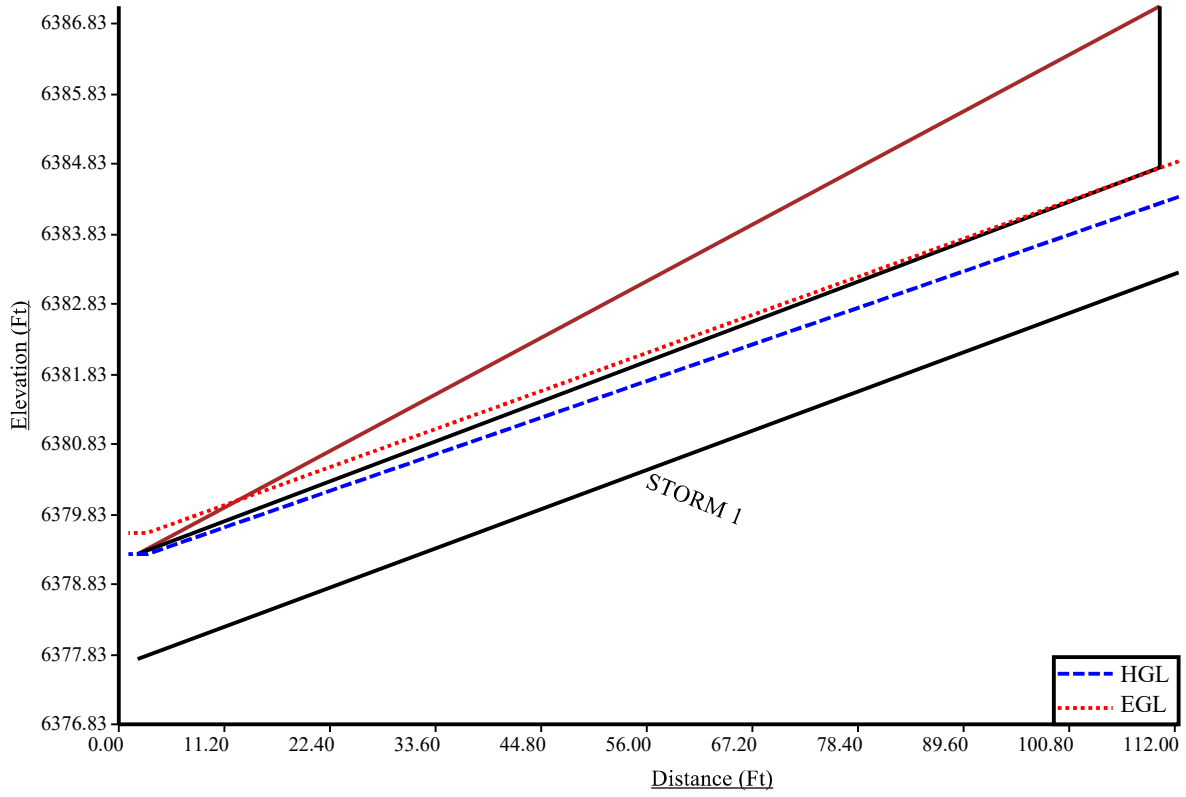
Element Name	Length (ft)	Wall (in)	Bedding (in)	Bottom Width (ft)	Downstream			Upstream			Volume (cu. yd)	Comment
					Top Width (ft)	Trench Depth (ft)	Cover (ft)	Top Width (ft)	Trench Depth (ft)	Cover (ft)		
STORM 1	112.33	2.50	4.00	4.92	0.00	2.04	0.00	7.10	4.34	2.09	67.77	Sewer Too Shallow

**Total earth volume for sewer trenches = 68 cubic yards.**

- The trench was estimated to have a bottom width equal to the outer pipe diameter plus 36 inches.
- If the calculated width of the trench bottom is less than the minimum acceptable width, the minimum acceptable width was used.
- The sewer wall thickness is equal to: (equivalent diameter in inches/12)+1 inches
- The sewer bedding thickness is equal to:
  - Four inches for pipes less than 33 inches.
  - Six inches for pipes less than 60 inches.
  - Eight inches for all larger sizes.



# 100-YR SYSTEM



**Design Procedure Form: Extended Detention Basin (EDB)**

UD-BMP (Version 3.07, March 2018)

Sheet 1 of 3

**Designer:** David Mijares  
**Company:** Catamount Engineering  
**Date:** December 13, 2022  
**Project:** Villas at Claremont Ranch  
**Location:** EDB B

<p>1. Basin Storage Volume</p> <p>A) Effective Imperviousness of Tributary Area, <math>I_a</math></p> <p>B) Tributary Area's Imperviousness Ratio (<math>i = I_a / 100</math>)</p> <p>C) Contributing Watershed Area</p> <p>D) For Watersheds Outside of the Denver Region, Depth of Average Runoff Producing Storm</p> <p>E) Design Concept (Select EURV when also designing for flood control)</p> <p>F) Design Volume (WQCV) Based on 40-hour Drain Time (<math>V_{DESIGN} = (1.0 * (0.91 * i^3 - 1.19 * i^2 + 0.78 * i) / 12 * Area)</math>)</p> <p>G) For Watersheds Outside of the Denver Region, Water Quality Capture Volume (WQCV) Design Volume (<math>V_{WQCV\ OTHER} = (d_6 * V_{DESIGN} * 0.43)</math>)</p> <p>H) User Input of Water Quality Capture Volume (WQCV) Design Volume (Only if a different WQCV Design Volume is desired)</p> <p>I) NRCS Hydrologic Soil Groups of Tributary Watershed              i) Percentage of Watershed consisting of Type A Soils              ii) Percentage of Watershed consisting of Type B Soils              iii) Percentage of Watershed consisting of Type C/D Soils</p> <p>J) Excess Urban Runoff Volume (EURV) Design Volume              For HSG A: <math>EURV_A = 1.68 * i^{1.28}</math>              For HSG B: <math>EURV_B = 1.36 * i^{1.08}</math>              For HSG C/D: <math>EURV_{C/D} = 1.20 * i^{1.08}</math></p> <p>K) User Input of Excess Urban Runoff Volume (EURV) Design Volume (Only if a different EURV Design Volume is desired)</p>	<p><math>I_a =</math> <input type="text" value="52.7"/> %</p> <p><math>i =</math> <input type="text" value="0.527"/></p> <p>Area = <input type="text" value="7.830"/> ac</p> <p><math>d_6 =</math> <input type="text" value=""/></p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;">             Choose One  <input checked="" type="radio"/> Water Quality Capture Volume (WQCV)  <input type="radio"/> Excess Urban Runoff Volume (EURV)         </div> <p><math>V_{DESIGN} =</math> <input type="text" value="0.139"/> ac-ft</p> <p><math>V_{DESIGN\ OTHER} =</math> <input type="text" value=""/> ac-ft</p> <p><math>V_{DESIGN\ USER} =</math> <input type="text" value=""/> ac-ft</p> <p>HSG <sub>A</sub> = <input type="text" value=""/> %              HSG <sub>B</sub> = <input type="text" value=""/> %              HSG <sub>C/D</sub> = <input type="text" value=""/> %</p> <p>EURV<sub>DESIGN</sub> = <input type="text" value=""/> ac-ft</p> <p>EURV<sub>DESIGN\ USER</sub> = <input type="text" value=""/> ac-ft</p>
<p>2. Basin Shape: Length to Width Ratio (A basin length to width ratio of at least 2:1 will improve TSS reduction.)</p>	<p>L : W = <input type="text" value="2.2"/> : 1</p>
<p>3. Basin Side Slopes</p> <p>A) Basin Maximum Side Slopes (Horizontal distance per unit vertical, 4:1 or flatter preferred)</p>	<p>Z = <input type="text" value="4.00"/> ft / ft</p>
<p>4. Inlet</p> <p>A) Describe means of providing energy dissipation at concentrated inflow locations:</p>	<p>_____</p> <p>_____</p> <p>_____</p>
<p>5. Forebay</p> <p>A) Minimum Forebay Volume (<math>V_{FMN} =</math> <input type="text" value="2%"/> of the WQCV)</p> <p>B) Actual Forebay Volume</p> <p>C) Forebay Depth (<math>D_F =</math> <input type="text" value="18"/> inch maximum)</p> <p>D) Forebay Discharge</p> <p>i) Undetained 100-year Peak Discharge</p> <p>ii) Forebay Discharge Design Flow (<math>Q_F = 0.02 * Q_{100}</math>)</p> <p>E) Forebay Discharge Design</p> <p>F) Discharge Pipe Size (minimum 8-inches)</p> <p>G) Rectangular Notch Width</p>	<p><math>V_{FMN} =</math> <input type="text" value="0.003"/> ac-ft</p> <p><math>V_F =</math> <input type="text" value=""/> ac-ft</p> <p><math>D_F =</math> <input type="text" value="12.0"/> in</p> <p><math>Q_{100} =</math> <input type="text" value="25.00"/> cfs</p> <p><math>Q_F =</math> <input type="text" value="0.50"/> cfs</p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;">             Choose One  <input type="radio"/> Berm With Pipe  <input checked="" type="radio"/> Wall with Rect. Notch  <input type="radio"/> Wall with V-Notch Weir         </div> <p>Calculated <math>D_P =</math> <input type="text" value=""/> in</p> <p>Calculated <math>W_N =</math> <input type="text" value="4.2"/> in</p> <p style="color: blue; font-size: small;">Flow too small for berm w/ pipe</p>



**Design Procedure Form: Extended Detention Basin (EDB)**

Sheet 2 of 3

**Designer:** David Mijares  
**Company:** Catamount Engineering  
**Date:** December 13, 2022  
**Project:** Villas at Claremont Ranch  
**Location:** EDB B

<p>6. Trickle Channel</p> <p>A) Type of Trickle Channel</p> <p>F) Slope of Trickle Channel</p>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">             Choose One  <input checked="" type="radio"/> Concrete  <input type="radio"/> Soft Bottom         </div> <p>S = <input style="width: 50px;" type="text" value="0.0100"/> ft / ft</p>
<p>7. Micropool and Outlet Structure</p> <p>A) Depth of Micropool (2.5-foot minimum)</p> <p>B) Surface Area of Micropool (10 ft<sup>2</sup> minimum)</p> <p>C) Outlet Type</p> <p>D) Smallest Dimension of Orifice Opening Based on Hydrograph Routing (Use UD-Detention)</p> <p>E) Total Outlet Area</p>	<p>D<sub>M</sub> = <input style="width: 50px;" type="text" value="2.5"/> ft</p> <p>A<sub>M</sub> = <input style="width: 50px;" type="text" value="20"/> sq ft</p> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">             Choose One  <input checked="" type="radio"/> Orifice Plate  <input type="radio"/> Other (Describe):         </div> <hr/> <p align="center">See UD-DETENTION FOR OUTFALL</p> <hr/> <p>D<sub>orifice</sub> = <input style="width: 50px;" type="text" value="0.94"/> inches</p> <p>A<sub>orifice</sub> = <input style="width: 50px;" type="text" value="2.82"/> square inches</p>
<p>8. Initial Surcharge Volume</p> <p>A) Depth of Initial Surcharge Volume (Minimum recommended depth is 4 inches)</p> <p>B) Minimum Initial Surcharge Volume (Minimum volume of 0.3% of the WQCV)</p> <p>C) Initial Surcharge Provided Above Micropool</p>	<p>D<sub>IS</sub> = <input style="width: 50px;" type="text" value="4"/> in</p> <p>V<sub>IS</sub> = <input style="width: 50px;" type="text"/> cu ft</p> <p>V<sub>s</sub> = <input style="width: 50px;" type="text" value="6.7"/> cu ft</p>
<p>9. Trash Rack</p> <p>A) Water Quality Screen Open Area: <math>A_t = A_{ot} * 38.5 * (e^{-0.095D})</math></p> <p>B) Type of Screen (If specifying an alternative to the materials recommended in the USDCM, indicate "other" and enter the ratio of the total open area to the total screen area for the material specified.)</p> <p style="margin-left: 40px;">Other (Y/N): <input style="width: 50px;" type="text" value="N"/></p> <p>C) Ratio of Total Open Area to Total Area (only for type 'Other')</p> <p>D) Total Water Quality Screen Area (based on screen type)</p> <p>E) Depth of Design Volume (EURV or WQCV) (Based on design concept chosen under 1E)</p> <p>F) Height of Water Quality Screen (H<sub>TR</sub>)</p> <p>G) Width of Water Quality Screen Opening (W<sub>opening</sub>) (Minimum of 12 inches is recommended)</p>	<p>A<sub>t</sub> = <input style="width: 50px;" type="text" value="99"/> square inches</p> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px; width: fit-content;"> <i>S.S. Well Screen with 60% Open Area</i> </div> <hr/> <p>User Ratio = <input style="width: 50px;" type="text"/></p> <p>A<sub>total</sub> = <input style="width: 50px;" type="text" value="165"/> sq. in.</p> <p>H = <input style="width: 50px;" type="text" value="2.06"/> feet</p> <p>H<sub>TR</sub> = <input style="width: 50px;" type="text" value="52.72"/> inches</p> <p>W<sub>opening</sub> = <input style="width: 50px;" type="text" value="12.0"/> inches <span style="color: red; font-size: small;">VALUE LESS THAN RECOMMENDED MIN. WIDTH. WIDTH HAS BEEN SET TO 12 INCHES.</span></p>

Design Procedure Form: Extended Detention Basin (EDB)

Designer: David Mijares  
Company: Catamount Engineering  
Date: December 13, 2022  
Project: Villas at Claremont Ranch  
Location: EDB B

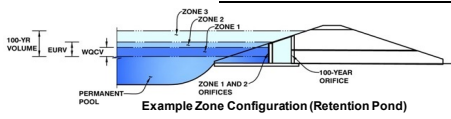
<p>10. Overflow Embankment</p> <p>A) Describe embankment protection for 100-year and greater overtopping:</p> <p>B) Slope of Overflow Embankment (Horizontal distance per unit vertical, 4:1 or flatter preferred)</p>	<p>_____</p> <p>_____</p> <p>_____</p> <p>Ze = <input type="text" value=""/> ft / ft</p>
<p>11. Vegetation</p>	<p>Choose One</p> <p><input type="radio"/> Irrigated</p> <p><input type="radio"/> Not Irrigated</p>
<p>12. Access</p> <p>A) Describe Sediment Removal Procedures</p>	<p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p>
<p>Notes: _____</p> <p>_____</p> <p>_____</p> <p>_____</p>	

# DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-*Detention, Version 4.04 (February 2021)*

Project: **VILLAS AT CLAREMONT RANCH**

Basin ID: \_\_\_\_\_



**Watershed Information**

Selected BMP Type =	<b>EDB</b>	
Watershed Area =	7.83	acres
Watershed Length =	1,300	ft
Watershed Length to Centroid =	1,130	ft
Watershed Slope =	0.015	ft/ft
Watershed Imperviousness =	52.70%	percent
Percentage Hydrologic Soil Group A =	25.8%	percent
Percentage Hydrologic Soil Group B =	74.2%	percent
Percentage Hydrologic Soil Groups C/D =	0.0%	percent
Target WQC Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	Denver - Capitol Building	

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

Water Quality Capture Volume (WQCV) =	0.139	acre-feet
Excess Urban Runoff Volume (EURV) =	0.453	acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	0.393	acre-feet
5-yr Runoff Volume (P1 = 1.5 in.) =	0.556	acre-feet
10-yr Runoff Volume (P1 = 1.75 in.) =	0.695	acre-feet
25-yr Runoff Volume (P1 = 2 in.) =	0.897	acre-feet
50-yr Runoff Volume (P1 = 2.25 in.) =	1.058	acre-feet
100-yr Runoff Volume (P1 = 2.52 in.) =	1.269	acre-feet
500-yr Runoff Volume (P1 = 3.14 in.) =	1.681	acre-feet
Approximate 2-yr Detention Volume =	0.330	acre-feet
Approximate 5-yr Detention Volume =	0.446	acre-feet
Approximate 10-yr Detention Volume =	0.576	acre-feet
Approximate 25-yr Detention Volume =	0.644	acre-feet
Approximate 50-yr Detention Volume =	0.684	acre-feet
Approximate 100-yr Detention Volume =	0.760	acre-feet

**Optional User Overrides**

	acre-feet
	acre-feet
1.19	inches
1.50	inches
1.75	inches
2.00	inches
2.25	inches
2.52	inches
	inches

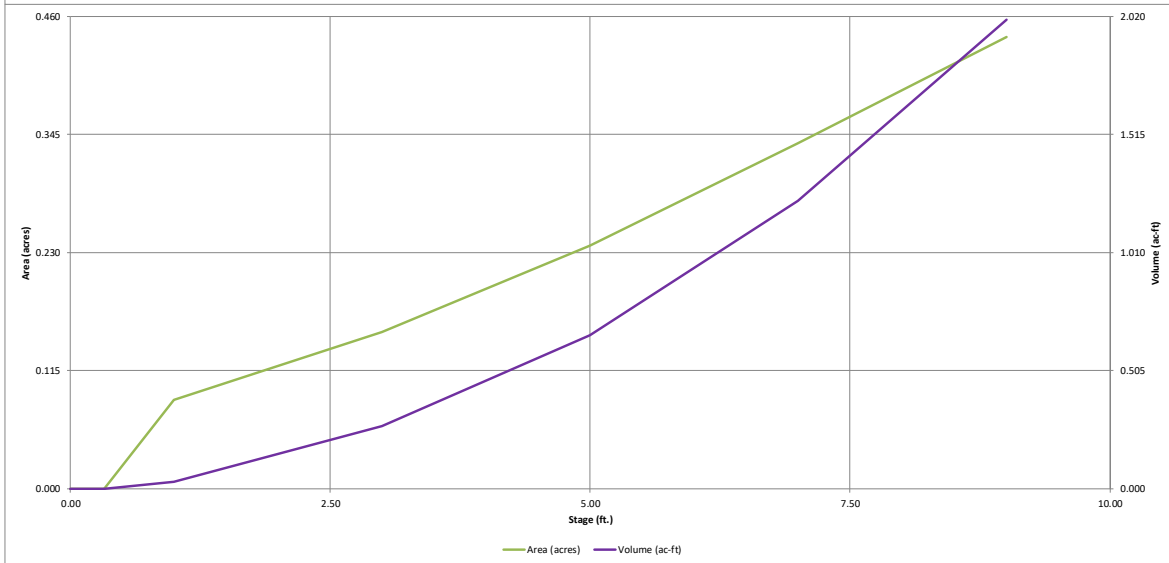
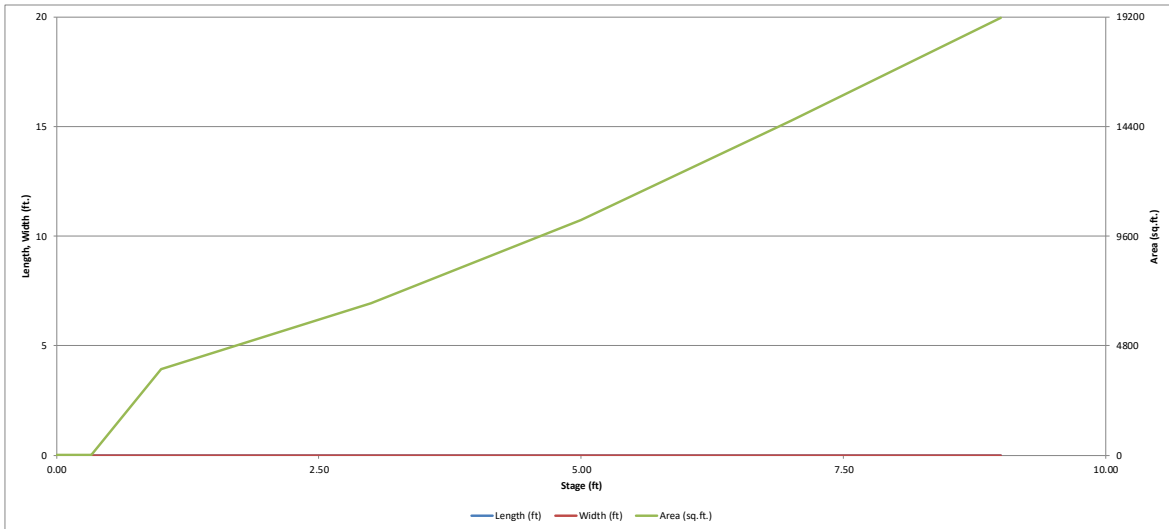
**Define Zones and Basin Geometry**

Zone 1 Volume (WQCV) =	0.139	acre-feet
Zone 2 Volume (EURV - Zone 1) =	0.314	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	0.307	acre-feet
Total Detention Basin Volume =	0.760	acre-feet
Initial Surcharge Volume (ISV) =	user	ft <sup>3</sup>
Initial Surcharge Depth (ISD) =	user	ft
Total Available Detention Depth (H <sub>total</sub> ) =	user	ft
Depth of Trickle Channel (H <sub>TC</sub> ) =	user	ft
Slope of Trickle Channel (S <sub>TC</sub> ) =	user	ft/ft
Slopes of Main Basin Sides (S <sub>main</sub> ) =	user	H:V
Basin Length-to-Width Ratio (R <sub>L/W</sub> ) =	user	
Initial Surcharge Area (A <sub>ISV</sub> ) =	user	ft <sup>2</sup>
Surcharge Volume Length (L <sub>ISV</sub> ) =	user	ft
Surcharge Volume Width (W <sub>ISV</sub> ) =	user	ft
Depth of Basin Floor (H <sub>FLOOR</sub> ) =	user	ft
Length of Basin Floor (L <sub>FLOOR</sub> ) =	user	ft
Width of Basin Floor (W <sub>FLOOR</sub> ) =	user	ft
Area of Basin Floor (A <sub>FLOOR</sub> ) =	user	ft <sup>2</sup>
Volume of Basin Floor (V <sub>FLOOR</sub> ) =	user	ft <sup>3</sup>
Depth of Main Basin (H <sub>MAN</sub> ) =	user	ft
Length of Main Basin (L <sub>MAN</sub> ) =	user	ft
Width of Main Basin (W <sub>MAN</sub> ) =	user	ft
Area of Main Basin (A <sub>MAN</sub> ) =	user	ft <sup>2</sup>
Volume of Main Basin (V <sub>MAN</sub> ) =	user	ft <sup>3</sup>
Calculated Total Basin Volume (V <sub>total</sub> ) =	user	acre-feet

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft <sup>2</sup> )	Optional Override Area (ft <sup>2</sup> )	Area (acre)	Volume (ft <sup>3</sup> )	Volume (ac-ft)
<b>Top of Micropool</b>	--	0.00	--	--	--	16	0.000		
<b>ISV</b>	--	0.33	--	--	--	16	0.000	5	0.000
<b>FLOOR-6384</b>	--	1.00	--	--	--	3,773	0.087	1,274	0.029
<b>6386</b>	--	3.00	--	--	--	6,652	0.153	11,699	0.269
<b>6388</b>	--	5.00	--	--	--	10,299	0.236	28,650	0.658
<b>6390</b>	--	7.00	--	--	--	14,646	0.336	53,595	1.230
<b>6392</b>	--	9.00	--	--	--	19,186	0.440	87,427	2.007

# DETENTION BASIN STAGE-STORAGE TABLE BUILDER

*MHFD-Detention, Version 4.04 (February 2021)*

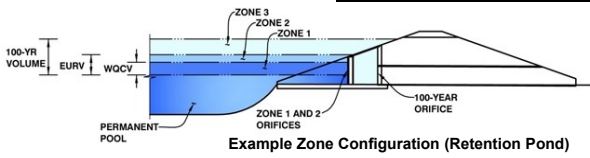


# DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-*Detention, Version 4.04 (February 2021)*

**Project: VILLAS AT CLAREMONT RANCH**

**Basin ID:** \_\_\_\_\_



	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	2.06	0.139	Orifice Plate
Zone 2 (EURV)	4.06	0.314	Orifice Plate
Zone 3 (100-year)	5.42	0.307	Weir&Pipe (Restrict)
<b>Total (all zones)</b>		<b>0.760</b>	

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

Underdrain Orifice Invert Depth = \_\_\_\_\_ ft (distance below the filtration media surface)  
 Underdrain Orifice Diameter = \_\_\_\_\_ inches

**Calculated Parameters for Underdrain**

Underdrain Orifice Area = \_\_\_\_\_ ft<sup>2</sup>  
 Underdrain Orifice Centroid = \_\_\_\_\_ feet

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

Invert of Lowest Orifice = 0.00 ft (relative to basin bottom at Stage = 0 ft)  
 Depth at top of Zone using Orifice Plate = 4.06 ft (relative to basin bottom at Stage = 0 ft)  
 Orifice Plate: Orifice Vertical Spacing = 16.20 inches  
 Orifice Plate: Orifice Area per Row = N/A inches

**Calculated Parameters for Plate**

WQ Orifice Area per Row = N/A ft<sup>2</sup>  
 Elliptical Half-Width = N/A feet  
 Elliptical Slot Centroid = N/A feet  
 Elliptical Slot Area = N/A ft<sup>2</sup>

**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	1.35	2.71					
Orifice Area (sq. inches)	0.94	0.94	0.94					

	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)**

Invert of Vertical Orifice = \_\_\_\_\_ ft (relative to basin bottom at Stage = 0 ft)  
 Depth at top of Zone using Vertical Orifice = \_\_\_\_\_ ft (relative to basin bottom at Stage = 0 ft)  
 Vertical Orifice Diameter = \_\_\_\_\_ inches

**Calculated Parameters for Vertical Orifice**

	Not Selected	Not Selected
Vertical Orifice Area =	N/A	N/A
Vertical Orifice Centroid =	N/A	N/A

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

	Zone 3 Weir	Not Selected
Overflow Weir Front Edge Height, H <sub>o</sub> =	4.06	N/A
Overflow Weir Front Edge Length =	4.00	N/A
Overflow Weir Gate Slope =	0.00	N/A
Horiz. Length of Weir Sides =	4.00	N/A
Overflow Gate Type =	Type C Gate	N/A
Debris Clogging % =	50%	N/A

**Calculated Parameters for Overflow Weir**

	Zone 3 Weir	Not Selected
Height of Gate Upper Edge, H <sub>t</sub> =	4.06	N/A
Overflow Weir Slope Length =	4.00	N/A
Gate Open Area / 100-yr Orifice Area =	30.32	N/A
Overflow Gate Open Area w/o Debris =	11.14	N/A
Overflow Gate Open Area w/ Debris =	5.57	N/A

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

	Zone 3 Restrictor	Not Selected
Depth to Invert of Outlet Pipe =	0.50	N/A
Outlet Pipe Diameter =	18.00	N/A
Restrictor Plate Height Above Pipe Invert =	4.70	N/A

**Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate**

	Zone 3 Restrictor	Not Selected
Outlet Orifice Area =	0.37	N/A
Outlet Orifice Centroid =	0.23	N/A
Half-Central Angle of Restrictor Plate on Pipe =	1.07	N/A

**User Input: Emergency Spillway (Rectangular or Trapezoidal)**

Spillway Invert Stage = 6.00 ft (relative to basin bottom at Stage = 0 ft)  
 Spillway Crest Length = 20.00 feet  
 Spillway End Slopes = 4.00 H:V  
 Freeboard above Max Water Surface = 1.00 feet

**Calculated Parameters for Spillway**

Spillway Design Flow Depth =	0.34
Stage at Top of Freeboard =	7.34
Basin Area at Top of Freeboard =	0.35
Basin Volume at Top of Freeboard =	1.35

**Routed Hydrograph Results**

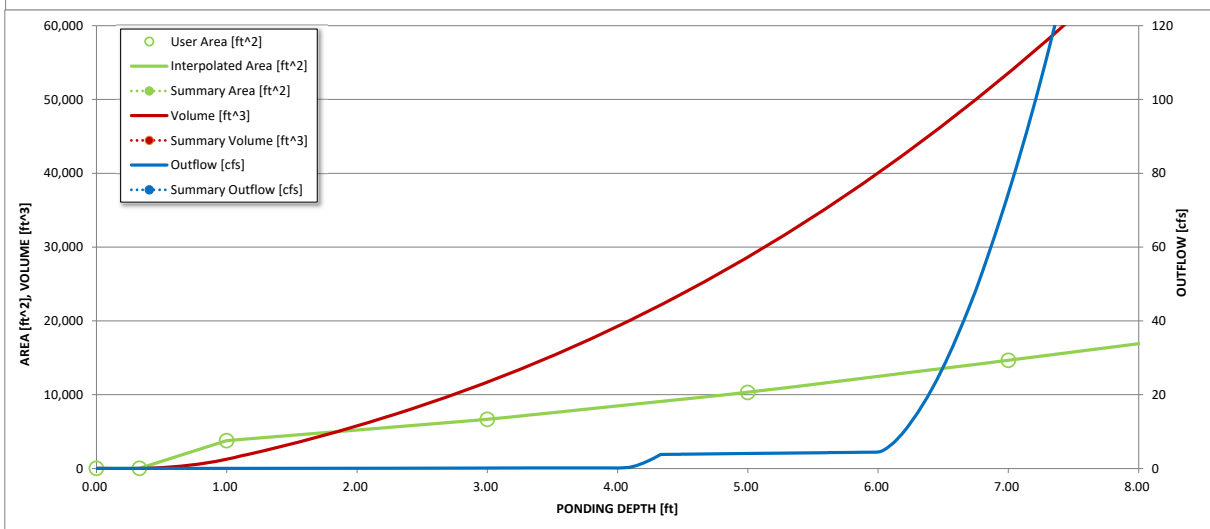
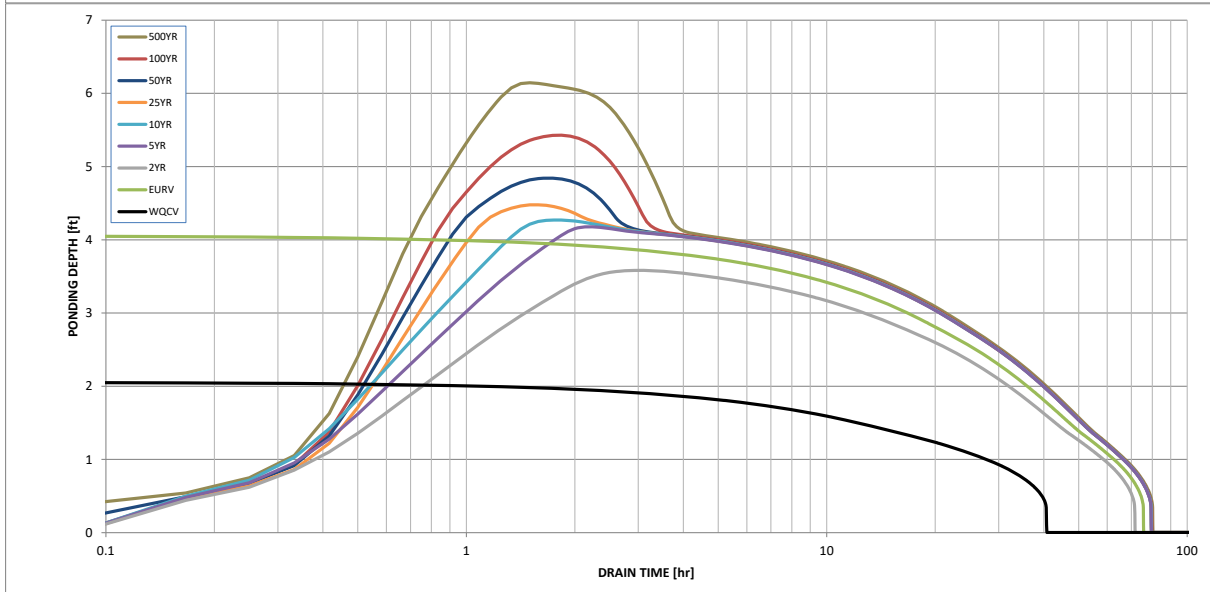
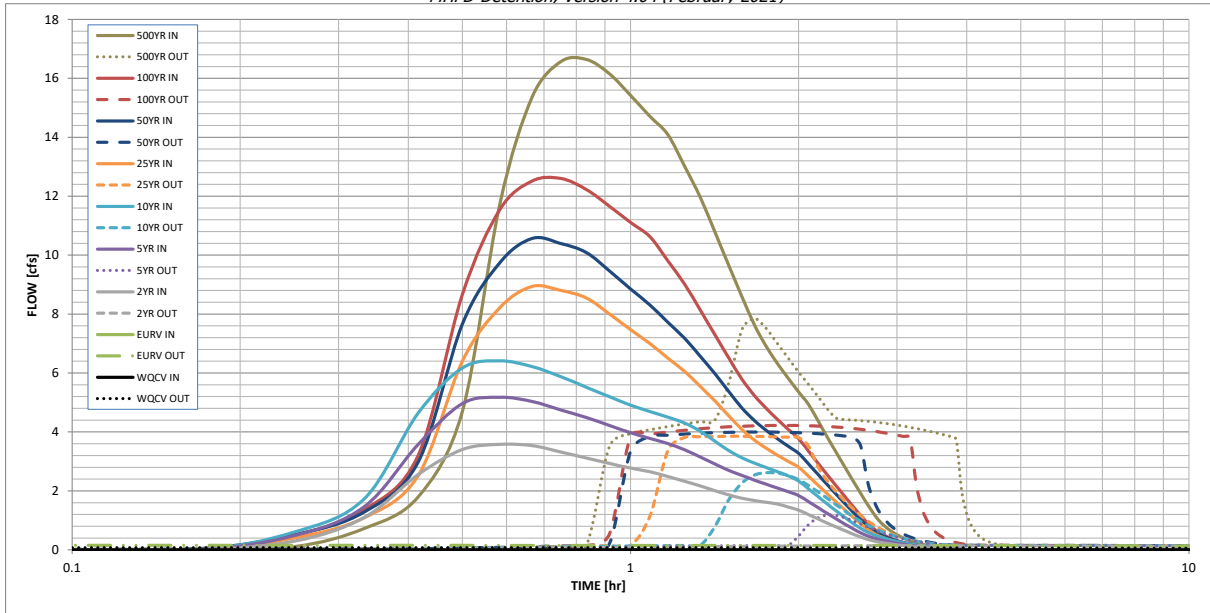
*The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).*

	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
Design Storm Return Period =	N/A	N/A	1.19	1.50	1.75	2.00	2.25	2.52	3.14
One-Hour Rainfall Depth (in) =	0.139	0.453	0.393	0.556	0.695	0.897	1.058	1.269	1.681
CUHP Runoff Volume (acre-ft) =	N/A	N/A	0.393	0.556	0.695	0.897	1.058	1.269	1.681
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	0.1	0.8	1.4	2.9	3.8	5.2	7.5
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	0.1	0.8	1.4	2.9	3.8	5.2	7.5
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.01	0.10	0.18	0.38	0.49	0.66	0.96
Peak Inflow Q (cfs) =	N/A	N/A	3.6	5.2	6.4	8.9	10.6	12.6	16.6
Peak Outflow Q (cfs) =	0.1	0.2	0.1	1.2	2.6	3.9	4.0	4.2	7.8
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	1.5	1.9	1.3	1.0	0.8	1.0
Structure Controlling Flow =	Plate	Overflow Weir 1	Plate	Overflow Weir 1	Overflow Weir 1	Outlet Plate 1	Outlet Plate 1	Outlet Plate 1	Spillway
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	0.1	0.2	0.3	0.3	0.4	0.4
Max Velocity through Grate 2 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours) =	39	69	66	72	70	68	66	64	60
Time to Drain 99% of Inflow Volume (hours) =	40	73	70	77	76	75	74	74	72
Maximum Ponding Depth (ft) =	2.06	4.06	3.58	4.18	4.27	4.48	4.84	5.43	6.14
Area at Maximum Ponding Depth (acres) =	0.12	0.20	0.18	0.20	0.21	0.21	0.23	0.26	0.29
Maximum Volume Stored (acre-ft) =	0.140	0.454	0.364	0.476	0.494	0.538	0.620	0.761	0.960



# DETENTION BASIN OUTLET STRUCTURE DESIGN

*MHFD-Detention, Version 4.04 (February 2021)*



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

# DETENTION BASIN OUTLET STRUCTURE DESIGN

Outflow Hydrograph Workbook Filename: \_\_\_\_\_

## Inflow Hydrographs

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

Time Interval	SOURCE	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP
	TIME	WQCV [cfs]	EURV [cfs]	2 Year [cfs]	5 Year [cfs]	10 Year [cfs]	25 Year [cfs]	50 Year [cfs]	100 Year [cfs]	500 Year [cfs]
5.00 min	0:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.11
	0:15:00	0.00	0.00	0.30	0.49	0.60	0.40	0.51	0.49	0.73
	0:20:00	0.00	0.00	1.10	1.46	1.73	1.09	1.28	1.36	1.80
	0:25:00	0.00	0.00	2.56	3.58	4.64	2.52	2.98	3.21	4.70
	0:30:00	0.00	0.00	3.40	4.96	6.17	6.40	7.66	8.67	11.73
	0:35:00	0.00	0.00	3.58	5.18	6.41	8.22	9.74	11.54	15.37
	0:40:00	0.00	0.00	3.53	5.03	6.22	8.94	10.57	12.51	16.57
	0:45:00	0.00	0.00	3.32	4.75	5.88	8.80	10.39	12.60	16.64
	0:50:00	0.00	0.00	3.12	4.49	5.52	8.55	10.09	12.23	16.16
	0:55:00	0.00	0.00	2.93	4.22	5.20	8.00	9.46	11.66	15.42
	1:00:00	0.00	0.00	2.77	3.97	4.91	7.47	8.85	11.11	14.71
	1:05:00	0.00	0.00	2.65	3.78	4.69	7.00	8.31	10.62	14.09
	1:10:00	0.00	0.00	2.49	3.61	4.50	6.51	7.72	9.81	13.01
	1:15:00	0.00	0.00	2.33	3.39	4.30	6.05	7.18	9.01	11.96
	1:20:00	0.00	0.00	2.16	3.15	4.02	5.54	6.57	8.13	10.78
	1:25:00	0.00	0.00	2.01	2.91	3.68	5.05	5.97	7.29	9.65
	1:30:00	0.00	0.00	1.86	2.69	3.37	4.55	5.37	6.51	8.59
	1:35:00	0.00	0.00	1.75	2.53	3.12	4.08	4.81	5.79	7.63
	1:40:00	0.00	0.00	1.67	2.37	2.94	3.72	4.39	5.23	6.90
	1:45:00	0.00	0.00	1.61	2.23	2.79	3.45	4.05	4.80	6.32
	1:50:00	0.00	0.00	1.56	2.10	2.65	3.21	3.77	4.42	5.82
	1:55:00	0.00	0.00	1.45	1.97	2.51	3.00	3.51	4.09	5.36
	2:00:00	0.00	0.00	1.35	1.84	2.34	2.80	3.27	3.77	4.94
	2:05:00	0.00	0.00	1.19	1.64	2.07	2.50	2.91	3.35	4.38
	2:10:00	0.00	0.00	1.05	1.43	1.81	2.19	2.56	2.94	3.83
	2:15:00	0.00	0.00	0.91	1.24	1.56	1.90	2.22	2.55	3.32
	2:20:00	0.00	0.00	0.78	1.05	1.32	1.63	1.89	2.18	2.83
	2:25:00	0.00	0.00	0.66	0.88	1.11	1.37	1.59	1.83	2.37
	2:30:00	0.00	0.00	0.54	0.72	0.91	1.12	1.30	1.49	1.92
	2:35:00	0.00	0.00	0.43	0.58	0.73	0.89	1.02	1.17	1.50
	2:40:00	0.00	0.00	0.35	0.46	0.59	0.68	0.78	0.88	1.12
	2:45:00	0.00	0.00	0.29	0.38	0.49	0.52	0.60	0.67	0.85
	2:50:00	0.00	0.00	0.24	0.32	0.41	0.41	0.47	0.51	0.66
	2:55:00	0.00	0.00	0.20	0.27	0.34	0.33	0.38	0.40	0.51
	3:00:00	0.00	0.00	0.17	0.22	0.28	0.27	0.31	0.31	0.40
	3:05:00	0.00	0.00	0.14	0.19	0.24	0.22	0.25	0.24	0.31
	3:10:00	0.00	0.00	0.12	0.15	0.20	0.18	0.20	0.19	0.24
	3:15:00	0.00	0.00	0.10	0.13	0.16	0.15	0.16	0.15	0.19
	3:20:00	0.00	0.00	0.08	0.10	0.13	0.12	0.13	0.12	0.15
	3:25:00	0.00	0.00	0.07	0.08	0.10	0.10	0.11	0.10	0.12
	3:30:00	0.00	0.00	0.05	0.07	0.08	0.08	0.08	0.08	0.10
	3:35:00	0.00	0.00	0.04	0.05	0.06	0.06	0.07	0.06	0.08
	3:40:00	0.00	0.00	0.03	0.04	0.05	0.05	0.05	0.05	0.06
	3:45:00	0.00	0.00	0.02	0.03	0.04	0.03	0.04	0.03	0.04
	3:50:00	0.00	0.00	0.02	0.02	0.02	0.02	0.03	0.02	0.03
	3:55:00	0.00	0.00	0.01	0.01	0.01	0.01	0.02	0.02	0.02
	4:00:00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01
	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



# Channel Report

## TRICKLE CHANNEL EDB-B

### Triangular

Side Slopes (z:1) = 4.00, 4.00

Total Depth (ft) = 0.50

Invert Elev (ft) = 1.00

Slope (%) = 0.50

N-Value = 0.015

### Calculations

Compute by: Known Q

Known Q (cfs) = 0.50

### Highlighted

Depth (ft) = 0.27

Q (cfs) = 0.500

Area (sqft) = 0.29

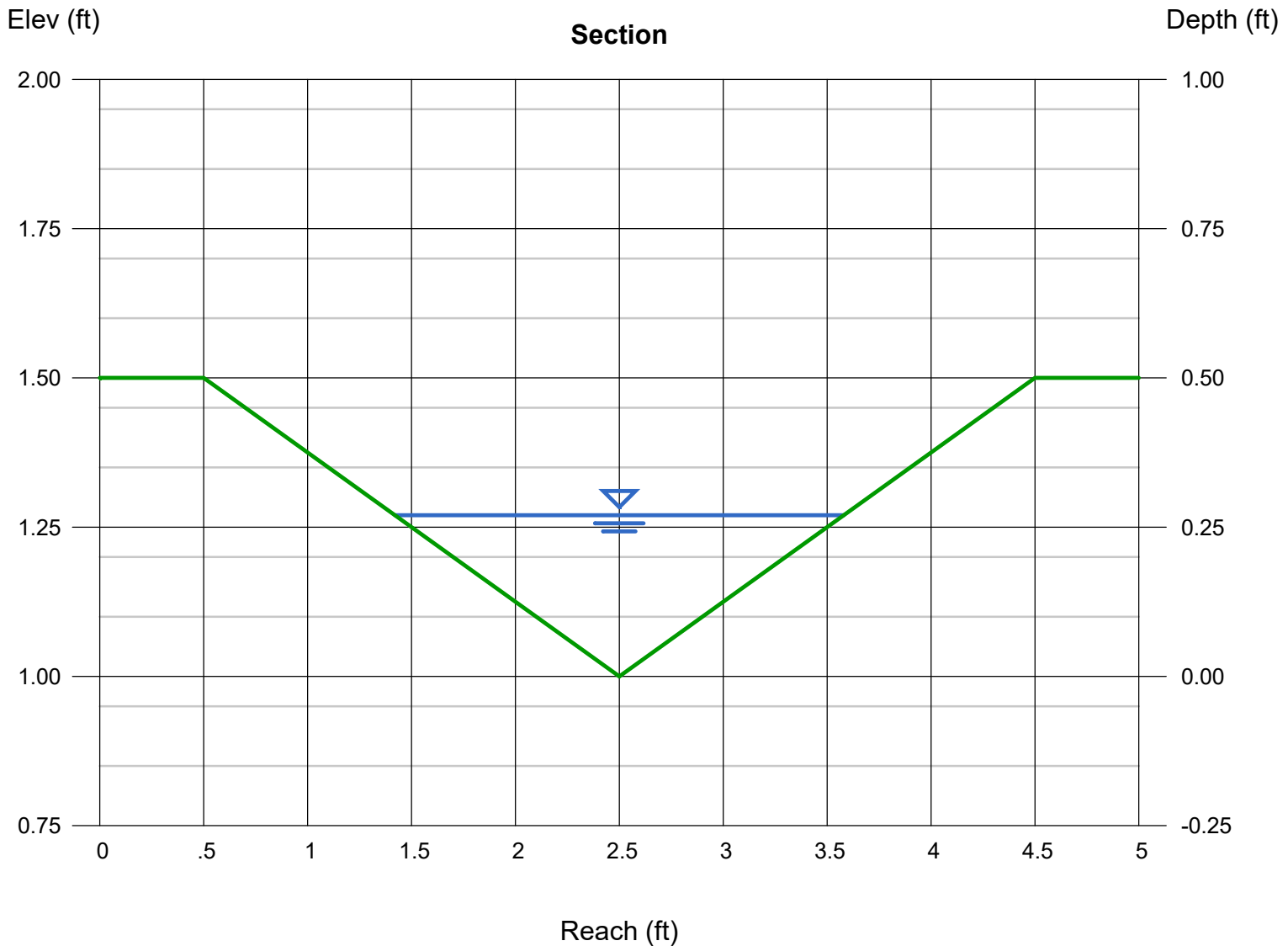
Velocity (ft/s) = 1.71

Wetted Perim (ft) = 2.23

Crit Depth,  $Y_c$  (ft) = 0.25

Top Width (ft) = 2.16

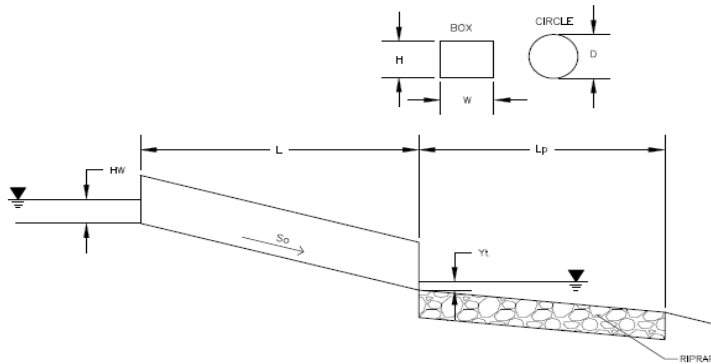
EGL (ft) = 0.32



## Determination of Culvert Headwater and Outlet Protection

Project: **Villas at Claremont Ranch**

Basin ID: **Outlet from curb chase SubBasin 2.1**



Unresolved:  
This sheet appears to be  
a duplicate. Please  
delete

**Soil Type:**

Choose One:

Sandy

Non-Sandy

Supercritical Flow! Using Ha to calculate protection type.

**Design Information (Input):**

Design Discharge	Q = <input style="width: 50px;" type="text" value="1.3"/> cfs
<b>Circular Culvert:</b>	
Barrel Diameter in Inches	D = <input style="width: 50px;" type="text"/>
Inlet Edge Type (Choose from pull-down list)	Square End Projection
<b>Box Culvert:</b>	<b>OR</b>
Barrel Height (Rise) in Feet	Height (Rise) = <input style="width: 50px;" type="text" value="0.5"/> ft
Barrel Width (Span) in Feet	Width (Span) = <input style="width: 50px;" type="text" value="1"/> ft
Inlet Edge Type (Choose from pull-down list)	1 : 1 Bevel w/ Headwall
Number of Barrels	No = <input style="width: 50px;" type="text" value="1"/>
Inlet Elevation	Elev IN = <input style="width: 50px;" type="text" value="0.2"/> ft
Outlet Elevation <b>OR</b> Slope	So = <input style="width: 50px;" type="text" value="0.02"/> ft/ft
Culvert Length	L = <input style="width: 50px;" type="text" value="1"/> ft
Manning's Roughness	n = <input style="width: 50px;" type="text" value="0.012"/>
Bend Loss Coefficient	$k_b$ = <input style="width: 50px;" type="text" value="0"/>
Exit Loss Coefficient	$k_x$ = <input style="width: 50px;" type="text" value="1"/>
Tailwater Surface Elevation	Elev $Y_t$ = <input style="width: 50px;" type="text"/>
Max Allowable Channel Velocity	V = <input style="width: 50px;" type="text" value="5"/> ft/s

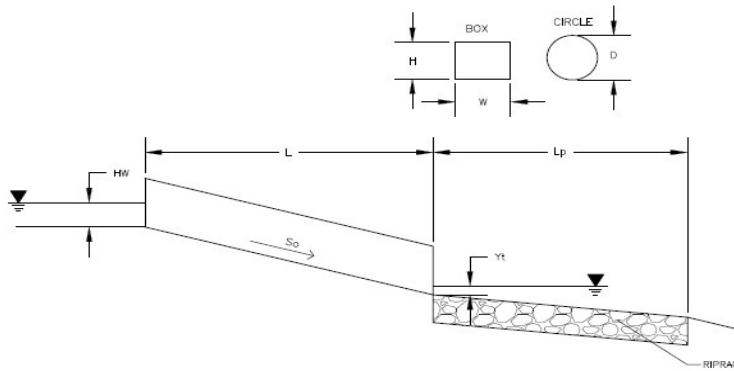
**Required Protection (Output):**

Tailwater Surface Height	$Y_t$ = <input style="width: 50px;" type="text" value="0.20"/> ft
Flow Area at Max Channel Velocity	$A_t$ = <input style="width: 50px;" type="text" value="0.26"/> ft <sup>2</sup>
Culvert Cross Sectional Area Available	A = <input style="width: 50px;" type="text" value="0.50"/> ft <sup>2</sup>
Entrance Loss Coefficient	$k_e$ = <input style="width: 50px;" type="text" value="0.20"/>
Friction Loss Coefficient	$k_f$ = <input style="width: 50px;" type="text" value="0.07"/>
Sum of All Losses Coefficients	$k_s$ = <input style="width: 50px;" type="text" value="1.27"/> ft
Culvert Normal Depth	$Y_n$ = <input style="width: 50px;" type="text" value="0.25"/> ft
Culvert Critical Depth	$Y_c$ = <input style="width: 50px;" type="text" value="0.37"/> ft
Tailwater Depth for Design	d = <input style="width: 50px;" type="text" value="0.44"/> ft
Adjusted Diameter <b>OR</b> Adjusted Rise	$H_a$ = <input style="width: 50px;" type="text" value="0.37"/> ft
Expansion Factor	$1/(2*\tan(\theta))$ = <input style="width: 50px;" type="text" value="5.22"/>
Flow/Diameter <sup>2.5</sup> <b>OR</b> Flow/(Span * Rise <sup>1.5</sup> )	$Q/WH^{1.5}$ = <input style="width: 50px;" type="text" value="3.68"/> ft <sup>0.5</sup> /s
Froude Number	Fr = <input style="width: 50px;" type="text" value="1.88"/> <span style="color: red; font-weight: bold;">Supercritical!</span>
Tailwater/Adjusted Diameter <b>OR</b> Tailwater/Adjusted Rise	$Y_t/H$ = <input style="width: 50px;" type="text" value="0.54"/>
Inlet Control Headwater	$HW_i$ = <input style="width: 50px;" type="text" value="0.60"/> ft
Outlet Control Headwater	$HW_o$ = <input style="width: 50px;" type="text" value="0.55"/> ft
<b>Design Headwater Elevation</b>	<b>HW</b> = <input style="width: 50px;" type="text" value="0.80"/> ft
<b>Headwater/Diameter <b>OR</b> Headwater/Rise Ratio</b>	<b>HW/H</b> = <input style="width: 50px;" type="text" value="1.20"/>
Minimum Theoretical Riprap Size	$d_{50}$ = <input style="width: 50px;" type="text" value="1"/> in
Nominal Riprap Size	$d_{50}$ = <input style="width: 50px;" type="text" value="6"/> in
<b>UDFCD Riprap Type</b>	<b>Type</b> = <input style="width: 50px;" type="text" value="VL"/>
<b>Length of Protection</b>	$L_p$ = <input style="width: 50px;" type="text" value="2"/> ft
<b>Width of Protection</b>	T = <input style="width: 50px;" type="text" value="2"/> ft

## Determination of Culvert Headwater and Outlet Protection

Project: **Villas at Claremont**

Basin ID: **Pond Outlet**



**Soil Type:**

Choose One:

- Sandy  
 Non-Sandy

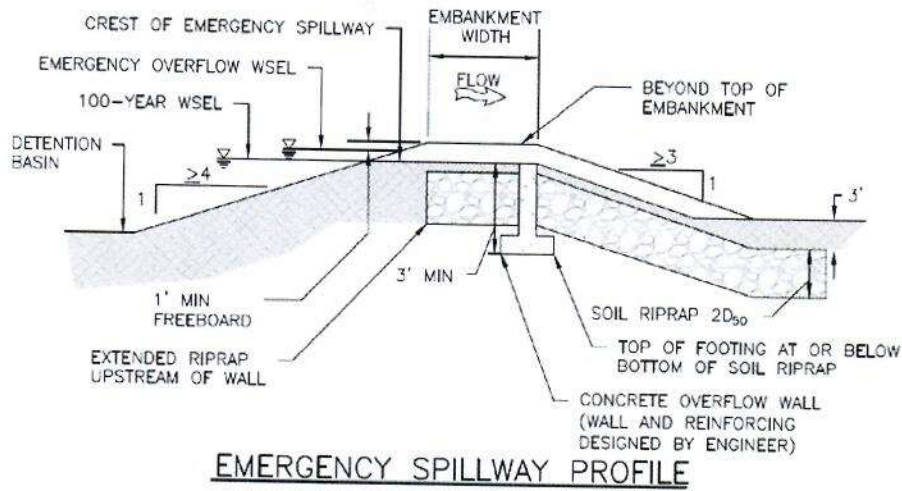
**Supercritical Flow! Using  $D_a$  to calculate protection type.**

**Design Information (Input):**

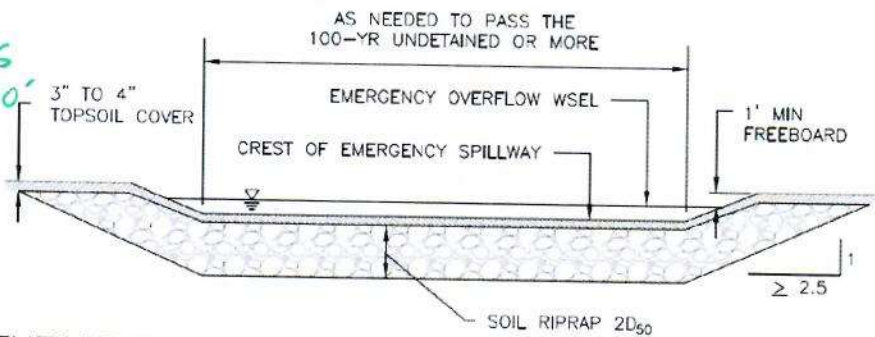
Design Discharge	Q = <input style="width: 50px;" type="text" value="5.2"/> cfs
<b>Circular Culvert:</b>	
Barrel Diameter in Inches	D = <input style="width: 50px;" type="text" value="18"/> inches
Inlet Edge Type (Choose from pull-down list)	Square End Projection <input type="button" value="v"/>
<b>Box Culvert:</b>	<b>OR</b>
Barrel Height (Rise) in Feet	Height (Rise) = <input style="width: 50px;" type="text"/>
Barrel Width (Span) in Feet	Width (Span) = <input style="width: 50px;" type="text"/>
Inlet Edge Type (Choose from pull-down list)	<input type="button" value="v"/>
Number of Barrels	No = <input style="width: 50px;" type="text" value="1"/>
Inlet Elevation	Elev IN = <input style="width: 50px;" type="text" value="6383.28"/> ft
Outlet Elevation <b>OR</b> Slope	Elev OUT = <input style="width: 50px;" type="text" value="6377.76"/> ft
Culvert Length	L = <input style="width: 50px;" type="text" value="119.45"/> ft
Manning's Roughness	n = <input style="width: 50px;" type="text" value="0.012"/>
Bend Loss Coefficient	$k_b$ = <input style="width: 50px;" type="text" value="0"/>
Exit Loss Coefficient	$k_x$ = <input style="width: 50px;" type="text" value="1"/>
Tailwater Surface Elevation	Elev $Y_t$ = <input style="width: 50px;" type="text"/>
Max Allowable Channel Velocity	V = <input style="width: 50px;" type="text" value="5"/> ft/s

**Required Protection (Output):**

Tailwater Surface Height	$Y_t$ = <input style="width: 50px;" type="text" value="0.60"/> ft
Flow Area at Max Channel Velocity	$A_t$ = <input style="width: 50px;" type="text" value="1.04"/> ft <sup>2</sup>
Culvert Cross Sectional Area Available	A = <input style="width: 50px;" type="text" value="1.77"/> ft <sup>2</sup>
Entrance Loss Coefficient	$k_e$ = <input style="width: 50px;" type="text" value="0.50"/>
Friction Loss Coefficient	$k_f$ = <input style="width: 50px;" type="text" value="1.84"/>
Sum of All Losses Coefficients	$k_s$ = <input style="width: 50px;" type="text" value="3.34"/> ft
Culvert Normal Depth	$Y_n$ = <input style="width: 50px;" type="text" value="0.47"/> ft
Culvert Critical Depth	$Y_c$ = <input style="width: 50px;" type="text" value="0.88"/> ft
Tailwater Depth for Design	d = <input style="width: 50px;" type="text" value="1.19"/> ft
Adjusted Diameter <b>OR</b> Adjusted Rise	$D_a$ = <input style="width: 50px;" type="text" value="0.98"/> ft
Expansion Factor	$1/(2*\tan(\Theta))$ = <input style="width: 50px;" type="text" value="6.70"/>
Flow/Diameter <sup>2.5</sup> <b>OR</b> Flow/(Span * Rise <sup>1.5</sup> )	$Q/D^{2.5}$ = <input style="width: 50px;" type="text" value="1.89"/> ft <sup>0.5</sup> /s
Froude Number	Fr = <input style="width: 50px;" type="text" value="3.33"/> <span style="color: red; font-weight: bold;">Supercritical!</span>
Tailwater/Adjusted Diameter <b>OR</b> Tailwater/Adjusted Rise	$Y_t/D$ = <input style="width: 50px;" type="text" value="0.61"/>
Inlet Control Headwater	$HW_i$ = <input style="width: 50px;" type="text" value="1.30"/> ft
Outlet Control Headwater	$HW_o$ = <input style="width: 50px;" type="text" value="-3.88"/> ft
<b>Design Headwater Elevation</b>	<b>HW</b> = <input style="width: 50px;" type="text" value="6,384.58"/> ft
<b>Headwater/Diameter <b>OR</b> Headwater/Rise Ratio</b>	<b>HW/D</b> = <input style="width: 50px;" type="text" value="0.87"/>
Minimum Theoretical Riprap Size	$d_{50}$ = <input style="width: 50px;" type="text" value="3"/> in
Nominal Riprap Size	$d_{50}$ = <input style="width: 50px;" type="text" value="6"/> in
<b>UDFCD Riprap Type</b>	<b>Type</b> = <input style="width: 50px;" type="text" value="VL"/>
<b>Length of Protection</b>	$L_p$ = <input style="width: 50px;" type="text" value="5"/> ft
<b>Width of Protection</b>	T = <input style="width: 50px;" type="text" value="3"/> ft



$Q_{100} = 25 \text{ CFS}$   
 WEIR LENGTH = 20'  
 $\therefore 1.25 \frac{\text{CFS}}{\text{FT}}$



4:1  
SLOPE

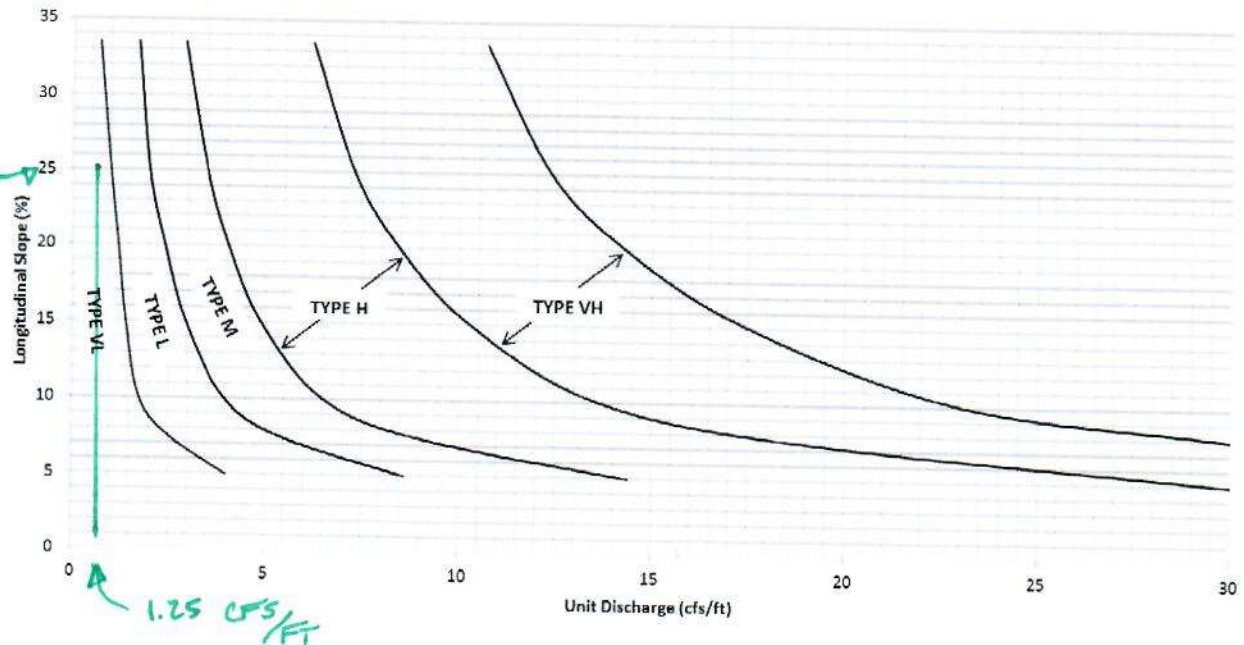


Figure 12-21. Embankment protection details and rock sizing chart (adapted from Arapahoe County)

# DRAINAGE MAPS

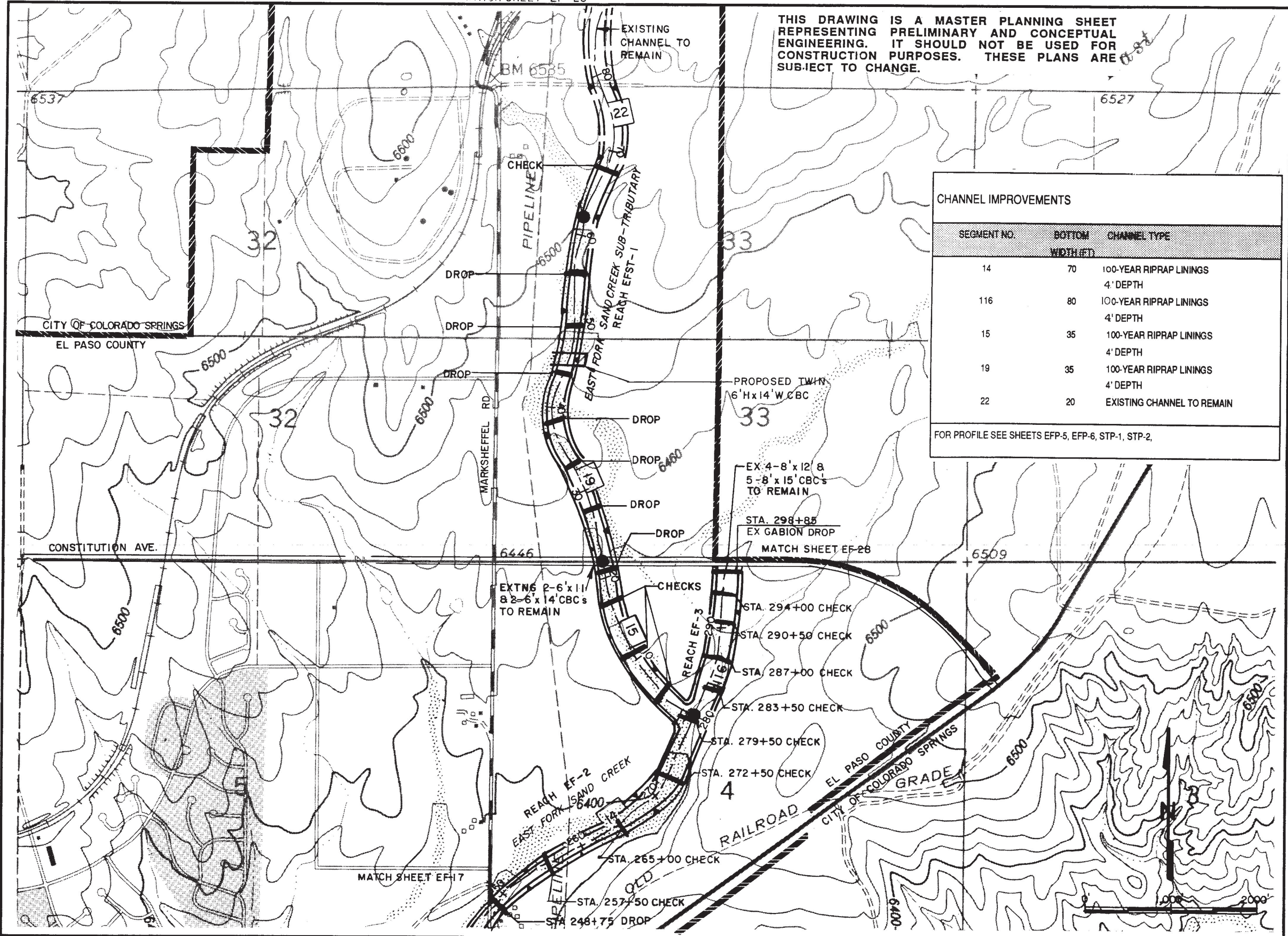


THIS DRAWING IS A MASTER PLANNING SHEET REPRESENTING PRELIMINARY AND CONCEPTUAL ENGINEERING. IT SHOULD NOT BE USED FOR CONSTRUCTION PURPOSES. THESE PLANS ARE SUBJECT TO CHANGE.

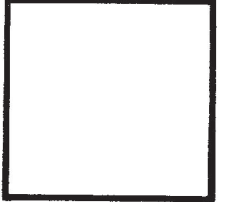
CHANNEL IMPROVEMENTS

SEGMENT NO.	BOTTOM WIDTH (FT)	CHANNEL TYPE
14	70	100-YEAR RIPRAP LININGS 4' DEPTH
116	80	100-YEAR RIPRAP LININGS 4' DEPTH
15	35	100-YEAR RIPRAP LININGS 4' DEPTH
19	35	100-YEAR RIPRAP LININGS 4' DEPTH
22	20	EXISTING CHANNEL TO REMAIN

FOR PROFILE SEE SHEETS EFP-5, EFP-6, STP-1, STP-2,

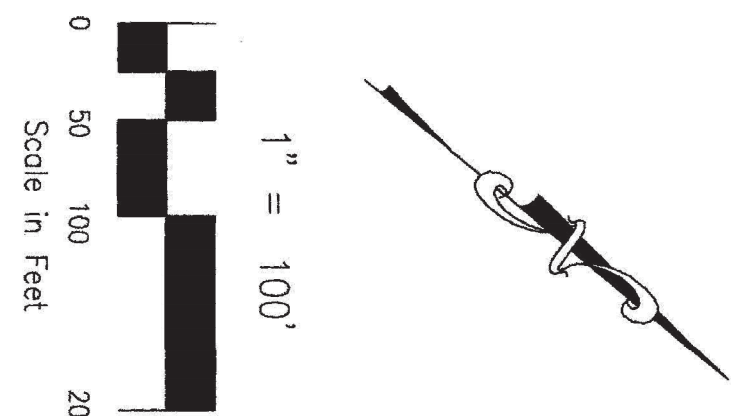
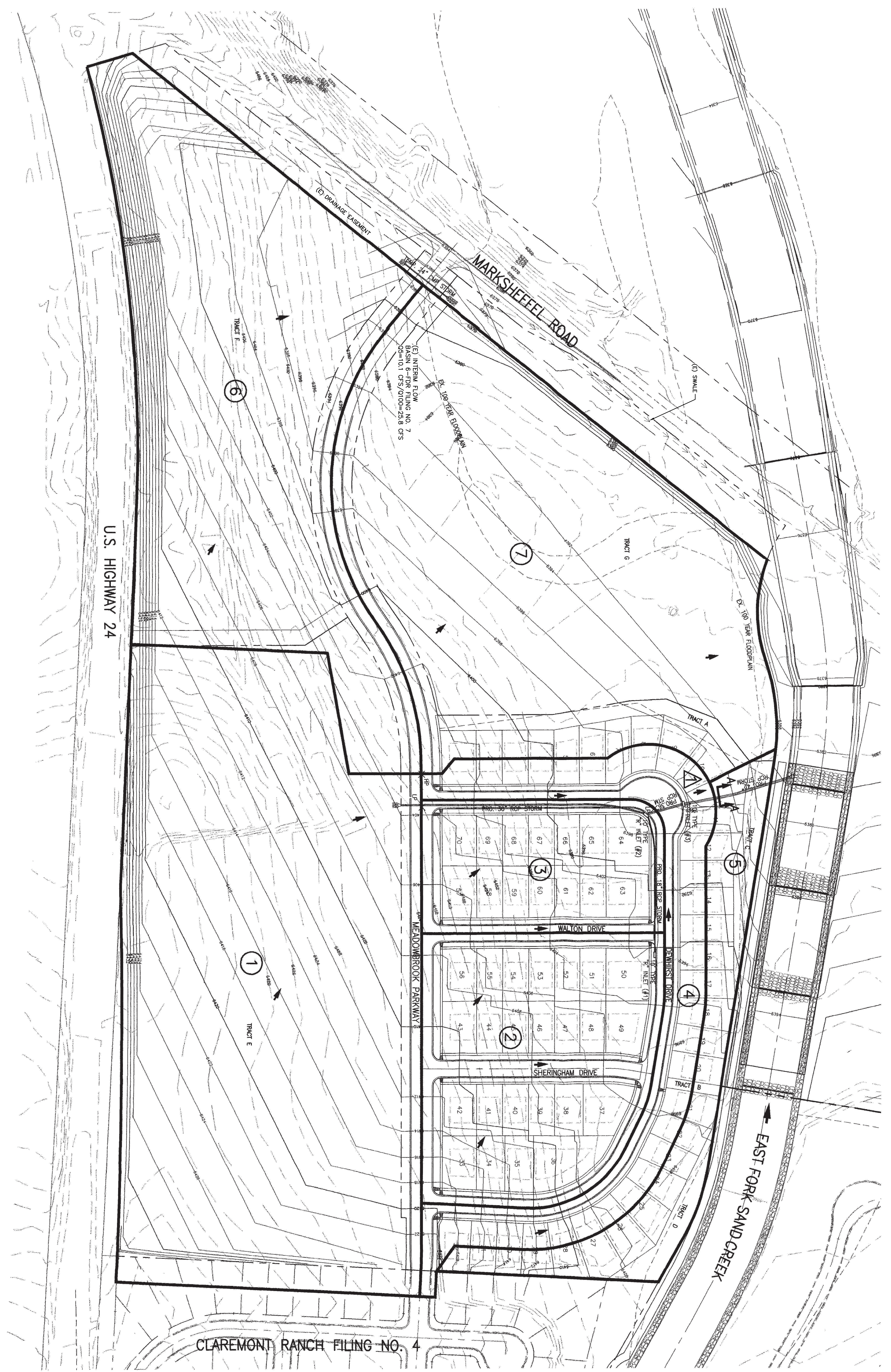


Kiowa Engineering Corporation  
 419 W. Bijou Street  
 Colorado Springs, Colorado  
 80905-1308

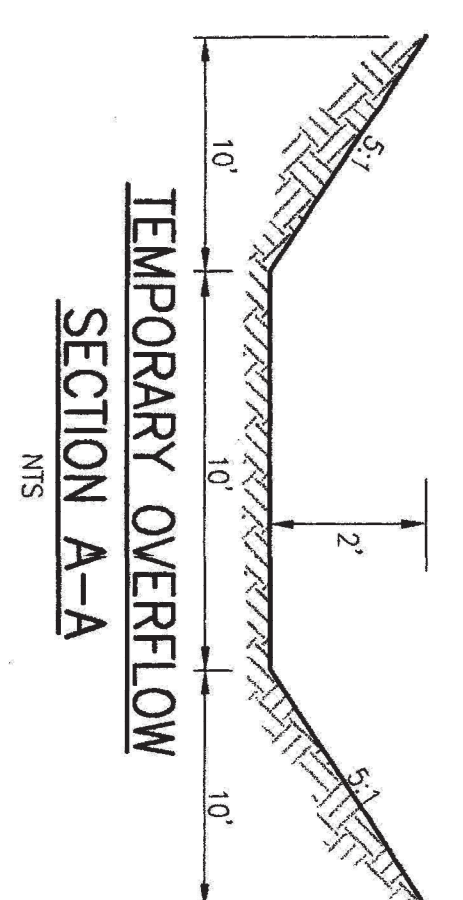


SAND CREEK DRAINAGE BASIN PLANNING STUDY  
 PRELIMINARY DESIGN PLANS

Project No	
Date:	
Design:	
Drawn:	
Check:	
Revisions:	



- LEGEND**
- EXISTING CONTOURS-MNR (2') - - - - -
  - EXISTING CONTOURS-MAR (10') - - - - -
  - PROPOSED CONTOURS-MAR (2') - - - - -
  - PROPOSED CONTOURS-MAR (10') - - - - -
  - BASIN BOUNDARY ———
  - BASIN DESIGNATOR (1) ○
  - DESIGN POINT DESIGNATOR (1) △
  - DIRECTION OF FLOW →
  - HIGH POINT X HP
  - LOW POINT X LP



**BASIN TABLE**

#	AC	Q <sub>s</sub> (cfs)	Q <sub>low</sub> (cfs)
1	15.60	35.6	77.5
2	5.15	11.1	24.9
3	2.77	6.5	14.6
4	3.36	7.9	18.1
5	2.43	5.8	13.1
6	11.18	60.4	90.5
7	12.21	56.0	96.7

**DESIGN POINT TABLE**

#	AC	Q <sub>s</sub> (cfs)	Q <sub>low</sub> (cfs)
1	26.88	58.1	128.0

**CLAREMONT RANCH FILING NO. 7  
DRAINAGE PLAN**

PROJECT NO. 01-006 FILE: Claremont #7\dwg\01-drainage.dwg  
 DESIGNED BY: TOM SCALE DATE: 05/17/04  
 DRAWN BY: KGV HORIZ: 1"=100'  
 CHECKED BY: TOM VERT: N/A SHEET 1 OF 1

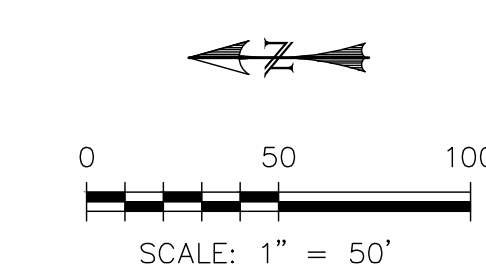
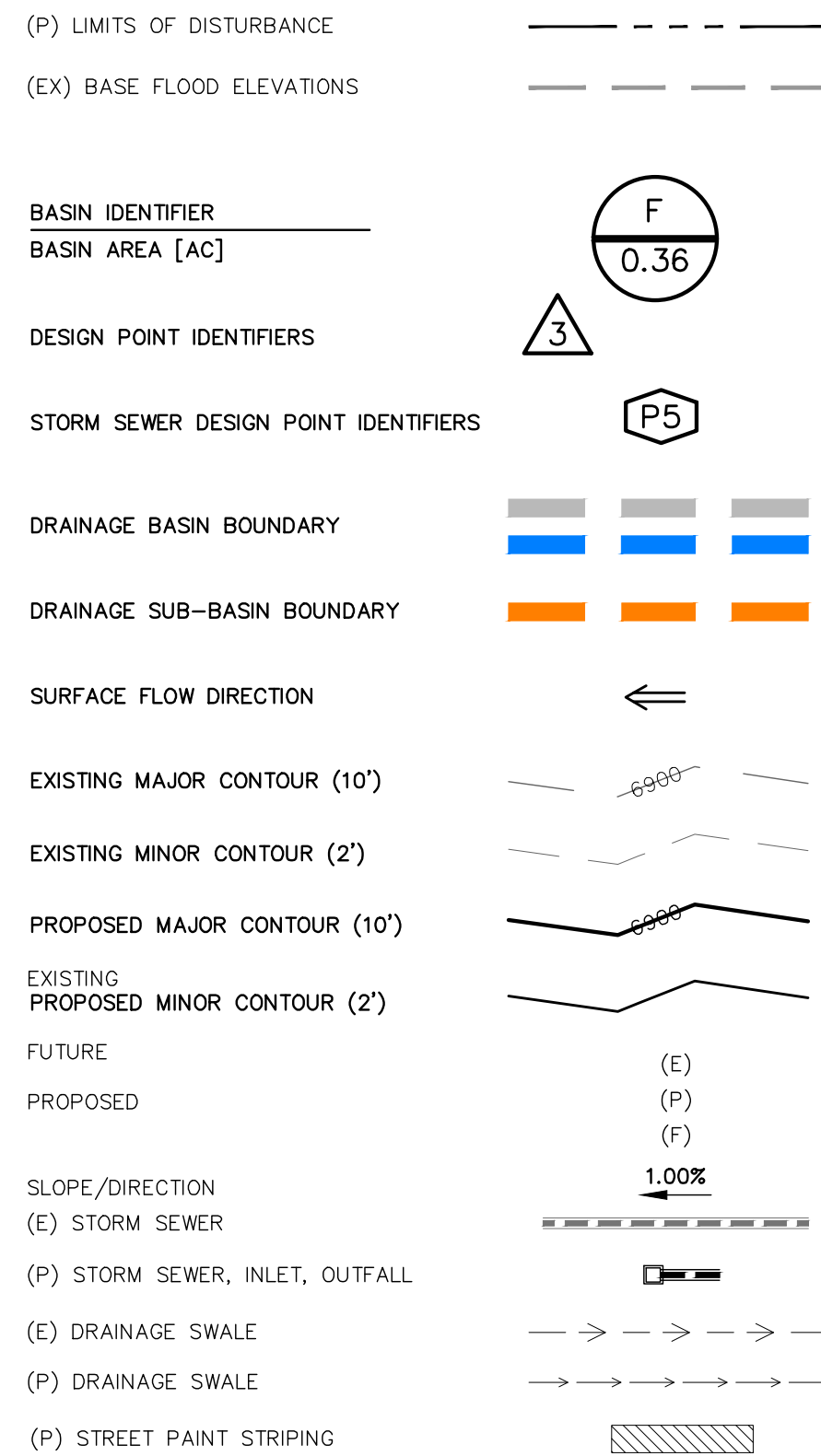
**REVISIONS:**

NO.	DATE:	BY:	DESCRIPTION:	APPROVED BY:	DATE:

TIM D. MCCONNELL, COLORADO P.E. NO. 33797  
 FOR AND ON BEHALF OF ENGINEERING AND SURVEYING INC. (ESI)

**ENGINEERING AND SURVEYING INC.**  
 20 BOULDER CRESCENT, 2nd FLOOR  
 COLORADO SPRINGS, CO 80903  
 (719) 955-5485, FAX (719) 471-4812

**DRAINAGE LEGEND**



BASIN	TRIBUTARY AREA TO POND EDB-B (ACRES)	TRIBUTARY AREA UNTREATED (ACRES)	APPLICABLE EXCLUSION
1	0.00	2.25	NO INCREASE IN IMPERMEABLE AREA PROPOSED
2	1.92		
3	0.76		
4	1.00		
5	0.80		
6	1.95		
7	0.65		
8	0.62		
9	0.13		
10	0.00	0.54	NO INCREASE IN IMPERMEABLE AREA PROPOSED

STORM EVENT	ELEVATION	VOLUME (A-FT)
WQCV	6385.06	0.14
EURV	6387.06	0.45
10-YR	6387.27	0.49
100-YR	6388.43	0.76
EM. OVERFLOW	6389.00	
MIN TOP OF BERM	6390.34	

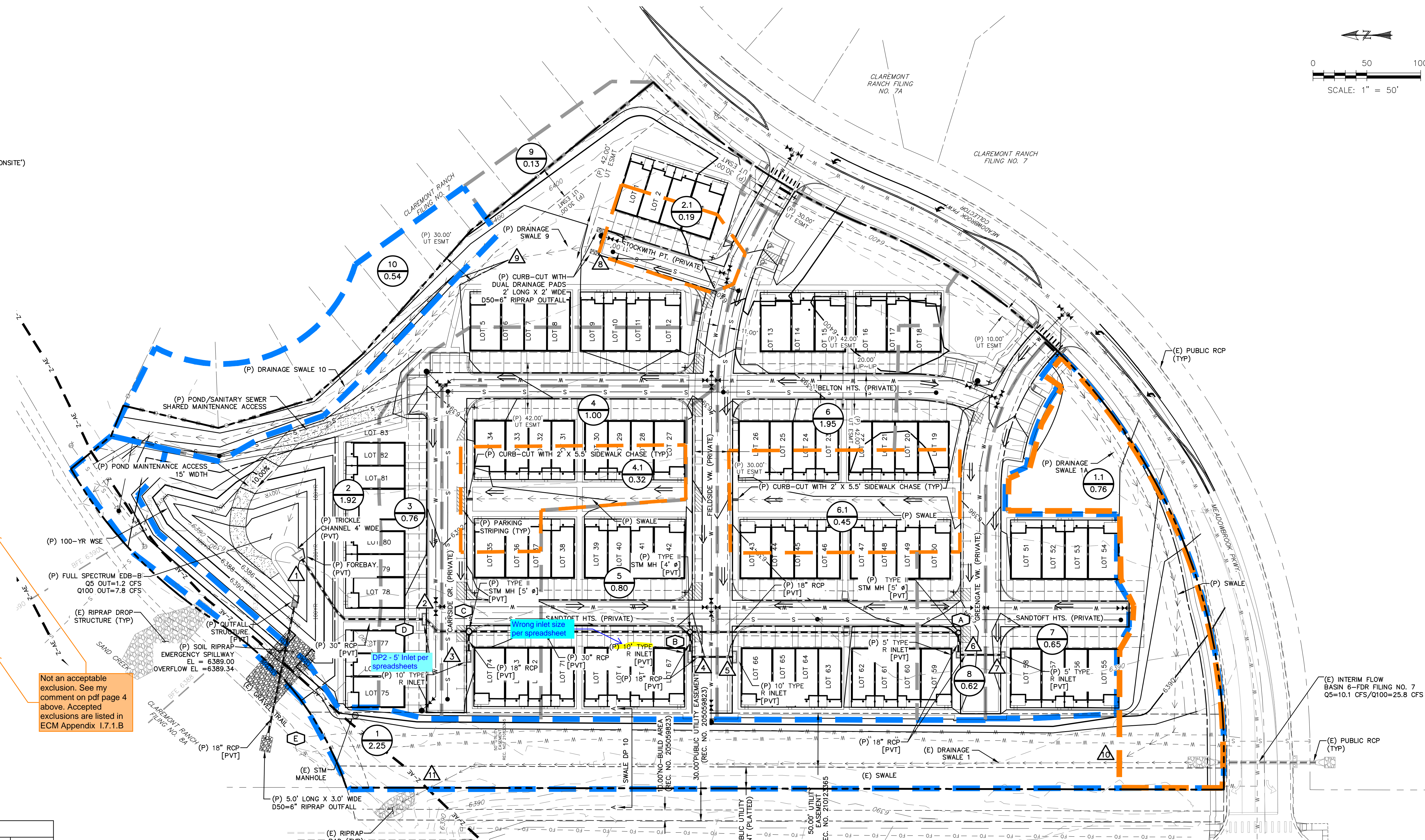
BASIN	AREA (ACRES)	Q2 (CFS)	Q5 (CFS)	Q10 (CFS)	Q25 (CFS)	Q50 (CFS)	Q100 (CFS)
1	2.25	0.2	0.6	1.2	2.0	2.6	3.3
2	1.92	1.3	1.9	2.7	3.8	4.6	5.6
3	0.76	1.1	1.5	2.0	2.5	2.9	3.4
4	1.00	1.3	1.8	2.3	2.9	3.5	4.1
5	0.80	1.2	1.7	2.2	2.7	3.2	3.7
6	1.95	2.1	3.0	3.9	5.0	6.0	7.0
7	0.65	1.0	1.4	1.7	2.2	2.6	3.0
8	0.62	1.2	1.6	2.0	2.4	2.9	3.3
9	0.13	0.0	0.1	0.1	0.2	0.2	0.3
10	0.54	0.1	0.3	0.5	0.8	1.1	1.4

BASIN	AREA (ACRES)	Q2 (CFS)	Q5 (CFS)	Q10 (CFS)	Q25 (CFS)	Q50 (CFS)	Q100 (CFS)
1.1	0.76	0.2	0.5	0.8	1.3	1.7	2.1
2.1	0.19	0.6	0.7	0.9	1.1	1.2	1.4
4.1	0.32	0.4	0.5	0.7	0.9	1.0	1.2
6.1	0.45	0.4	0.6	0.8	1.1	1.3	1.6

DESIGN POINT	Q2 (CFS)	Q5 (CFS)	Q10 (CFS)	Q25 (CFS)	Q50 (CFS)	Q100 (CFS)
1	7.5	10.6	13.8	17.9	21.3	25.0
2	1.1	1.5	2.0	2.5	2.9	3.4
3	1.3	1.8	2.3	2.9	3.5	4.1
4	1.2	1.7	2.1	2.7	3.2	3.7
5	2.1	3.0	3.9	5.0	6.0	7.0
6	1.2	1.6	2.0	2.4	2.9	3.3
7	1.0	1.4	1.7	2.2	2.6	3.0
8	0.5	0.7	0.8	1.0	1.1	1.3
9	0.4	0.5	0.7	0.9	1.0	1.2
10		10.6				27.9
11		11.2				31.2
A	2.3	3.0	3.8	4.7	5.6	6.4
B	5.0	6.8	8.7	11.1	13.1	15.3
C	6.2	8.6	10.9	13.8	16.4	19.0
D	7.2	9.9	12.6	15.9	18.9	21.9
E (POND OUT)		1.1				5.2

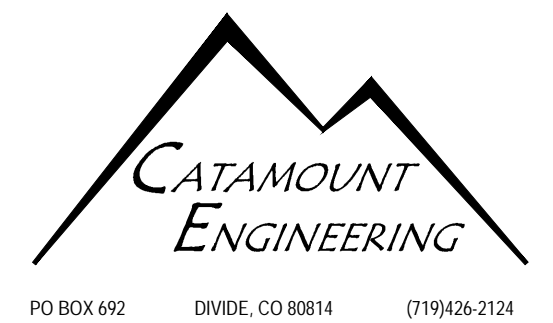
Not an acceptable exclusion. See my comment on pdf page 4 above. Accepted exclusions are listed in ECM Appendix 1.7.1.B

Unresolved. Flows do not match release rates on Pond spreadsheet



REV.	DESCRIPTION	DATE

PREPARED FOR:  
PHI REAL ESTATE SERVICES, LLC  
200 W. CITY CENTER DR. STE 200  
PUEBLO, CO 81003

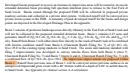


THE VILLAS AT CLAREMONT RANCH  
PROPOSED DRAINAGE MAP

DESIGNED BY: DLM	DRAWN BY: MGP
SCALE: 1" = 50'	DATE: 06/13/17
JOB NUMBER: 16-102	SHEET: ___ OF ___

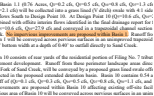
# V4\_Drainage Report - Final.pdf Markup Summary

## #FF8000 (3)



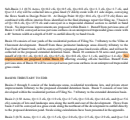
**Subject:** SW - Highlight  
**Page Label:** 4  
**Author:** Glenn Reese - EPC Stormwater  
**Date:** 3/29/2023 3:27:02 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

No impervious improvements are proposed within Basin 1.



**Subject:** SW - Highlight  
**Page Label:** 5  
**Author:** Glenn Reese - EPC Stormwater  
**Date:** 3/29/2023 3:27:11 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

No impervious improvements are proposed within Basin 1



**Subject:** SW - Highlight  
**Page Label:** 5  
**Author:** Glenn Reese - EPC Stormwater  
**Date:** 3/29/2023 3:27:15 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

No improvements are proposed within Basin 10

## #FFFF00 (4)

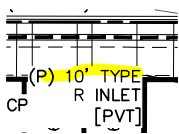
ins 2.25 acres and  
cfs, and  $Q_{100}=3.3$   
ek or be combined  
) of  $Q_s=10.1$  cfs,  
own installed with  
Basin 6 (tract F,  
Filino No 7) with

**Subject:** Highlight  
**Page Label:** 4  
**Author:** CDurham  
**Date:** 4/3/2023 9:04:46 AM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

cfs). Runoff fr  
with interim c  
 $Q_{100}=25.8$  to tl  
filing 7 impro  
Claremont Ran

**Subject:** Highlight  
**Page Label:** 4  
**Author:** CDurham  
**Date:** 4/3/2023 9:04:48 AM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

$Q_{100}=25.8$



**Subject:** Highlight  
**Page Label:** 83  
**Author:** CDurham  
**Date:** 4/3/2023 9:36:39 AM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

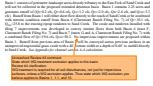
area in a private street system. A concrete tunnel was no conveyance (EOR). A summary of peak developed runoff for the basin and Developed Drainage Plan is in the appendix.

an landscape area directly tributary to the East Fork of Sand Creek proposed residential development. Basin 1 contains 2.25 ac 2 cfs, Q<sub>10</sub>=0.8 cfs, Q<sub>5</sub>=1.2 cfs, Q<sub>2</sub>=2.0 cfs, Q<sub>1</sub>=2.8 cfs, and Q<sub>0</sub> will discharge flow directly to the east of Sand Creek to be conveyed from Basin 6 (Claremont Ranch Filing No. 7) at Q=10 (per easement to Sand Creek). The creek and treatment facilities are developed to convey storm flows from both Basin 6 (1.5 ac, Q<sub>10</sub>=2.0 cfs, Q<sub>5</sub>=3.0 cfs, Q<sub>2</sub>=4.0 cfs, Q<sub>1</sub>=5.0 cfs, Q<sub>0</sub>=6.0 cfs) and Basin 7 (1.5 ac, Q<sub>10</sub>=2.0 cfs, Q<sub>5</sub>=3.0 cfs, Q<sub>2</sub>=4.0 cfs, Q<sub>1</sub>=5.0 cfs, Q<sub>0</sub>=6.0 cfs). The impervious improvements are proposed from area of Basin 1 will be conveyed across previous surface area with all basins within a depth of 0.40' as outlined for channel section 3-1-1 calculation.

**Subject:** Highlight  
**Page Label:** 4  
**Author:** CDurham  
**Date:** 4/3/2023 9:39:26 AM  
**Status:**  
**Color:**    
**Layer:**  
**Space:**

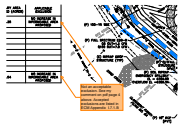
Basin 6 (Claremont Ranch Filing No. 7)

#000000 (2)



**Subject:** SW - Textbox with Arrow  
**Page Label:** 4  
**Author:** Glenn Reese - EPC Stormwater  
**Date:** 3/29/2023 3:27:24 PM  
**Status:**  
**Color:**    
**Layer:**  
**Space:**

Unresolved Review #3 comment:  
State which WQ treatment exclusion applies to this basin.  
Review #4 clarification:  
WQ treatment is required for all soil disturbances, not just for impervious surfaces, unless a WQ exclusion applies. Thus state which WQ exclusion you believe applies to Basins 1, 1.1, and 10.



**Subject:** SW - Textbox with Arrow  
**Page Label:** 83  
**Author:** Glenn Reese - EPC Stormwater  
**Date:** 3/29/2023 3:34:23 PM  
**Status:**  
**Color:**    
**Layer:**  
**Space:**

Not an acceptable exclusion. See my comment on pdf page 4 above. Accepted exclusions are listed in ECM Appendix I.7.1.B

#0000FF (7)

and outfall in an 18" RCP at 0.50% to Type R inlet. Combined flows from 1 % to the manhole at DP-B (Q=6.8 cfs, UNRESOLVED: 10' per inlet spreadsheet

**Subject:** Callout  
**Page Label:** 7  
**Author:** dsdrice  
**Date:** 3/31/2023 4:09:02 PM  
**Status:**  
**Color:**    
**Layer:**  
**Space:**

UNRESOLVED: 10' per inlet spreadsheet

Sub-Basin 1.1 (0.76 Acres, Q=0. Qu=2.1 cfs) will be collected into the Rose Spits to Design Point 1 combined with offsite storm flow of Q=10.6 cfs, Q<sub>5</sub>=27.9 cfs and Creek. No impervious improvement

**Subject:** Callout  
**Page Label:** 5  
**Author:** CDurham  
**Date:** 4/3/2023 9:05:43 AM  
**Status:**  
**Color:**    
**Layer:**  
**Space:**

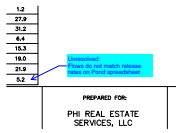
Unresolved:  
Per previous paragraph flows from Basin 6 Filing 7 are 10.1 & 25.8 cfs.

Unresolved: This sheet appears to be a duplicate. Please delete



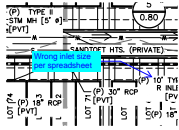
**Subject:** Text Box  
**Page Label:** 77  
**Author:** CDurham  
**Date:** 4/3/2023 9:27:43 AM  
**Status:**  
**Color:**    
**Layer:**  
**Space:**

Unresolved:  
This sheet appears to be a duplicate. Please delete



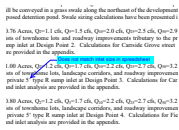
**Subject:** Callout  
**Page Label:** 83  
**Author:** CDurham  
**Date:** 4/3/2023 9:33:47 AM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Unresolved:  
 Flows do not match release rates on Pond spreadsheet



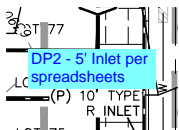
**Subject:** Callout  
**Page Label:** 83  
**Author:** CDurham  
**Date:** 4/3/2023 9:37:40 AM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Wrong inlet size per spreadsheet



**Subject:** Callout  
**Page Label:** 5  
**Author:** CDurham  
**Date:** 4/3/2023 9:40:47 AM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

Does not match inlet size in spreadsheet



**Subject:** Text Box  
**Page Label:** 83  
**Author:** CDurham  
**Date:** 4/3/2023 9:45:19 AM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

DP2 - 5' Inlet per spreadsheets

#00FFFF (1)

0" RCP st  
 the 5' Ty  
 veved in s

**Subject:**  
**Page Label:** 7  
**Author:** dsdrice  
**Date:** 3/31/2023 4:08:30 PM  
**Status:**  
**Color:** ■  
**Layer:**  
**Space:**

5'