

INNOVATIVE DESIGN. CLASSIC RESULTS.

PRELIMINARY/FINAL DRAINAGE REPORT FOR REDTAIL RANCH FILING 1

ADDENDUM NO. 1 APRIL 2020

Prepared for: MICHAEL S. LUDWIG 4255 ARROWHEAD DRIVE COLORADO SPRINGS, CO 80908

Prepared by: CLASSIC CONSULTING 619 N. CASCADE AVE., SUITE 200 COLORADO SPRINGS, CO 80903 (719) 785-0790

Job no. 2525.00

PCD Project No. SP-18-004/SF-18-021



619 N. Cascade Ave, Suite 200 | Colorado Springs, CO 80903 | (719) 785-0790

PRELIMINARY/FINAL DRAINAGE REPORT FOR REDTAIL RANCH FILING NO. 1 (Addendum No. 1)

27:01

DESIGN ENGINEER'S STATEMENT:

EUir

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

	37155 2	
Marc A.	Whorton, Colorado 8:E, #37155	
	MANARA CONVAL LINING	

6/8/2020 Date

OWNERS/DEVELOPER'S STATEMENT:

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

Name:

chael 5. Luuwig	
LIC.	
(m) (2.7)	11
Duna / lava	La F

Title:

Address:

4255 Arrowhead Drive

Colorado Springs, CO 80908

EL PASO COUNTY:

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

Jennifer Irvine, P.E. County Engineer / ECM Administrator

Conditions:



By: Elizabeth Nijkamp Date:06/15/2020



El Paso County Planning & Community Development



PRELIMINARY/FINAL DRAINAGE REPORT FOR REDTAIL RANCH FILING NO. 1 (Addendum No. 1)

TABLE OF CONTENTS:

PURPOSE	Page	1
DEVELOPED DRAINAGE CONDITIONS	Page	1
HYDROLOGIC CALCULATIONS	Page	2
FLOODPLAIN STATEMENT	Page	4
DRAINAGE/BRIDGE FEES	Page	4
SUMMARY	Page	4
REFERENCES	Page	5

APPENDICES

VICINITY MAP EDB FACILITY CALCULATIONS / DESIGN DETAILS DRAINAGE MAP



PURPOSE

This document is Addendum No. 1 of Preliminary/Final Drainage Report for Redtail Ranch Filing No. 1. The purpose of this addendum is to revise the two stormwater quality facilities from Sand Filter Basins to Extended Detention Basins. All hydrology, pond sizing and locations remain the same as previously approved. (Reference Preliminary/Final Drainage Report Redtail Ranch Filing No. 1)

DEVELOPED DRAINAGE CONDITIONS (KETTLE CREEK BASIN)

Design Point D4 ($Q_5 = 7 \text{ cfs}$ and $Q_{100} = 28 \text{ cfs}$) consists of developed flows from Basins D, F and Design Point D3 and represents the total inflow to Pond 1. Prior to the developed flows entering Pond 1, pretreatment by permanent rock check dams will be provided. At this location, the existing stock pond is proposed to be replaced with a formal BMP as described below:

Pond 1 (Extended Detention Basin) has the following design parameters as a full-spectrum facility:

(See UD-Detention in Appendix)

Facility sized to release pre-development acreage of 14.8 ac. (Basin EX-3)				
0.113 Acft. WQCV required				
0.097 Acft. EURV required				
0.097 Acft. EURV design with 4:1 max. slopes				
0.448 Acft. 100-yr. storage				
Total In-flow:	$Q_5 = 7 \text{ cfs}, Q_{100} = 28 \text{ cfs}$			
Pond Design Release:	$Q_5 = 0.05 \text{ cfs}, \ Q_{100} = 13.8 \text{ cfs}$			
Pre-development Release:	Q ₅ = 0.30 cfs, Q ₁₀₀ = 17.6 cfs			

This facility will be constructed within a drainage easement with ownership and maintenance by the HOA for the subdivision. The O&M Plan for this project will further specify maintenance responsibilities for this facility.



DEVELOPED DRAINAGE CONDITIONS (UPPER BLACK SQUIRREL BASIN)

Design Point D7 ($Q_5 = 10$ cfs and $Q_{100} = 46$ cfs) consists of developed flows from Basins OS-4, H and Design Point D6 and represents the total inflow to Pond 2. Prior to the developed flows entering Pond 2, pretreatment by permanent rock check dams will be provided. At this location, the existing stock pond is proposed to be replaced with a formal BMP as described below:

Pond 2 (Extended Detention Basin) has the following design parameters as a full-spectrum facility:

(See UD-Detention in Appendix)

0.153 Ac.-ft. WQCV required0.101 Ac.-ft. EURV required0.254 Ac.-ft. EURV design with 4:1 max. slopes0.78 Ac.-ft. 100-yr. storageTotal In-flow: $Q_5 = 10 \text{ cfs}, \quad Q_{100} = 46 \text{ cfs}$ Pond Design Release: $Q_5 = 0.10 \text{ cfs}, \quad Q_{100} = 20.7 \text{ cfs}$ Pre-development Release: $Q_5 = 0.49 \text{ cfs}, \quad Q_{100} = 29.9 \text{ cfs}$

This facility will be constructed within a drainage easement with ownership and maintenance by the HOA for the subdivision. The O&M Plan for this project will further specify maintenance responsibilities for this facility.

HYDROLOGIC CALCULATIONS

Hydrologic calculations were performed using the City of Colorado Springs/El Paso County Drainage Criteria Manual, as revised in November 1991 and 1994 with County adopted Chapter 6 and Section 3.2.1 of Chapter 13 of the City of Colorado Springs/El Paso County Drainage Criteria Manual as revised in May 2014. Individual on-site developed basin design used for culvert sizing and system routing was calculated using the Rational Method. BMP design was calculated using the UD-Detention (Version 3.07) spreadsheet developed by the Urban Drainage and Flood Control District.



The City of Colorado Springs/El Paso County DCM requires the Four Step Process for receiving water protection that focuses on reducing runoff volumes, treating the water quality capture volume (WQCV), stabilizing drainage ways, and implementing long-term source controls. The Four Step Process pertains to management of smaller, frequently occurring storm events, as opposed to larger storms for which drainage and flood control infrastructure are sized. Implementation of these four steps helps to achieve storm water permit requirements. This site adheres to this **Four Step Process** as follows:

- Employ Runoff Reduction Practices: Development of project site is proposed large lot single family residential (5.0 ac. min.) with homes and associated landscaping. Proposed impervious areas (roof tops, patios) will sheet flow across landscaped ground and through large open areas within the lots across natural vegetation to slow runoff and increase time of concentration prior to being conveyed to the proposed public roads and adjacent properties. This will minimize directly connected impervious areas within the project site.
- 2. Stabilize Drainageways: This site will utilize roadside ditches with culvert crossings throughout the site. These facilities will then direct the on-site development flows to the multiple BMPs, designed to release at or below historic rates into the Kettle Creek and Upper Black Squirrel drainage basins. Based upon the proposed reduction in released flows compared to the predeveloped flows, no impact to downstream drainageways is anticipated.
- 3. **Provide Water Quality Capture Volume (WQCV):** Runoff from the impervious road areas of this development will be treated through capture and slow release of the WQCV in two permanent Extended Detention Basins designed per current El Paso County drainage criteria.
- 4. Consider need for Industrial and Commercial BMPs: No industrial or commercial uses are proposed within this development. However, a site specific storm water quality and erosion control plan and narrative is being submitted concurrently with this report and development. Details such as site specific construction BMP's as well as permanent sediment control BMP's are detailed in this plan and narrative to protect receiving waters. Roadside ditch stabilization,



in the form of erosion control blanketing, turf reinforcement matting and permanent rock check dams (as specified on the plans) are also proposed. (See appendix for calculations) The described BMP's will be constructed and maintained by the developer upon approval by El Paso County Staff.

FLOODPLAIN STATEMENT

No portion of this site is located within a FEMA floodplain as determined by the Flood Insurance Rate Maps (F.I.R.M.) Map Numbers 08041C 0320G, with effective date of December 7, 2018 (See Appendix).

DRAINAGE & BRIDGE FEES

All fees previously paid prior to plat recordation in December 2019.

SUMMARY

This proposed development remains consistent with pre-development drainage conditions with the construction of the proposed on-site Extended Detention Basins. These proposed facilities meet current criteria and provide full spectrum design. The proposed development will not adversely impact surrounding developments.

PREPARED BY: Classic Consulting Engineers & Surveyors, LLC

Marc A. Whorton, P.E. Project Manager

mw/252500/Reports/FDR Addendum 1.doc



REFERENCES

- 1. City of Colorado Springs/County of El Paso Drainage Criteria Manual, as revised in November 1991 and 1994 with County adopted Chapter 6 and Section 3.2.1 of Chapter 13 of the City of Colorado Springs/El Paso County Drainage Criteria Manual as revised in May 2014.
- 2. Soil Survey of El Paso County Area, Colorado Soil Conservation Service, June 1981.
- 3. "Preliminary/Final Drainage Report for Walker Place Subdivision", by ADP, Inc., approved January 2010.
- 4. "Preliminary/Final Drainage Report for Redtail Ranch Filing No. 1", by Classic Consulting, approved December 2019.



APPENDIX



VICINITY MAP





BMP FACILITY DESIGN CALCULATIONS



Design Procedure Form: Extended Detention Basin (EDB)				
UD Designer: Marc A. Whorton, P.E. Company: Classic Consulting Date: April 28, 2020 Project: Redtail Ranch Filing No. 1 (Pond 1) Location: Black Forest, CO	-BMP (Version 3.06, November 2016) Sheet 1 of 4			
1. Basin Storage Volume A) Effective Imperviousness of Tributary Area. Ia	l₀= 14.6 %			
B) Tributary Area's Imperviousness Ratio (i = $I_a/100$)	i = 0.146			
C) Contributing Watershed Area	Area = <u>14.800</u> ac			
D) For Watersheds Outside of the Denver Region, Depth of Average Runoff Producing Storm	d ₆ = in			
 E) Design Concept (Select EURV when also designing for flood control) 	Choose One O Water Quality Capture Volume (WQCV) © Excess Urban Runoff Volume (EURV)			
F) Design Volume (WQCV) Based on 40-hour Drain Time (V _{DESIGN} = (1.0 * (0.91 * i ³ - 1.19 * i ² + 0.78 * i) / 12 * Area)	V _{DESIGN} = 0.113 ac-ft			
G) For Watersheds Outside of the Denver Region, Water Quality Capture Volume (WQCV) Design Volume (V _{WQCV OTHER} = (d _e [*] (V _{DESIGN} /0.43))	V _{DESIGN OTHER} = 0.110 ac-ft			
 H) User Input of Water Quality Capture Volume (WQCV) Design Volume (Only if a different WQCV Design Volume is desired) 	V _{DESIGN USER} = ac-ft			
I) Predominant Watershed NRCS Soil Group	Choose One C A B C / D			
J) Excess Urban Runoff Volume (EURV) Design Volume For HSG A: EURV _A = 1.68 * i ^{1.28} For HSG B: EURV _B = 1.36 * i ^{1.08} For HSG C/D: EURV _{C/D} = 1.20 * i ^{1.08}	EURV = ac-f t			
 Basin Shape: Length to Width Ratio (A basin length to width ratio of at least 2:1 will improve TSS reduction.) 	L : W =: 1			
3. Basin Side Slopes				
 A) Basin Maximum Side Slopes (Horizontal distance per unit vertical, 4:1 or flatter preferred) 	Z = ft / ft			
4. Inlet				
 A) Describe means of providing energy dissipation at concentrated inflow locations: 				

Design Procedure Form: Extended Detention Basin (EDB) Sheet 2 of 4 Marc A. Whorton, P.E. Designer: **Classic Consulting** Company: April 28, 2020 Date: Redtail Ranch Filing No. 1 (Pond 1) Project: Black Forest, CO Location: 5. Forebay A) Minimum Forebay Volume V_{FMIN} = 0.002 ac-ft $(V_{FMIN} = 2\%)$ of the WQCV) B) Actual Forebay Volume V_F = 0.002 ac-ft C) Forebay Depth 18 ____ inch maximum) D_F = <u>12.0</u> in (D_F = D) Forebay Discharge i) Undetained 100-year Peak Discharge Q₁₀₀ = _____ cfs Q_F = 0.56 cfs ii) Forebay Discharge Design Flow $(Q_F = 0.02 * Q_{100})$ E) Forebay Discharge Design Choose One O Berm With Pipe (flow too small for berm w/ pipe) Wall with Rect. Notch O Wall with V-Notch Weir Calculated D_P = _____ in F) Discharge Pipe Size (minimum 8-inches) Calculated W_N = 4.4 in G) Rectangular Notch Width Choose One 6. Trickle Channel Concrete A) Type of Trickle Channel O Soft Bottom F) Slope of Trickle Channel S = 0.0100 ft / ft 7. Micropool and Outlet Structure A) Depth of Micropool (2.5-feet minimum) D_M = ______ ft A_M = _____ 40 ____ sq ft B) Surface Area of Micropool (10 ft² minimum) C) Outlet Type Choose One Orifice Plate O Other (Describe): D) Smallest Dimension of Orifice Opening Based on Hydrograph Routing (Use UD-Detention) D_{orifice} = 0.67 inches E) Total Outlet Area A_{ot} = 1.16 square inches

	Design Procedure Form: Extended Detention Basin (EDB)			
Designer: Marc Company: Class Date: April Project: Redta Location: Black	A. Whorton, P.E. ic Consulting 28, 2020 ail Ranch Filing No. 1 (Pond 1) Forest, CO			Sheet 3 of 4
8. Initial Surcharge Volume	9			
A) Depth of Initial Surch (Minimum recommen	narge Volume nded depth is 4 inches)	D _{IS} =6	in	
B) Minimum Initial Surch (Minimum volume of (narge Volume 0.3% of the WQCV)	V _{IS} =	cu ft	
C) Initial Surcharge Prov	vided Above Micropool	V _s = <u>20</u> .	0 cu ft	
9. Trash Rack				
A) Water Quality Scree	n Open Area: A _t = A _{ot} * 38.5*(e ^{-0.095D})	A _t =42	square inches	
B) Type of Screen (If sp in the USDCM, indicate total screen are for the r	ecifying an alternative to the materials recommended "other" and enter the ratio of the total open are to the material specified.)	S.S. Well Scr	een with 60% Open Area	
	Other (Y/N): N			
C) Ratio of Total Open A	Area to Total Area (only for type 'Other')	User Ratio =		
D) Total Water Quality S	Screen Area (based on screen type)	A _{total} = 70) sq. in.	
E) Depth of Design Volu (Based on design co	ime (EURV or WQCV) ncept chosen under 1E)	H= <u>3</u>	feet	
F) Height of Water Qual	lity Screen (H _{TR})	H _{TR} = 64	inches	
G) Width of Water Quali (Minimum of 12 inche	ity Screen Opening (W _{opening}) es is recommended)	W _{opening} = <u>12</u> .	0 inches	

	Design Procedure Form	: Extended Detention Basin (EDB)
Designer: Company: Date: Project: Location:	Marc A. Whorton, P.E. Classic Consulting April 28, 2020 Redtail Ranch Filing No. 1 (Pond 1) Black Forest, CO	Sheet 4 of
 Overflow Emba A) Describe e B) Slope of O (Horizonta) 	ankment mbankment protection for 100-year and greater overtopping: verflow Embankment l distance per unit vertical, 4:1 or flatter preferred)	
11. Vegetation		○ Irrigated ● Not Irrigated
12. Access A) Describe S	ediment Removal Procedures	
Notes:		

Design Procedure Form: Extended Detention Basin (EDB)					
	UD-BM	P (Version 3.06, November 2016)	Sheet 1 of 4		
Designer:	Marc A. Whorton, P.E.				
Company:	Classic Consulting				
Date:	April 30, 2020				
Project: Redtail Ranch Filing No. 1 (Pond 2)					
Location:	Black Forest, CO				
1. Basin Storage ^v	Volume				
A) Effective Imp	perviousness of Tributary Area, I _a	l _a = <u>9.5</u> %			
B) Tributary Are	ea's Imperviousness Ratio (i = $I_a/100$)	i =0.095			
C) Contributing	y Watershed Area	Area = <u>28.600</u> ac			
D) For Waters Runoff Proc	heds Outside of the Denver Region, Depth of Average ducing Storm	d ₆ = <u>0.42</u> in			
E) Design Con	cent	Choose One			
(Select EUR	RV when also designing for flood control)	 Water Quality Capture Volume (WQCV) 			
		Excess Urban Runoff Volume (EURV)			
F) Design Volu (V _{DESIGN} = (ıme (WQCV) Based on 40-hour Drain Time (1.0 * (0.91 * i ³ - 1.19 * i ² + 0.78 * i) / 12 * Area)	V _{DESIGN} = <u>0.153</u> ac-ft			
G) For Waters Water Qual (V _{WQCV OTHE}	heds Outside of the Denver Region, lity Capture Volume (WQCV) Design Volume $_{ER} = (d_6^*(V_{DESIGN}/0.43))$	V _{DESIGN OTHER} = 0.149 ac-ft			
H) User Input o (Only if a di	of Water Quality Capture Volume (WQCV) Design Volume fferent WQCV Design Volume is desired)	V _{DESIGN USER} = ac-ft			
I) Predominant	Watershed NRCS Soil Group	Choose One O A B O C / D			
J) Excess Urba For HSG A For HSG B	an Runoff Volume (EURV) Design Volume $\therefore EURV_A = 1.66 * i^{1.28}$ $\therefore EURV_n = 1.36 * i^{1.08}$	EURV = <u>0.255</u> ac-f t			
For HSG C	$C/D: EURV_{C/D} = 1.20 * i^{1.08}$				
2. Basin Shape: L (A basin length	ength to Width Ratio to width ratio of at least 2:1 will improve TSS reduction.)	L : W = <u>2.0</u> : 1			
3. Basin Side Slop	Des				
A) Basin Maxir (Horizontal	num Side Slopes distance per unit vertical, 4:1 or flatter preferred)	Z = ft / ft			
4. Inlet		Rip-Rap Dissipator into concrete forebay			
A) Describe m	eans of providing energy dissipation at concentrated				
, inflow locat	ions:				
l					

Design Procedure Form: Extended Detention Basin (EDB) Sheet 2 of 4 Marc A. Whorton, P.E. Designer: **Classic Consulting** Company: April 30, 2020 Date: Redtail Ranch Filing No. 1 (Pond 2) Project: Black Forest, CO Location: 5. Forebay A) Minimum Forebay Volume V_{FMIN} = 0.003 ac-ft $(V_{FMIN} = 2\%)$ of the WQCV) B) Actual Forebay Volume V_F = 0.003 ac-ft C) Forebay Depth 18 ____ inch maximum) D_F = <u>12.0</u> in (D_F = D) Forebay Discharge i) Undetained 100-year Peak Discharge Q₁₀₀ = _____ 46.00 cfs Q_F = 0.92 cfs ii) Forebay Discharge Design Flow $(Q_F = 0.02 * Q_{100})$ E) Forebay Discharge Design Choose One O Berm With Pipe (flow too small for berm w/ pipe) Wall with Rect. Notch O Wall with V-Notch Weir Calculated D_P = _____ in F) Discharge Pipe Size (minimum 8-inches) Calculated W_N = 5.7 in G) Rectangular Notch Width Choose One 6. Trickle Channel Concrete A) Type of Trickle Channel O Soft Bottom F) Slope of Trickle Channel S = 0.0100 ft / ft 7. Micropool and Outlet Structure A) Depth of Micropool (2.5-feet minimum) D_M = ______ ft A_M = _____ 60 ____ sq ft B) Surface Area of Micropool (10 ft² minimum) C) Outlet Type Choose One Orifice Plate O Other (Describe): D) Smallest Dimension of Orifice Opening Based on Hydrograph Routing (Use UD-Detention) D_{orifice} = 0.94 inches E) Total Outlet Area A_{ot} = 2.66 square inches

	Design Procedure Form: Extended Detention Basin (EDB)			
Designer: Marc A. Whorte Company: Classic Consul Date: April 30, 2020 Project: Redtail Ranch Location: Black Forest, C	on, P.E. Iting Filing No. 1 (Pond 2) CO			Sheet 3 of 4
8. Initial Surcharge Volume				
 A) Depth of Initial Surcharge Volu (Minimum recommended depth) 	ime i is 4 inches)	D _{IS} =	<u>6</u> in	
B) Minimum Initial Surcharge Volu (Minimum volume of 0.3% of the	me e WQCV)	V _{IS} =	cu ft	
C) Initial Surcharge Provided Abov	ve Micropool	V _s =	30.0 cu ft	
9. Trash Rack				
A) Water Quality Screen Open Ar	rea: A _t = A _{ct} * 38.5*(e ^{-0.095D})	A _t =	94 square inches	
B) Type of Screen (If specifying ar in the USDCM, indicate "other" an total screen are for the material sp	n alternative to the materials recommended d enter the ratio of the total open are to the secified.)	S.S. Well	Screen with 60% Open Area	_
Othe	r (Y/N): N			-
C) Ratio of Total Open Area to To	tal Area (only for type 'Other')	User Ratio =		
D) Total Water Quality Screen Are	ea (based on screen type)	A _{total} =	156 sq. in.	
E) Depth of Design Volume (EUR) (Based on design concept cho	V or WQCV) sen under 1E)	H=	<u>3</u> feet	
F) Height of Water Quality Screen	(H _{TR})	H _{TR} =	64 inches	
G) Width of Water Quality Screen (Minimum of 12 inches is recor	Opening (W _{opening}) nmended)	W _{opening} =	12.0 inches	

	Design Procedure Form	n: Extended Detention Basin (EDB)	
Designer: Company: Date: Project: Location:	Marc A. Whorton, P.E. Classic Consulting April 30, 2020 Redtail Ranch Filing No. 1 (Pond 2) Black Forest, CO		Sheet 4 of 4
 Overflow Emb A) Describe e B) Slope of O (Horizonta 11. Vegetation 	ankment embankment protection for 100-year and greater overtopping: everflow Embankment Il distance per unit vertical, 4:1 or flatter preferred)	Choose One O Irrigated () Not Irrigated	
12. Access A) Describe S Notes:	Sediment Removal Procedures		

Description

An extended detention basin (EDB) is a sedimentation basin designed to detain stormwater for many hours after storm runoff ends. This BMP is similar to a detention basin used for flood control. however: the EDB uses a much smaller outlet that extends the emptying time of the more frequently occurring runoff events to facilitate pollutant removal. The EDB's 40-hour drain time for the water quality capture volume (WQCV) is recommended to remove a significant portion of total suspended solids (TSS). Soluble pollutant removal is enhanced by providing a small wetland marsh or "micropool" at the outlet to promote biological uptake. The basins are sometimes called "dry ponds" because



Photograph EDB-1: This EDB includes a concrete trickle channel and a micropool with a concrete bottom and grouted boulder sideslopes. The vegetation growing in the sediment of the micropool adds to the natural look of this facility and ties into the surrounding landscape.

they are designed not to have a significant permanent pool of water remaining between storm runoff events.

Site Selection

EDBs are well suited for watersheds with at least five impervious acres up to approximately one square mile of watershed. Smaller watersheds can result in an orifice size prone to clogging. Larger watersheds and watersheds with baseflows can complicate the design and reduce the level of treatment provided. EDBs are also well suited where flood detention is incorporated into the same basin. The depth of groundwater should be investigated. Groundwater depth should be 2 or more feet below the bottom of the basin in order to keep this area dry and maintainable.

n Basin				
Somewhat				
Yes				
Yes				
Yes				
Typical Effectiveness for Targeted Pollutants ³				
Good				
Moderate				
Moderate				
Poor				
Moderate				
 ³ Based primarily on data from the International Stormwater BMP Database (www.bmpdatabase.org). ⁴ Based primarily on BMP-REALCOST available at www.udfcd.org. Analysis based on a single installation (not based on the maximum recommended watershed tributery to each BMD) 				

Designing for Maintenance

Recommended maintenance practices for all BMPs are provided in the BMP Maintenance chapter of this manual. During design, the following should be considered to ensure ease of maintenance over the long-term:

- Always provide a micropool (see step 7).
- Provide a design slope of at least 3% in the vegetated bottom of the basin (either toward the trickle channel or toward the micropool). This will help maintain the appearance of the turf grass in the bottom of the basin and reduce the possibility of saturated areas that may produce unwanted species of vegetation and mosquito breeding conditions. Verify slopes during construction, prior to vegetation.
- Follow trash rack sizing recommendations to determine the minimum area for the trash rack (see design step 9).
- Provide adequate initial surcharge volume for frequent inundation (see design step 3).
- Provide stabilized access to the forebay, outlet, spillway, and micropool for maintenance purposes.
- Provide access to the well screen. The well screen requires maintenance more often than any other EDB component. Ensure that the screen can be reached from a point outside of the micropool. When the well screen is located inside the outlet structure, provide an access port

Benefits

- The relatively simple design can make EDBs less expensive to construct than other BMPs, especially for larger basins.
- Maintenance requirements are straightforward.
- The facility can be designed for multiple uses.

Limitations

- Ponding time and depths may generate safety concerns.
- Best suited for tributary areas of 5 impervious acres or more. EDBs are not recommended for sites less than 2 impervious acres.
- Although ponds do not require more total area compared to other BMPs, they typically require a relatively large continuous area.

within the trash rack or use a sloped trash rack that consists of bearing bars (not horizontal) that create openings no more than five inches clear.

- Provide a hard-bottom forebay that allows for removal of sediment.
- Where baseflows are anticipated, consider providing a flow-measuring device (e.g. weir or flume with staff gage and rating curve) at the forebay to assist with future modifications of the water quality plate. Typically, the baseflow will increase as the watershed develops. It is important that the water quality plate continue to function, passing the baseflow while draining the WQCV over approximately 40 hours. Measuring the actual baseflow can be helpful in determining if and when the orifice place should be replaced.

EDBs providing combined water quality and flood control functions can serve multiple uses such as playing fields or picnic areas. These uses are best located at higher elevation within the basin, above the WQCV pool level.

Design Procedure and Criteria

The following steps outline the design procedure and criteria for an EDB and Figure EDB-3 shows a typical configuration. UD-BMP, available at <u>www.udfcd.org</u>, is an Excel based workbook that can be used to perform some of the below calculations and ensure conformance to these criteria. UD-Detention, another workbook developed by UDFCD can be used to develop and route a storm hydrograph through an EDB and design the outlet structure.

- 1. **Basin Storage Volume**: Provide a design volume equal to the WQCV or the EURV. This volume begins at the lowest orifice in the outlet structure.
 - Determine the imperviousness of the watershed (or effective imperviousness where LID elements are used upstream).
 - Find the required storage volume. Determine the required WQCV or EURV (watershed inches of runoff) using Figure 3-2 located in Chapter 3 of this manual (for WQCV) or equations provided in the *Storage* chapter of Volume 2 (for EURV).
 - Calculate the design volume as follows:

For WQCV:
$$V = \left[\frac{WQCV}{12}\right]A$$
Equation EDB-1For EURV:
 $V = \left[\frac{EURV}{12}\right]A$ Equation EDB-2

Where:

V = design volume (acre ft)

- *A* = watershed area tributary to the extended detention basin (acres)
- 2. **Basin Shape**: Always maximize the distance between the inlet and the outlet. It is best to have a basin length (measured along the flow path from inlet to outlet) to width ratio of at least 2:1. A longer flow path from inlet to outlet will minimize short circuiting and improve reduction of TSS. To achieve this ratio, it may be necessary to modify the inlet and outlet points through the use of pipes or swales.
- 3. **Basin Side Slopes**: Basin side slopes should be stable and gentle to facilitate maintenance and access. Slopes that are 4:1or flatter should be used to allow for conventional maintenance equipment and for improved safety, maintenance, and aesthetics. Side slopes should be no steeper than 3:1. The use of walls is highly discouraged due to maintenance constraints.
- 4. **Inlet**: Dissipate flow energy at concentrated points of inflow. This will limit erosion and promote particle sedimentation. Inlets should be designed in accordance with UDFCD drop structure criteria for inlets above the invert of the forebay, impact basin outlet details for at grade inlets, or other types of energy dissipating structures.

5. **Forebay Design**: The forebay provides an opportunity for larger particles to settle out in an area that can be easily maintained. The length of the flow path through the forebay should be maximized, and the slope minimized to encourage settling. The appropriate size of the forebay may be as much a function of the level of development in the tributary area as it is a percentage of the WQCV. When portions of the watershed may remain disturbed for an extended period of time, the forebay size will need to be increased due to the potentially high sediment load. Refer to Table EDB-4 for a design criteria summary. When using this table, the designer should consider increasing the size of the forebay if the watershed is not fully developed.

The forebay outlet should be sized to release 2% of the undetained peak 100-year discharge. A soil riprap berm with 3:1 sideslopes (or flatter) and a pipe outlet or a concrete wall with a notch outlet should be constructed between the forebay and the main EDB. It is recommended that the berm/pipe configuration be reserved for watersheds in excess of 20 impervious acres to accommodate the minimum recommended pipe diameter of 8 inches. When using the berm/pipe configuration, round up to the nearest standard pipe size and use a minimum diameter of 8 inches. The floor of the forebay should be concrete or lined with grouted boulders to define sediment removal limits. With either configuration, soil riprap should also be provided on the downstream side of the forebay berm or wall if the downstream grade is lower than the top of the berm or wall. The forebay will overtop frequently so this protection is necessary for erosion control. All soil riprap in the area of the forebay should be seeded and erosion control fabric should be placed to retain the seed in this high flow area.

- 6. **Trickle Channel:** Convey low flows from the forebay to the micropool with a trickle channel. The trickle channel should have a minimum flow capacity equal to the maximum release from the forebay outlet.
 - Concrete Trickle Channels: A concrete trickle channel will help to establish the bottom of the basin long-term and may also facilitate regular sediment removal. It can be a "V" shaped concrete drain pan or a concrete channel with curbs. A flat-bottom channel facilitates maintenance. A slope between 0.4% 1% is recommended to encourage settling while reducing the potential for low points within the pan.
 - Soft-bottom Trickle Channels: When designed and maintained properly, soft-bottom trickle channels can allow for an attractive alternative to concrete. They can also improve water quality. However, they are not appropriate for all sites. Be aware, maintenance of soft bottom trickle channels requires mechanical removal of sediment and vegetation. Additionally, this option provides mosquito habitat. For this reason, UDFCD recommends that they be considered on a case-by-case basis and with the approval of the local jurisdiction. It is recommended that soft bottom trickle channels be designed with a consistent longitudinal slope from forebay to micropool and that they not meander. This geometry will allow for reconstruction of the original design when sediment removal in the trickle channel is not desired. The recommended minimum depth of a soft bottom trickle channel is 1.5 feet. This depth will help limit potential wetland growth to the trickle channel, preserving the bottom of the basin.

Riprap and soil riprap lined trickle channels are not recommended due to past maintenance experiences, where the riprap was inadvertently removed along with the sediment during maintenance.

7. **Micropool and Outlet Structure**: Locate the outlet structure in the embankment of the EDB and provide a permanent micropool directly in front of the structure. Submerge the well screen to the bottom of the micropool. This will reduce clogging of the well screen because it allows water to flow though the well screen below the elevation of the lowest orifice even when the screen above the water surface is plugged. This will prevent shallow ponding in front of the structure, which provides a breeding ground for mosquitoes (large shallow puddles tend to produce more mosquitoes than a smaller, deeper permanent pond).

Micropool side slopes may be vertical walls or stabilized slopes of 3:1 (horizontal:vertical). For watersheds with less than 5 impervious acres, the micropool can be located inside the outlet structure (refer to Figures OS-7 and OS-8 provided in Fact Sheet T-12). The micropool should be at least 2.5 feet in depth with a minimum surface area of 10 square feet. The bottom should be concrete unless a baseflow is present or anticipated or if groundwater is anticipated. Riprap is not recommended because it complicates maintenance operations. Basins with micropools have fewer mosquitoes. Micropools reduce shallow wet areas where breeding is most favorable.

Where possible, place the outlet in an inconspicuous

location as shown in Photo EDB-3. This urban EDB utilizes landscaped parking lot islands connected by a series of culverts (shown in Photo EDB-4) to provide the required water quality and flood control volumes.

The outlet should be designed to release the WQCV over a 40-hour period. Draining a volume of water over a specified time can be done through an orifice plate as detailed in Fact Sheet T-12. Use reservoir routing calculations as discussed in the *Storage* Chapter of Volume 2 to assist in the design. Two workbooks tools have been developed by UDFCD for this purpose, UD-FSD and UD-Detention. Both are available at <u>www.udfcd.org</u>. UD-FSD is recommended for a typical EDB full spectrum detention design. UD-Detention uses the same methodology and can be used for a full spectrum detention basin or a WQCV only design. It also allows for a wider range of outlet controls should the user want to specify something beyond what is shown in Fact Sheet T-12.

Refer to BMP Fact Sheet T-12 for schematics pertaining to structure geometry, grates, trash racks, orifice plate, and all other necessary components.

The outlet may have flared or parallel wing walls as shown in Figures EDB-1 and EDB-2, respectively. Either configuration should be recessed into the embankment to minimize its profile. Additionally, the trash rack should be sloped with the basin side-slopes.

8. **Initial Surcharge Volume**: Providing a surcharge volume above the micropool for frequently occurring runoff minimizes standing water and sediment deposition in the remainder of the basin. This is critical to turf maintenance and mosquito abatement in the basin bottom. The initial surcharge volume is not provided in the micropool nor does it include the micropool volume. It is the available storage volume that begins at the water surface elevation of the micropool and extends upward to a grade break within the basin (typically the invert of the trickle channel).



Photograph EDB-2. The initial surcharge volume of this EDB is contained within the boulders that surround the micropool.



Photograph EDB-3. Although walls may complicate maintenance access, this outlet structure is relatively hidden from public view. This photo was taken shortly following a storm event.

The area of the initial surcharge volume, when full, is typically the same or slightly larger than that of the micropool. The initial surcharge volume should have a depth of at least 4 inches. For watersheds of at least 5 impervious acres, the initial surcharge volume should also be at least 0.3% of the WQCV. The initial surcharge volume is considered a part of the WQCV and does not need to be provided in addition to the WQCV. It is recommended that this area be shown on the grading plan or in a profile for the EDB. When baseflows are anticipated, it is recommended that the initial surcharge volume be increased. See the inset on page EDB-9 for



Photograph EDB-4. A series of landscape islands connected by culverts provide water quality and flood control for this site.

additional guidelines for designing for baseflows.

9. Trash Rack: Provide a trash rack (or screen) of sufficient size at the outlet to provide hydraulic capacity while the rack is partially clogged. Openings should be small enough to limit clogging of the individual orifices. Size any overflow safety grate so it does not interfere with the hydraulic capacity of the outlet pipe. See BMP Fact Sheet T-12 for detailed trash rack and safety grate design guidance.



Figure EDB-1. Flared wall outlet structure configuration. Graphic by Adia Davis.



Figure EDB-2. Parallel wall outlet structure configuration. Graphic by Adia Davis.

- 10. Overflow Embankment: Design the embankment to withstand the 100-year storm at a minimum. If the embankment falls under the jurisdiction of the State Engineer's Office, it must be designed to meet the requirements of the State Engineer's Office. The overflow should be located at a point where waters can best be conveyed downstream. Slopes that are 4:1 or flatter should be used to allow for conventional maintenance equipment and for improved safety, maintenance, and aesthetics. Side slopes should be no steeper than 3:1 and should be planted with turf forming grasses. Poorly compacted native soils should be excavated and replaced. Embankment soils should be compacted to 95% of maximum dry density for ASTM D698 (Standard Proctor) or 90% for ASTM D1557 (Modified Proctor). Spillway structures and overflows should be designed in accordance with the Storage Chapter of Volume 2 as well as any local drainage criteria. Buried soil riprap or reinforced turf mats installed per manufacturer's recommendations can provide an attractive and less expensive alternative to concrete.
- 11. Vegetation: Vegetation provides erosion control and sediment entrapment. Basin bottom, berms, and side slopes should be planted with turf grass, which is a general term for any grasses that will form a turf or mat, as opposed to bunch grass which will grow in clumplike fashion. Xeric grasses with temporary irrigation are recommended to reduce maintenance requirements, including maintenance of the irrigation system as well as frequency of mowing. Where possible, place irrigation heads outside the basin bottom because irrigation heads in an EDB can become buried with sediment over time.
- 12. Access: Provide appropriate maintenance access to the forebay and outlet works. For larger basins, this means stabilized access for maintenance vehicles. If stabilized access is not provided, the maintenance plan should provide detail, including recommended equipment, on how sediment and trash will be removed from the outlet structure and micropool. Some communities may require

Designing for Baseflows

Baseflows should be anticipated for large tributary areas and can be accommodated in a variety of ways. Consider the following:

- If water rights are available, consider alternate BMPs such as a constructed wetland pond or retention pond.
- Anticipate future modifications to the outlet structure. Following construction, baseflows should be monitored periodically. Intermittent flows can become perennial and perennial flows can increase over time. It may be determined that outlet modifications are necessary long after construction of the BMP is complete.
- Design foundation drains and other groundwater drains to bypass the water quality plate directing these drains to a conveyance element downstream of the EDB. This will reduce baseflows and help preserve storage for the WQCV.
- When the basin is fully developed and an existing baseflow can be approximated prior to design, the water quality orifices should be increased to drain the WQCV in 40 hours while also draining the baseflow. This requires reservoir routing using an inflow hydrograph that includes the baseflow. The UD-Detention workbook available at <u>www.udfcd.org</u> may be used for this purpose.
- Increase the initial surcharge volume of the pond to provide some flexibility when baseflows are known or anticipated. Baseflows are difficult to approximate and will continue to increase as the watershed develops. Increasing the initial surcharge volume will accommodate a broader range of flows.

vehicle access to the bottom of the basin regardless of the size of the watershed. Grades should not exceed 10% for haul road surfaces and 20% for skid-loader and backhoe access. Stabilized access includes concrete, articulated concrete block, concrete grid pavement, or reinforced grass pavement. The recommended cross slope is 2%.

Aesthetic Design

Since all land owners and managers wish to use land in the most efficient manner possible, it is important that EDBs become part of a multi-use system. This encourages the design of EDBs as an aesthetic part of a naturalized environment or to include passive and/or active open space. Within each scenario, the EDB can begin to define itself as more than just a drainage facility. When this happens, the basin becomes a public amenity. This combination of public amenity and drainage facility is of much greater value to a landowner. Softened and varied slopes, interspersed irrigated fields, planting areas and wetlands can all be part of an EDB.

The design should be aesthetic whether it is considered to be an architectural or naturalized basin. Architectural basins incorporate design borrowed or reflective of the surrounding architecture or urban forms. An architectural basin is intended to appear as part of the built environment, rather than hiding the cues that identify it as a stormwater structure. A naturalized basin is designed to appear as though it is a natural part of the landscape. This section provides suggestions for designing a naturalized basin. The built environment, in contrast to the natural environment, does not typically contain the randomness of form inherent in nature. Constructed slopes typically remain consistent, as do slope transitions. Even dissipation structures are usually a hard form and have edges seldom seen in nature. If the EDB is to appear as though it is a natural part of the landscape, it is important to minimize shapes that provide visual cues indicating the presence of a drainage structure. For example, the side sides should be shaped more naturally and with varying slopes for a naturalized basin.

Suggested Methods for a Naturalized Basin

- Create a flowing form that looks like it was shaped by water.
- Extend one side of the basin higher than the other. This may require a berm.
- Shape the bottom of the basin differently than the top.
- Slope of one side of the basin more mildly than the opposing side.
- Vary slope transitions both at the top of the bank and at the toe.
- Use a soft-surface trickle channel if appropriate and approved.
- When using rock for energy dissipation, the rock should graduate away from the area of hard edge into the surrounding landscape. Other non-functional matching rock should occur in other areas of the basin to prevent the actual energy dissipation from appearing out of context.
- Design ground cover to reflect the type of water regime expected for their location within the basin.



Figure EDB-3. Extended Detention Basin (EDB) Plan and Profile

Additional Details are provided in BMP Fact Sheet T-12. This includes outlet structure details including orifice plates and trash racks.

	On-Site EDBs for Watersheds up to 1 Impervious Acre ¹	EDBs with Watersheds between 1 and 2 Impervious Acres ¹	EDBs with Watersheds up to 5 Impervious Acres	EDBs with Watersheds over 5 Impervious Acres	EDBs with Watersheds over 20 Impervious Acres
Forebay Release and Configuration		Release 2% of the undetained 100-year peak discharge by way of a wall/notch configuration	Release 2% of the undetained 100-year peak discharge by way of a wall/notch configuration	Release 2% of the undetained 100-year peak discharge by way of a wall/notch configuration	Release 2% of the undetained 100-year peak discharge by way of a wall/notch or berm/pipe ² configuration
Minimum Forebay Volume	EDBs should not be used for watersheds with less than	1% of the WQCV	2% of the WQCV	3% of the WQCV	3% of the WQCV
Maximum Forebay Depth	1 impervious acre.	12 inches	18 inches	18 inches	30 inches
Trickle Channel Capacity		≥ the maximum possible forebay outlet capacity	≥ the maximum possible forebay outlet capacity	≥ the maximum possible forebay outlet capacity	≥ the maximum possible forebay outlet capacity
Micropool		Area $\geq 10 \text{ ft}^2$			
Initial Surcharge Volume		$\begin{array}{l} \text{Depth} \geq 4\\ \text{inches} \end{array}$	$\begin{array}{l} \text{Depth} \geq 4\\ \text{inches} \end{array}$	$\begin{array}{l} \text{Depth} \geq 4 \text{ in.} \\ \text{Volume} \geq \\ 0.3\% \text{ WQCV} \end{array}$	$\begin{array}{l} \text{Depth} \geq 4 \text{ in.} \\ \text{Volume} \geq \\ 0.3\% \text{ WQCV} \end{array}$

 Table EDB-4.
 EDB component criteria

¹ EDBs are not recommended for sites with less than 2 impervious acres. Consider a sand filter or rain garden.

² Round up to the first standard pipe size (minimum 8 inches).

DETENTION	BASIN STAGE	STORAGETA	
DETENTION	DASIN STAGE	-STURAGE TA	IDLE DUILDER

Project:	REDTAIL RA	NCH FILING	NO. 1			
Basin ID:	POND 1					
ZONE 3						
	2 ONE 1					
VOLUME EURY WOCY		1		~		
		100 YEA	8	-	I	
ZONE	1 AND 2	ORIFICE			Depth Increment =	0.5
POOL Example Zone	Configuratio	on (Retentio	on Pond)		Stage - Storage	Stage
					Description	(ft)
Required Volume Calculation					Top of Micropool	
Selected BMP Type =	EDB				99	
Watershed Area =	14.80	acres			7600	
Watershed Length =	1,200	ft			1	
Watershed Slope =	0.020	ft/ft			2	
Watershed Imperviousness =	14.60%	percent			3	
Percentage Hydrologic Soil Group A =	0.0%	percent			4	
Percentage Hydrologic Soil Group B =	100.0%	percent			4.5	
Percentage Hydrologic Soil Groups C/D =	0.0%	percent				
Desired WQCV Drain Time =	40.0	hours				
Location for 1-hr Rainfall Depths =	User Input					
Water Quality Capture Volume (WQCV) =	0.113	acre-feet	Optional Use	r Override		-
Excess Urban Runoff Volume (EURV) =	0.209	acre-feet	T-III Precipita	1		
2-yr Runoff Volume (P1 = 1.19 in.) =	0.149	acre-feet	1.19	inches		
5-yr Runott Volume (P1 = 1.5 in.) =	0.225	acre-teet	1.50	inches		
10-yr Runoff Volume (P1 = 1.75 in.) =	0.436	acre-feet	1.75	inches		
25-yr Runoff Volume (P1 = 2 In.) =	0.983	acre-reet	2.00	incnes		
50-yr Ruhoff Volume (P1 = 2.25 in.) =	1.328	acre-reet	2.25	inches		
500 vr Runoff Volume (P1 = 2.52 III.) =	2.262	acre feet	2.52	inches		
Approximate 2 vr Detention Volume =	0.1202	acre feet	3.05			
Approximate 5 vr Detention Volume =	0.135	acre feet				
Approximate 30yr Detention Volume =	0.211	acre-feet				-
Approximate 25-yr Detention Volume =	0.494	acre-feet				-
Approximate 50-yr Detention Volume =	0.521	acre-feet				
Approximate 00-yr Detention Volume =	0.657	acre-feet				
Stage-Storage Calculation						
Zone 1 Volume (WQCV) =	0.113	acre-feet				
Zone 2 Volume (EURV - Zone 1) =	0.097	acre-feet				
Zone 3 Volume (100-year - Zones 1 & 2) =	0.448	acre-feet				
Total Detention Basin Volume =	0.657	acre-feet				
Initial Surcharge Volume (ISV) =	user	ft^3				
Initial Surcharge Depth (ISD) =	user	ft				-
Total Available Detention Depth (H _{total}) =	user	ft				
Depth of Trickle Channel (H _{TC}) =	user	ft				
Slope of Trickle Channel (S _{TC}) =	user	ft/ft				
Slopes of Main Basin Sides (Smain) =	user	H:V				
Basin Length-to-Width Ratio (R _{L/W}) =	user	J				
Initial Surcharge Area (A _{ISV}) =	user	ft^2				
Surcharge Volume Length (L _{ISV}) =	user	ft				-
Surcharge Volume Width (W _{ISV}) =	user	ft				
Depth of Basin Floor (H _{FLOOR}) =	user	ft				-
Length of Basin Floor (L _{FLOOR}) =	user	ft				-
Width of Basin Floor (W _{FLOOR}) =	user	ft				-
Area of Basin Floor (A _{FLOOR}) =	user	ft^2				-
Volume of Basin Floor (V _{FLOOR}) =	user	ft^3				
Lepth of Main Basin (H _{MAIN}) =	user	ft				-
Length or Main Basin (L _{MAIN}) =	user	n				
Area of Main Basin (W _{MAIN}) =	USEI	n ano				-
Volume of Main Barin (V) =	LISOT	IT*2				-
Calculated Total Basin Volume (V) =	user	11:3				-
Scholarado Fotal Bublin Voidille (Vtotal) =		aure-reet				

		1							
Depth Increment =	0.5	ft Optional				Optional			1
Stage - Storage	Stage	Override	Length	Width	Area	Override	Area	Volume	Volume
Description	(ft)	Stage (ft)	(ft)	(ft)	(ft^2)	Area (ft ²)	(acre)	(ft^3)	(ac-ft)
Top of Micropool	-	0.00	-		-	40	0.001		
99		1.00	-			115	0.003	76	0.002
7600	-	2.00	-	-	-	6,421	0.147	3,281	0.075
1	-	3.00	-		-	7,821	0.180	10,466	0.240
2		4.00				9,335	0.214	19,044	0.437
3		5.00				11,027	0.253	29,225	0.671
4		6.00	-			14,490	0.333	41,984	0.964
4.5		6.50				16,129	0.370	49,639	1.140
	-				-				
			-	-	-				
					-				
					-				
					-				
									
	-				-				<u> </u>
								 	<u> </u>
					-				
					-			-	
	-		-		-				L
								L	I
								L	<u> </u>
			-					L	L
	-		-	-	-				
			-						L
			-						
	-		-						
			-						
			-						
	-		-	-	-				
			-						
			-						
			-		-				
			-						
			-						
			-						
	-		-	-	-				t
	-		-	-	-				
			-		-				
	-		-	-	-				
	-		-		-				
					-				
			-		-				I
			-	-	-				
			-					<u> </u>	——————————————————————————————————————
	-			-	-				
			-		-				
			-		-				<u> </u>
			-		-				
			-		-				
	-		-	-	-				
			-		-				
							<u> </u>	<u> </u>	<u> </u>
	-		-		-				
			-		-				
	-		-	-	-				
			-		-				
			-		-			<u> </u>	<u> </u>
					-				
	-		-	-	-				
	-		-	-	-				<u>├</u> ──
			-		-				
			-		-			<u> </u>	├ ───
			-		-				L
	-		-	-	-				
								-	-

UD-Detention, Version 3.07 (February 2017)



Detention Basin Outlet Structure Design										
Project:	REDTAIL RANCH F	FILING NO. 1	UD-Detention, Ve	rsion 3.07 (Februar	ry 2017)					
Basin ID:	POND 1									
ZONE 3										
100-YR				Stage (ft)	Zone Volume (ac-ft)	Outlet Type				
VOLUME EURV WOCV			Zone 1 (WQCV)	2.24	0.113	Orifice Plate				
I TOUR LAND	100-YEA	R	Zone 2 (EURV)	2.83	0.097	Orifice Plate				
PERMANENT ORIFICES			:one 3 (100-year)	4.95	0.448	Weir&Pipe (Restrict)				
Example Zone	Configuration (Re	tention Pond)			0.657	Total				
User Input: Orifice at Underdrain Outlet (typically u	sed to drain WQCV i	n a Filtration BMP)				Calculate	ed Parameters for Ur	derdrain		
Underdrain Orifice Invert Depth =	N/A	ft (distance below th	ne filtration media sur	rface)	Unde	rdrain Orifice Area =	N/A	ft²		
Underdrain Orifice Diameter =	N/A	inches			Underdra	in Orifice Centroid =	N/A	feet		
		. (1		101/1		0.1		D I		
User Input: Orifice Plate with one or more orifices		r (typically used to di	rain WQCV and/or EU	JRV in a sedimentati		ifico Aroa por Pow -	lated Parameters for			
Depth at top of Zone using Orifice Plate =	3.00	ft (relative to basin t	hottom at Stage = 0 ft	-)	WQ OI	lintical Half-Width =	N/A	π feet		
Orifice Plate: Orifice Vertical Spacing =	12.00	inches	oottom at Stage - o h	.)	Fllir	ntical Slot Centroid =	N/A	feet		
Orifice Plate: Orifice Area per Row =	N/A	inches				Elliptical Slot Area =	N/A	ft ²		
		1						1		
User Input: Stage and Total Area of Each Orifice	Row (numbered fro	m 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	1.00	2.00							
Orifice Area (sq. inches)	0.46	0.35	0.35						I	
	Row Q (optional)	Pow 10 (optional)	Pow 11 (optional)	Row 12 (ontinger)	Pow 12 (ontingen)	Row 14 (optional)	Row 15 (optional)	Row 16 (onfinent)	l	
Stare of Orifice Centroid (#)	now a (optional)	rtow to (optional)	now in (optional)	now 12 (optional)	now is (optional)	now 14 (optional)	now to (optional)	now to (optional)		
Orifice Area (sg. inches)										
									1	
User Input: Vertical Orifice (Circ	ular or Rectangular)		_			Calculated	Parameters for Vert	ical Orifice		
	Not Selected	Not Selected					Not Selected	Not Selected		
Invert of Vertical Orifice =	N/A	N/A	ft (relative to basin b	oottom at Stage = 0 f	t) V	ertical Orifice Area =	N/A	N/A	ft ²	
Depth at top of Zone using Vertical Orifice =	N/A	N/A	ft (relative to basin b	oottom at Stage = 0 f	t) Vertio	al Orifice Centroid =	N/A	N/A	feet	
vertical Orifice Diameter =	N/A	N/A	linches							
User Input: Overflow Weir (Dropbox) and G	rate (Flat or Sloped)					Calculated	Parameters for Ove	rflow Weir		
User Input: Overflow Weir (Dropbox) and G	rate (Flat or Sloped) Zone 3 Weir	Not Selected	1			Calculated	Parameters for Ove Zone 3 Weir	rflow Weir Not Selected	1	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho =	rate (Flat or Sloped) Zone 3 Weir 3.00	Not Selected	ft (relative to basin bo	ttom at Stage = 0 ft)	Height of Gr	Calculated ate Upper Edge, H _t =	Parameters for Ove Zone 3 Weir 3.75	rflow Weir Not Selected N/A	feet	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length =	rate (Flat or Sloped) Zone 3 Weir 3.00 3.00	Not Selected N/A N/A	ft (relative to basin bo feet	ttom at Stage = 0 ft)	Height of Gr Over Flow	Calculated ate Upper Edge, H _t = Weir Slope Length =	Parameters for Ove Zone 3 Weir 3.75 3.09	rflow Weir Not Selected N/A N/A	feet feet	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Slope =	rate (Flat or Sloped) Zone 3 Weir 3.00 3.00 4.00	Not Selected N/A N/A N/A	ft (relative to basin bo feet H:V (enter zero for fl	ttom at Stage = 0 ft) at grate)	Height of Gr Over Flow Grate Open Area /	Calculated ate Upper Edge, H _t = Weir Slope Length = 100-yr Orifice Area =	Parameters for Ove Zone 3 Weir 3.75 3.09 5.56	rflow Weir Not Selected N/A N/A N/A	feet feet should be ≥ 4	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Slope = Horiz. Length of Weir Sides =	rate (Flat or Sloped) Zone 3 Weir 3.00 3.00 4.00 3.00	Not Selected N/A N/A N/A N/A	ft (relative to basin bo feet H:V (enter zero for fl feet	ttom at Stage = 0 ft) at grate)	Height of Gr Over Flow Grate Open Area / Overflow Grate Ope	Calculated ate Upper Edge, H _t = Weir Slope Length = 100-yr Orifice Area = en Area w/o Debris =	Parameters for Ove Zone 3 Weir 3.75 3.09 5.56 6.96	rflow Weir Not Selected N/A N/A N/A N/A	feet feet should be ≥ 4 ft ²	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Slope = Horiz. Length of Weir Sides = Overflow Grate Open Area % =	rate (Flat or Sloped) Zone 3 Weir 3.00 4.00 3.00 75%	Not Selected N/A N/A N/A N/A N/A	ft (relative to basin bo feet H:V (enter zero for fl feet %, grate open area/t	ttom at Stage = 0 ft) at grate) :otal area	Height of Gr Over Flow Grate Open Area / Overflow Grate Ope Overflow Grate Op	Calculated ate Upper Edge, H _t = Weir Slope Length = 100-yr Orifice Area = en Area w/o Debris = en Area w/ Debris =	Parameters for Ove Zone 3 Weir 3.75 3.09 5.56 6.96 3.48	rflow Weir N/A Selected N/A N/A N/A N/A N/A	feet feet should be ≥ 4 ft ² ft ²	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Slope = Horiz. Length of Weir Sides = Overflow Grate Open Area % = Debris Clogging % =	rate (Flat or Sloped) Zone 3 Weir 3.00 3.00 4.00 3.00 75% 50%	Not Selected N/A N/A N/A N/A N/A N/A	ft (relative to basin bo feet H:V (enter zero for fl feet %, grate open area/t %	ttom at Stage = 0 ft) at grate) total area	Height of Gr Over Flow Grate Open Area / Overflow Grate Ope Overflow Grate Op	Calculated ate Upper Edge, H _t = Weir Slope Length = 100-yr Orifice Area = en Area w/o Debris = een Area w/ Debris =	Parameters for Ove Zone 3 Weir 3.75 3.09 5.56 6.96 3.48	rflow Weir N/A Selected N/A N/A N/A N/A N/A	feet feet should be ≥ 4 ft ² ft ²	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Slope = Horiz. Length of Weir Sides = Overflow Grate Open Area % = Debris Clogging % =	rate (Flat or Sloped) Zone 3 Weir 3.00 3.00 4.00 3.00 75% 50% incular Orifice Restr	Not Selected N/A N/A N/A N/A N/A N/A inter Plate, or Rectan	ft (relative to basin bo feet H:V (enter zero for fl feet %, grate open area/t %	ttom at Stage = 0 ft) at grate) total area	Height of Gr Over Flow Grate Open Area / Overflow Grate Op Overflow Grate Op	Calculated ate Upper Edge, H, = Weir Slope Length = 100-yr Orifice Area = Ion Area w/ Debris = ben Area w/ Debris = alculated Parameter	Parameters for Ove Zone 3 Weir 3.75 3.09 5.56 6.96 3.48 s for Outlet Pine w/	rflow Weir N/A N/A N/A N/A N/A N/A	feet feet should be ≥ 4 ft ² ft ²	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Slope = Horiz. Length of Weir Slobe = Overflow Grate Open Area % = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate (C	rate (Flat or Sloped) Zone 3 Weir 3.00 4.00 3.00 75% 50% Sircular Orifice, Restr Zone 3 Restrictor	Not Selected N/A N/A N/A N/A N/A N/A ictor Plate, or Rectar Not Selected	ft (relative to basin bo feet H:V (enter zero for fl feet %, grate open area/t % ngular Orifice)	ttom at Stage = 0 ft) at grate) :otal area	Height of Gr Over Flow Grate Open Area / Overflow Grate Op Overflow Grate Op	Calculated ate Upper Edge, H _t = Weir Slope Length = 100-yr Orifice Area en Area w/o Debris = alculated Parameter	Parameters for Ove Zone 3 Weir 3.75 3.09 5.56 6.96 3.48 s for Outlet Pipe w/ Zone 3 Restrictor	rflow Weir N/A N/A N/A N/A N/A Flow Restriction Plat	feet feet should be ≥ 4 ft ² ft ²	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Slope = Horiz. Length of Weir Sides = Overflow Grate Open Area % = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate (C Depth to Invert of Outlet Pipe =	rate (Flat or Sloped) Zone 3 Weir 3.00 4.00 3.00 75% 50% Concerned and the second seco	Not Selected N/A N/A N/A N/A N/A N/A ictor Plate, or Rectar Not Selected N/A	ft (relative to basin bo feet H:V (enter zero for fl feet %, grate open area/t % ngular Orifice) ft (distance below bas	ttom at Stage = 0 ft) at grate) total area in bottom at Stage = 0	Height of Gr Over Flow Grate Open Area / Overflow Grate Op Overflow Grate Op Overflow Grate Op (Calculated ate Upper Edge, H _t = Weir Slope Length = 100-yr Orifice Area = en Area w/o Debris = alculated Parameter Dutlet Orifice Area =	Parameters for Ove Zone 3 Weir 3.75 3.09 5.56 6.96 3.48 s for Outlet Pipe w/ Zone 3 Restrictor 1.25	rflow Weir N/A N/A N/A N/A N/A N/A Flow Restriction Plat Not Selected N/A	feet feet should be ≥ 4 ft^2 te ft^2	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Slope = Horiz. Length of Weir Sides = Overflow Grate Open Area % = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate (C Depth to Invert of Outlet Pipe = Outlet Pipe Diameter =	rate (Flat or Sloped) Zone 3 Weir 3.00 4.00 3.00 75% 50% Concerned and the second seco	Not Selected N/A N/A N/A N/A N/A ictor Plate, or Rectar Not Selected N/A N/A	ft (relative to basin bo feet H:V (enter zero for fl feet %, grate open area/t % ngular Orifice) ft (distance below bas inches	ttom at Stage = 0 ft) at grate) :otal area in bottom at Stage = 0	Height of Gr Over Flow Grate Open Area / Overflow Grate Ope Overflow Grate Op Overflow Grate O (t)	Calculated ate Upper Edge, H _t = Weir Slope Length = 100-yr Orifice Area = en Area w/o Debris = alculated Parameter Dutlet Orifice Area = et Orifice Centroid =	Parameters for Ove Zone 3 Weir 3.75 3.09 5.56 6.96 3.48 s for Outlet Pipe w/ Zone 3 Restrictor 1.25 0.56	rflow Weir N/A N/A N/A N/A N/A Flow Restriction Plat Not Selected N/A N/A	feet feet should be ≥ 4 ft ² ft te ft ² ft feet	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Slope = Horiz. Length of Weir Sides = Overflow Grate Open Area % = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate (C Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert =	rate (Flat or Sloped) Zone 3 Weir 3.00 4.00 3.00 75% 50% Construction Construction 0.50 18.00 12.00	Not Selected N/A N/A N/A N/A N/A ictor Plate, or Rectar Not Selected N/A N/A	ft (relative to basin bo feet H:V (enter zero for fl feet %, grate open area/t % ngular Orifice) ft (distance below bas inches inches	ttom at Stage = 0 ft) iat grate) :otal area in bottom at Stage = 0 Half-1	Height of Gr Over Flow Grate Open Area / Overflow Grate Ope Overflow Grate Op Overflow Grate Op (ft) Out Central Angle of Rest	Calculated ate Upper Edge, H _t = Weir Slope Length = 100-yr Orifice Area = en Area w/o Debris = alculated Parameter Dutlet Orifice Area = et Orifice Centroid = ictor Plate on Pipe =	Parameters for Ove Zone 3 Weir 3.75 3.09 5.56 6.96 3.48 s for Outlet Pipe w/ Zone 3 Restrictor 1.25 0.56 1.91	rflow Weir N/A N/A N/A N/A N/A Flow Restriction Plat N/A N/A N/A	feet feet should be ≥ 4 ft ² ft ² ft ² feet radians	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Slope = Horiz. Length of Weir Sides = Overflow Grate Open Area % = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate (C Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert =	rate (Flat or Sloped) Zone 3 Weir 3.00 4.00 3.00 75% 50% dircular Orifice, Restri Zone 3 Restrictor 0.50 18.00 12.00	Not Selected N/A N/A N/A N/A N/A ictor Plate, or Rectar Not Selected N/A N/A	ft (relative to basin bo feet H:V (enter zero for ff feet % ngular Orifice) ft (distance below bas inches	ttom at Stage = 0 ft) at grate) :otal area in bottom at Stage = 0 Half-0	Height of Gr Over Flow Grate Open Area / Overflow Grate Op Overflow Grate Op Overflow Grate Op (ft) Out Central Angle of Rest	Calculated ate Upper Edge, H _t = Weir Slope Length = 100-yr Orifice Area = en Area w/o Debris = en Area w/ Debris = alculated Parameter Dutlet Orifice Area = et Orifice Centroid = ictor Plate on Pipe =	Parameters for Ove Zone 3 Weir 3.75 3.09 5.56 6.96 3.48 s for Outlet Pipe w/ Zone 3 Restrictor 1.25 0.56 1.91	rflow Weir N/A N/A N/A N/A N/A Flow Restriction Plat N/A N/A N/A N/A	feet feet should be ≥ 4 ft ² ft ² ft ² feet radians	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Slope = Horiz. Length of Weir Sides = Overflow Grate Open Area % = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate (C Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert = User Input: Emergency Spillway (Rectang	rate (Flat or Sloped) Zone 3 Weir 3.00 4.00 3.00 75% 50% ircular Orifice, Restr Zone 3 Restrictor 0.50 18.00 12.00 gular or Trapezoidal)	Not Selected N/A N/A N/A N/A N/A ictor Plate, or Rectar Not Selected N/A N/A	ft (relative to basin bo feet H:V (enter zero for ff feet % gular Orifice) ft (distance below bas inches	ttom at Stage = 0 ft) (at grate) (otal area in bottom at Stage = 0 Half-0	Height of Gr Over Flow Grate Open Area / Overflow Grate Ope Overflow Grate Op Overflow Grate Op (ft) Out Central Angle of Restr	Calculated ate Upper Edge, H _t = Weir Slope Length = 100-yr Orfice Area = en Area w/o Debris = en Area w/o Debris = alculated Parameter Dutlet Orifice Area = et Orifice Centroid = ictor Plate on Pipe = Calcula	Parameters for Ove Zone 3 Weir 3.75 3.09 5.56 6.96 3.48 s for Outlet Pipe w/ Zone 3 Restrictor 1.25 0.56 1.91 ted Parameters for S	rflow Weir N/A N/A N/A N/A N/A Flow Restriction Plat Not Selected N/A N/A N/A N/A N/A	feet feet should be ≥ 4 ft ² ft ² ft ² feet radians	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Slope = Horiz. Length of Weir Sides = Overflow Grate Open Area % = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate (C Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert = User Input: Emergency Spillway (Rectang Spillway Invert Stage=	rate (Flat or Sloped) Zone 3 Weir 3.00 4.00 3.00 75% 50% Som ircular Orifice, Restr Zone 3 Restrictor 0.50 18.00 12.00 gular or Trapezoidal) 5.50 4.00 2.00	Not Selected N/A N/A N/A N/A N/A N/A ictor Plate, or Rectar Not Selected N/A N/A	ft (relative to basin bo feet H:V (enter zero for ff feet % rgular Orifice) ft (distance below bas inches inches	ttom at Stage = 0 ft) (at grate) (otal area in bottom at Stage = 0 Half-0	Height of Gr Over Flow Grate Open Area / Overflow Grate Ope Overflow Grate Op Overflow Grate Op (t) Out Central Angle of Restr Spillway	Calculated ate Upper Edge, H _t = Weir Slope Length = 100-yr Orfice Area = en Area w/o Debris = en Area w/o Debris = alculated Parameter Outlet Orifice Area = et Orifice Centroid = ictor Plate on Pipe = Calcula Design Flow Depth=	Parameters for Ove Zone 3 Weir 3.75 3.09 5.56 6.96 3.48 s for Outlet Pipe w/ Zone 3 Restrictor 1.25 0.56 1.91 ted Parameters for S 0.84 6.34	rflow Weir Not Selected N/A N/A N/A N/A N/A Flow Restriction Plat Not Selected N/A N/A N/A N/A N/A Selected N/A	feet feet should be ≥ 4 ft ² ft ² feet radians	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Slope = Horiz. Length of Weir Sides = Overflow Grate Open Area % = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate (C Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert = User Input: Emergency Spillway (Rectang Spillway Invert Stage= Spillway Crest Length =	rate (Flat or Sloped) Zone 3 Weir 3.00 3.00 4.00 3.00 75% 50% ircular Orifice, Restr Zone 3 Restrictor 0.50 18.00 12.00 gular or Trapezoidal) 5.50 10.00 2.00	Not Selected N/A N/A N/A N/A N/A N/A ictor Plate, or Rectar Not Selected N/A N/A ft (relative to basin t feet	ft (relative to basin bo feet H:V (enter zero for fi feet %, grate open area/t % ngular Orifice) ft (distance below bas inches inches inches	ttom at Stage = 0 ft) (at grate) (otal area in bottom at Stage = 0 Half-0	Height of Gr Over Flow Grate Open Area / Overflow Grate Op Overflow Grate Op (t) ft) Out Central Angle of Restr Spillway Stage a	Calculated ate Upper Edge, H, = Weir Slope Length = 100-yr Orifice Area = In Area w/ Debris = alculated Parameter Outlet Orifice Area = et Orifice Centroid = ictor Plate on Pipe = Calcula Design Flow Depth= Top of Freeboard =	Parameters for Ove Zone 3 Weir 3.75 3.09 5.56 6.96 3.48 s for Outlet Pipe w/ Zone 3 Restrictor 1.25 0.56 1.91 ted Parameters for S 0.84 6.34 0.37	rflow Weir N/A N/A N/A N/A N/A N/A N/A Flow Restriction Plat Not Selected N/A N/A N/A N/A Selected N/A N/A N/A	feet feet should be ≥ 4 ft ² ft ² feet radians	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Slope = Horiz. Length of Weir Sides = Overflow Grate Open Area % = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate (C Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert = User Input: Emergency Spillway (Rectang Spillway Invert Stage= Spillway Crest Length = Spillway End Slopes = Errepoard above Max Water Curface o	rate (Flat or Sloped) Zone 3 Weir 3.00 3.00 4.00 3.00 75% 50% ircular Orifice, Restr Zone 3 Restrictor 0.50 18.00 12.00 gular or Trapezoidal) 5.50 10.00 3.00	Not Selected N/A N/A N/A N/A N/A N/A N/A ictor Plate, or Rectar Not Selected N/A N/A ft (relative to basin t feet H:V feet H:V	ft (relative to basin bo feet H:V (enter zero for fl feet %, grate open area/t % ngular Orifice) ft (distance below bas inches inches inches	ttom at Stage = 0 ft) at grate) total area in bottom at Stage = 0 Half-0	Height of Gr Over Flow Grate Open Area / Overflow Grate Op Overflow Grate Op (t) ft) Central Angle of Restr Spillway Stage a Basin Area a	Calculated ate Upper Edge, H, = Weir Slope Length = 100-yr Orifice Area = in Area w/ Debris = alculated Parameter Outlet Orifice Area = et Orifice Centroid = ictor Plate on Pipe = Calcula Design Flow Depth= t Top of Freeboard = t Top of Freeboard =	Parameters for Ove Zone 3 Weir 3.75 3.09 5.56 6.96 3.48 s for Outlet Pipe w/ Zone 3 Restrictor 1.25 0.56 1.91 ted Parameters for S 0.84 6.34 0.36	rflow Weir N/A N/A N/A N/A N/A N/A Flow Restriction Plat Not Selected N/A N/A N/A N/A ipillway feet feet feet acres	feet feet should be ≥ 4 ft ² ft ² feet radians	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Slope = Horiz. Length of Weir Sides = Overflow Grate Open Area % = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate (C Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert = User Input: Emergency Spillway (Rectang Spillway Invert Stage= Spillway Crest Length = Spillway End Slopes = Freeboard above Max Water Surface =	rate (Flat or Sloped) Zone 3 Weir 3.00 3.00 4.00 3.00 75% 50% ircular Orifice, Restr Zone 3 Restrictor 0.50 18.00 12.00 S.50 10.00 3.00 	Not Selected N/A N/A N/A N/A N/A N/A N/A totro Plate, or Rectan Not Selected N/A N/A ft (relative to basin the feet H:V feet	ft (relative to basin bo feet H:V (enter zero for fl feet %, grate open area/t % syular Orifice) ft (distance below bas inches inches inches	ttom at Stage = 0 ft) (at grate) (otal area in bottom at Stage = 0 Half-4	Height of Gr Over Flow Grate Open Area / Overflow Grate Op Overflow Grate Op (t) ft) Out Central Angle of Restr Spillway Stage a Basin Area a	Calculated ate Upper Edge, H, = Weir Slope Length = 100-yr Orifice Area = In Area w/ Debris = alculated Parameter Outlet Orifice Area = et Orifice Centroid = ictor Plate on Pipe = Calcula Design Flow Depth= t Top of Freeboard = t Top of Freeboard =	Parameters for Ove Zone 3 Weir 3.75 3.09 5.56 6.96 3.48 s for Outlet Pipe w/ Zone 3 Restrictor 1.25 0.56 1.91 ted Parameters for S 0.84 6.34 0.36	rflow Weir N/A N/A N/A N/A N/A N/A Flow Restriction Plat Not Selected N/A N/A N/A Selected N/A N/A N/A N/A Selected N/A Selected N/A N/A N/A Selected N/A Selected Selecte	feet feet should be ≥ 4 ft ² ft ² feet radians	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Front Edge Length = Overflow Weir Slope = Horiz. Length of Weir Sides = Overflow Grate Open Area % = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate (C Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert = User Input: Emergency Spillway (Rectang Spillway Invert Stage= Spillway Crest Length = Spillway End Slopes = Freeboard above Max Water Surface =	rate (Flat or Sloped) Zone 3 Weir 3.00 3.00 4.00 3.00 75% 50% Sircular Orifice, Restr Zone 3 Restrictor 0.50 18.00 12.00 Sular or Trapezoidal) 5.50 10.00 3.00	Not Selected N/A N/A N/A N/A N/A N/A into Plate, or Rectan Not Selected N/A into Plate, or Rectan it (relative to basin the feet H:V feet	ft (relative to basin bo feet H:V (enter zero for fl feet %, grate open area/t % gular Orifice) ft (distance below bas inches inches bottom at Stage = 0 ft	ttom at Stage = 0 ft) (at grate) (otal area in bottom at Stage = 0 Half-0 (t)	Height of Gr Over Flow Grate Open Area / Overflow Grate Op Overflow Grate Op (t) Central Angle of Restr Spillway Stage a Basin Area a	Calculated ate Upper Edge, H, = Weir Slope Length = 100-yr Orifice Area = ben Area w/ Debris = alculated Parameter Outlet Orifice Area = et Orifice Centroid = ictor Plate on Pipe = Calcula Design Flow Depth= t Top of Freeboard = t Top of Freeboard =	Parameters for Ove Zone 3 Weir 3.75 3.09 5.56 6.96 3.48 s for Outlet Pipe w/ Zone 3 Restrictor 1.25 0.56 1.91 ted Parameters for S 0.84 6.34 0.36	rflow Weir N/A N/A N/A N/A N/A N/A Flow Restriction Plat Not Selected N/A N/A N/A N/A Spillway feet feet feet feet	feet feet should be ≥ 4 ft^2 ft^2 feet radians	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Front Edge Length = Overflow Grate Open Area % = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate (C Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert = User Input: Emergency Spillway (Rectang Spillway Invert Stage= Spillway End Slopes = Freeboard above Max Water Surface = Routed Hydrograph Results Design Storm Return Period =	rate (Flat or Sloped) Zone 3 Weir 3.00 3.00 3.00 75% 50% So% So% So% So% So% So% So% So	Not Selected N/A N/A N/A N/A N/A N/A N/A ictor Plate, or Rectan Not Selected N/A N/A ft (relative to basin t feet H:V feet EURV	ft (relative to basin bo feet H:V (enter zero for fi feet %, grate open area/t % rgular Orifice) ft (distance below bas inches inches bottom at Stage = 0 ft	ttom at Stage = 0 ft) at grate) total area in bottom at Stage = 0 Half-0	Height of Gr Over Flow Grate Open Area / Overflow Grate Op Overflow Grate Op (t) Central Angle of Restr Spillway Stage a Basin Area a	Calculated ate Upper Edge, H _t = Weir Slope Length = 100-yr Orifice Area = en Area w/ Debris = alculated Parameter Outlet Orifice Area = et Orifice Centroid = ictor Plate on Pipe = Calcula Design Flow Depth= t Top of Freeboard = t Top of Freeboard =	Parameters for Ove Zone 3 Weir 3.75 3.09 5.56 6.96 3.48 s for Outlet Pipe w/ Zone 3 Restrictor 1.25 0.56 1.91 ted Parameters for S 0.84 6.34 0.36	rflow Weir N/A N/A N/A N/A N/A N/A N/A N/A	feet feet should be ≥ 4 ft ² ft ² ft ² feet radians	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Front Edge Length = Overflow Grate Open Area % = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate (C Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert = User Input: Emergency Spillway (Rectang Spillway Invert Stage= Spillway End Slopes = Freeboard above Max Water Surface = Routed Hydrograph Results Design Storm Return Period = One-Hour Rainfall Depth (in) =	rate (Flat or Sloped) Zone 3 Weir 3.00 4.00 3.00 75% 50% ircular Orifice, Restr Zone 3 Restrictor 0.50 18.00 12.00 gular or Trapezoidal) 5.50 10.00 3.00 WQCV 0.53 0.12	Not Selected N/A N/A N/A N/A N/A N/A N/A ictor Plate, or Rectar Not Selected N/A N/A ft (relative to basin t feet H:V feet EURV 1.07 0.070	ft (relative to basin bo feet H:V (enter zero for fi feet %, grate open area/t % rgular Orifice) ft (distance below bas inches inches bottom at Stage = 0 ft <u>2 Year</u> 1.19	ttom at Stage = 0 ft) at grate) total area in bottom at Stage = 0 Half-0 t) S Year 1.50	Height of Gr Over Flow Grate Open Area / Overflow Grate Op Overflow Grate Op (t) Central Angle of Restr Spillway Stage a Basin Area a 10 Year 1.75	Calculated ate Upper Edge, H _t = Weir Slope Length = 100-yr Orifice Area = en Area w/o Debris = alculated Parameter Outlet Orifice Area = et Orifice Centroid = ictor Plate on Pipe = Calcula Design Flow Depth= t Top of Freeboard = t Top of Freeboard = 25 Year 2.00 0 000	Parameters for Ove Zone 3 Weir 3.75 3.09 5.56 6.96 3.48 s for Outlet Pipe w/ Zone 3 Restrictor 1.25 0.56 1.91 ted Parameters for S 0.84 6.34 0.36 50 Year 2.25 1.22	rflow Weir Not Selected N/A N/A N/A N/A N/A N/A N/A N/A	feet feet should be ≥ 4 ft ² ft ² fee feet radians	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Front Edge Length = Overflow Weir Slope = Horiz. Length of Weir Slotes = Overflow Grate Open Area % = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate (C Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert = User Input: Emergency Spillway (Rectang Spillway Crest Length = Spillway Crest Length = Spillway End Slopes = Freeboard above Max Water Surface = Routed Hydrograph Results Design Storm Return Period = One-Hour Rainfall Depth (in) = Calculated Runoff Volume (area-ft) = OPTIONAL Override Runoff Volume (area-ft) =	rate (Flat or Sloped) Zone 3 Weir 3.00 4.00 3.00 75% 50% ircular Orifice, Restr Zone 3 Restrictor 0.50 18.00 12.00 gular or Trapezoidal) 5.50 10.00 3.00 WQCV 0.53 0.113	Not Selected N/A N/A N/A N/A N/A N/A N/A ictor Plate, or Rectar Not Selected N/A N/A ft (relative to basin t feet H:V feet EURV 1.07 0.209	ft (relative to basin bo feet H:V (enter zero for fi feet %, grate open area/t % gular Orifice) ft (distance below bas inches inches bottom at Stage = 0 ft 1.19 0.149	ttom at Stage = 0 ft) at grate) total area in bottom at Stage = 0 Half-1 t) 5 Year 1.50 0.225	Height of Gr Over Flow Grate Open Area / Overflow Grate Op Overflow Grate Op (t) Central Angle of Resti Spillway Stage a Basin Area a 10 Year 1.75 0.436	Calculated ate Upper Edge, H, = Weir Slope Length = 100-yr Orifice Area = en Area w/o Debris = alculated Parameter Outlet Orifice Area = et Orifice Centroid = ictor Plate on Pipe = Calcula Design Flow Depth= t Top of Freeboard = t Top of Freeboard = 25 Year 2.00 0.983	Parameters for Ove Zone 3 Weir 3.75 3.09 5.56 6.96 3.48 s for Outlet Pipe w/ Zone 3 Restrictor 1.25 0.56 1.91 ted Parameters for S 0.84 6.34 0.36 SO Year 2.25 1.328	rflow Weir Not Selected N/A N/A N/A N/A N/A N/A N/A N/A	feet feet should be ≥ 4 ft^2 ft^2 fee fret radians 500 Year 3.85 3.262	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Front Edge Length = Overflow Weir Slotes = Horiz. Length of Weir Slotes = Overflow Grate Open Area % = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate (C Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert = User Input: Emergency Spillway (Rectang Spillway Crest Length = Spillway Crest Length = Spillway End Slopes = Freeboard above Max Water Surface = Resting Storm Return Period = One-Hour Rainfall Depth (in) = Calculated Runoff Volume (acre-ft) = OPTIONAL Override Runoff Volume (acre-ft) =	rate (Flat or Sloped) Zone 3 Weir 3.00 4.00 3.00 75% 50% ircular Orifice, Restr Zone 3 Restrictor 0.50 18.00 12.00 gular or Trapezoidal) 5.50 10.00 3.00 	Not Selected N/A N/A N/A N/A N/A N/A ictor Plate, or Rectar Not Selected N/A N/A ft (relative to basin t feet H:V feet EURV 1.07 0.209 0.209	ft (relative to basin bo feet H:V (enter zero for fi feet %, grate open area/t % gular Orifice) ft (distance below bas inches inches bottom at Stage = 0 ft 2 Year 1.19 0.149	ttom at Stage = 0 ft) at grate) total area in bottom at Stage = 0 Half-0 total 5 Year 1.50 0.225 0.225	Height of Gr Over Flow Grate Open Area / Overflow Grate Ope Overflow Grate Op (C (t) Central Angle of Restu Spillway Stage a Basin Area a 10 Year 1.75 0.436 0.435	Calculated ate Upper Edge, H, = Weir Slope Length = 100-yr Orifice Area = en Area w/o Debris = alculated Parameter Dutlet Orifice Area = et Orifice Centroid = ictor Plate on Pipe = Calcula Design Flow Depth= t Top of Freeboard = t Top of Freeboard = 25 Year 2.00 0.983 0.981	Parameters for Ove Zone 3 Weir 3.75 3.09 5.56 6.96 3.48 s for Outlet Pipe w/ Zone 3 Restrictor 1.25 0.56 1.91 ted Parameters for S 0.84 6.34 0.36 50 Year 2.25 1.328 1.326	rflow Weir Not Selected N/A N/A N/A N/A N/A N/A N/A N/A	feet feet should be ≥ 4 ft ² ft ² fee ftet radians <u>500 Year</u> <u>3.85</u> <u>3.252</u> <u>3.259</u>	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Stope = Horiz. Length of Weir Sides = Overflow Grate Open Area % = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate (C Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert = User Input: Emergency Spillway (Rectang Spillway Invert Stage= Spillway Crest Length = Spillway Crest Length = Spillway Crest Length = Spillway Crest Length = Spillway Crest Surface = Cne-Hour Rainfall Depth (in) = Calculated Runoff Volume (acre-ft) = Inflow Hydorgraph Volume (acre-ft) = Inflow Hydorgraph Volume (acre-ft) = Inflow Hydorgraph Volume (acre-ft) = Inflow Hydorgraph Volume (acre-ft) = Predevelopment Unit Peak Flow, q (cfs/acre) =	rate (Flat or Sloped) Zone 3 Weir 3.00 4.00 3.00 75% 50% ircular Orifice, Restri Zone 3 Restrictor 0.50 18.00 12.00 gular or Trapezoidal) 5.50 10.00 3.00 	Not Selected N/A N/A N/A N/A N/A N/A ictor Plate, or Rectar Not Selected N/A N/A ft (relative to basin t feet H:V feet EURV 1.07 0.209 0.00	ft (relative to basin bo feet H:V (enter zero for ff feet %, grate open area/t % ft (distance below bas inches inches bottom at Stage = 0 ft 2 Year 1.19 0.149 0.149	ttom at Stage = 0 ft) [at grate] (otal area in bottom at Stage = 0 Half-() 5 Year 1.50 0.225 0.225 0.02	Height of Gr Over Flow Grate Open Area / Overflow Grate Ope Overflow Grate Op (C (t) Central Angle of Restrict Spillway Stage a Basin Area a 10 Year 1.75 0.436 0.19	Calculated ate Upper Edge, H _t = Weir Slope Length = 100-yr Orifice Area = en Area w/o Debris = alculated Parameter Dutlet Orifice Area = et Orifice Centroid = ictor Plate on Pipe = Calcula Design Flow Depth= t Top of Freeboard = t Top of Freeboard = 25 Year 2.00 0.983 0.981 0.64	Parameters for Ove Zone 3 Weir 3.75 3.09 5.56 6.96 3.48 s for Outlet Pipe w/ Zone 3 Restrictor 1.25 0.56 1.91 ted Parameters for S 0.84 6.34 0.36 0.36 50 Year 2.25 1.328 1.326 0.88	rflow Weir Not Selected N/A N/A N/A N/A N/A N/A N/A N/A	feet feet should be ≥ 4 ft ² fe ft ² feet radians <u>500 Year</u> <u>3.85</u> <u>3.262</u> <u>3.259</u> 2.16	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Stope = Horiz. Length of Weir Sides = Overflow Grate Open Area % = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate (C Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert = User Input: Emergency Spillway (Rectang Spillway Invert Stage= Spillway Crest Length = Spillway Crest Length = Calculated Runoff Volume (acre-ft) = OPTIONAL Override Runoff Volume (acre-ft) = Inflow Hydrograph Volume (acre-ft) = Predevelopment Unit Peak Flow, q (cfs/acre) = Predevelopment Peak Q (cfs) =	rate (Flat or Sloped) Zone 3 Weir 3.00 4.00 3.00 75% 50% ircular Orifice, Restr Zone 3 Restrictor 0.50 18.00 12.00 gular or Trapezoidal) 5.50 10.00 3.00 	Not Selected N/A N/A N/A N/A N/A N/A N/A N/A ictor Plate, or Rectar Not Selected N/A N/A If (relative to basin t feet EURV 1.07 0.209 0.00 0.00 0.0 0.0 0.0 0.0 0.0 0.0 0.0	ft (relative to basin bo feet H:V (enter zero for ff feet %, grate open area/t % gular Orifice) ft (distance below bas inches inches inches bottom at Stage = 0 ft <u>2 Year</u> <u>1.19</u> 0.149 0.149 0.01 0.2	ttom at Stage = 0 ft) iat grate) :otal area in bottom at Stage = 0 Half-0 :) 5 Year 1.50 0.225 0.225 0.02 0.295 0.225	Height of Gr Over Flow Grate Open Area / Overflow Grate Ope Overflow Grate Op Overflow Grate Op (Central Angle of Restr Spillway Stage a Basin Area a 10 Year 1.75 0.435 0.19 2.8	Calculated ate Upper Edge, H _t = Weir Slope Length = 100-yr Orifice Area = en Area w/o Debris = en Area w/o Debris = alculated Parameter Dutlet Orifice Area = et Orifice Centroid = ictor Plate on Pipe = Calcula Design Flow Depth= t Top of Freeboard = t Top of Freeboard = 25 Year 2.00 0.983 0.981 0.64 9.4	Parameters for Ove Zone 3 Weir 3.75 3.09 5.56 6.96 3.48 s for Outlet Pipe w/ Zone 3 Restrictor 1.25 0.56 1.91 ted Parameters for S 0.84 6.34 0.36 50 Year 2.25 1.328 1.326 0.88 1.3.1 2.5	rflow Weir Not Selected N/A N/A N/A N/A N/A Flow Restriction Plat NA N/A N/A N/A N/A N/A N/A N/A	feet feet should be ≥ 4 ft ² ft ² fee ft ² feet radians 3.85 3.262 3.259 2.16 3.1.9 7.2	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Stope = Horiz. Length of Weir Sidos = Overflow Grate Open Area % = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate (C Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert = User Input: Emergency Spillway (Rectang Spillway Invert Stage= Spillway Crest Length = Spillway End Slopes = Freeboard above Max Water Surface = Restrict Plate Height Above Pipe Invert = Spillway Crest Length = Spillway End Slopes = Freeboard above Max Water Surface = One-Hour Rainfall Depth (in) = Calculated Runoff Volume (acre-ft) = Inflow Hydrograph Volume (acre-ft) = Predevelopment Unit Peak Flow, q (cfs/acre) = Peak Inflow Q (cfs) = Peak Inflow Q (cfs) = Peak Inflow Q (cfs) =	rate (Flat or Sloped) Zone 3 Weir 3.00 4.00 3.00 75% 50% ircular Orifice, Restr Zone 3 Restrictor 0.50 18.00 12.00 3.00	Not Selected N/A Intervention Interventinterventet Interventet	ft (relative to basin bo feet H-V (enter zero for fi feet %, grate open area/t % sular Orifice) ft (distance below bas inches inches inches inches inches inches 0.149 0.149 0.149 0.01 0.2 2.4	ttom at Stage = 0 ft) at grate) total area in bottom at Stage = 0 Half-0 total area Half-0 total area Half-0 Half-	Height of Gr Over Flow Grate Open Area / Overflow Grate Op Overflow Grate Op Overflow Grate Op (t) Contral Angle of Restr Spillway Stage a Basin Area a Basin Area a 1.75 0.436 0.19 2.8 7.0 2 2	Calculated ate Upper Edge, H, = Weir Slope Length = in Oryr Orifice Area = an Area w/ Debris = ben Area w/ Debris = alculated Parameter Dutlet Orifice Area = et Orifice Centroid = ictor Plate on Pipe = Calcula Design Flow Depth= t Top of Freeboard = t Top of Freeboard = 25 Year 2.00 0.983 0.64 9.4 15.7 10.2	Parameters for Ove Zone 3 Weir 3.75 3.09 5.56 6.96 3.48 s for Outlet Pipe w/ Zone 3 Restrictor 1.25 0.56 1.91 ted Parameters for S 0.84 6.34 0.36 S Vear 2.25 1.328 S 0.88 13.1 21.1 12.5	rflow Weir Not Selected N/A N/A N/A N/A N/A Flow Restriction Plat Not Selected N/A N/A N/A N/A N/A N/A N/A N/A	feet feet should be ≥ 4 ft ² ft ² feet radians 3.85 3.262 3.259 2.16 31.9 51.3 51.3	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Stope = Horiz. Length of Weir Sides = Overflow Grate Open Area % = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate (C Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert = User Input: Emergency Spillway (Rectang Spillway Invert Stage Spillway Crest Length = Spillway Crest Length = Spillway Crest Length = Spillway Crest Length = Spillway Crest Surface = Freeboard above Max Water Surface = Noted Hydrograph Results Design Storm Return Period = One-Hour Rainfall Depth (in) = Calculated Runoff Volume (acre-ft) = Inflow Hydrograph Volume (acre-ft) = Inflow Hydrograph Volume (acre-ft) = Predevelopment Unit Peak Flow, q (cfs/acre) = Peak Inflow Q (cfs) = Peak Outflow Q (cfs) = Peak Outflow Q (cfs) =	rate (Flat or Sloped) Zone 3 Weir 3.00 3.00 4.00 3.00 75% 50% ircular Orifice, Restr Zone 3 Restrictor 0.50 18.00 12.00 3.00	Not Selected N/A Intervention EURV 1.07 0.209 0.209 0.209 0.00 0.0 0.1 N/A	ft (relative to basin bo feet H:V (enter zero for fl feet %, grate open area/t % gular Orifice) ft (distance below bas inches inches inches bottom at Stage = 0 ft 2 Year 1.19 0.149 0.149 0.0149 0.01 0.2 2.4 0.0 N/A	ttom at Stage = 0 ft) at grate) total area in bottom at Stage = 0 Half-1 t) 5 Year 1.50 0.225 0.02 0.225 0.02 0.295 3.7 0.053 0.2	Height of Gr Over Flow Grate Open Area / Overflow Grate Op Overflow Grate Op Overflow Grate Op (tr) Out Central Angle of Restr Spillway Stage a Basin Area a 10 Year 1.75 0.436 0.436 0.19 2.8 7.0 2.2 0.8	Calculated ate Upper Edge, H, = Weir Slope Length = 100-yr Orifice Area = ton Area w/ Debris = alculated Parameter Outlet Orifice Area = et Orifice Centroid = ictor Plate on Pipe = Calcula Design Flow Depth= t Top of Freeboard = Con of Freeboard = 25 Year 2.00 0.983 0.64 9.4 15.7 10.2 1.1	Parameters for Ove Zone 3 Weir 3.75 3.09 5.56 6.96 3.48 s for Outlet Pipe w/ Zone 3 Restrictor 1.25 0.56 1.91 ted Parameters for S 0.84 6.34 0.36 50 Year 2.25 1.328 50 Year 2.25 1.328 1.326 1.328 1.328 1.328 1.326 1.328 1.328 1.328 1.326 1.328 1.326 1.328 1.328 1.328 1.328 1.328 1.328 1.328 1.328 1.328 1.328 1.326 1.328 1.328 1.328 1.328 1.328 1.328 1.326 1.328 1.328 1.326 1.326 1.328 1.328 1.328 1.325 1.0 1.0 1.0	rflow Weir Not Selected N/A N/A N/A N/A N/A N/A Plow Restriction Plat Not Selected N/A N/A N/A N/A N/A N/A N/A N/A	feet feet should be ≥ 4 ft^2 ft^2 feet radians	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Front Edge Length = Overflow Weir Slope = Horiz. Length of Weir Sides = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate (C Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert = User Input: Emergency Spillway (Rectang Spillway Invert Stage= Spillway Crest Length = Spillway Crest Length = Spillway Crest Length = Spillway Crest Length = Spillway End Slopes = Freeboard above Max Water Surface = Routed Hydrograph Results Design Storm Return Period = One-Hour Rainfall Depth (in) = Calculated Runoff Volume (acre-ft) = Inflow Hydrograph Volume (acre-ft) = Predevelopment Unit Peak Flow, q (cfs/acre) = Predevelopment Deak Q (cfs) = Ratio Peak Outflow to Predevelopment Q = Peak Inflow Q (cfs) = Ratio Peak Outflow to Predevelopment Q = Structure Controlling Flow =	rate (Flat or Sloped) Zone 3 Weir 3.00 3.00 4.00 3.00 75% 50% ircular Orifice, Restr Zone 3 Restrictor 0.50 18.00 12.00 3.00	Not Selected N/A N/A N/A N/A N/A N/A N/A N/A ictor Plate, or Rectar Not Selected N/A N/A it (relative to basin b feet H:V feet EURV 1.07 0.209 0.209 0.209 0.00 0.0 3.4 0.1 N/A Plate	ft (relative to basin bo feet H:V (enter zero for fi feet %, grate open area/t % gular Orifice) ft (distance below bas inches inches inches bottom at Stage = 0 ft 0.149 0.149 0.149 0.149 0.2 2.4 0.0 N/A Plate	ttom at Stage = 0 ft) at grate) total area in bottom at Stage = 0 Half-0 t) 5 Year 1.50 0.225 0.225 0.225 0.225 0.225 0.225 0.225 0.225 0.225 0.225 0.225 0.225 0.225 0.225 0.225 0.225 0.225	Height of Gr Over Flow Grate Open Area / Overflow Grate Op Overflow Grate Op (t) Central Angle of Restr Spillway Stage a Basin Area a 10 Year 1.75 0.436 0.435 0.19 2.8 7.0 2.2 0.8 0verflow Grate 1	Calculated ate Upper Edge, H, = Weir Slope Length = 100-yr Orifice Area = ben Area w/ Debris = ben Area w/ Debris = alculated Parameter Outlet Orifice Area = et Orifice Centroid = ictor Plate on Pipe = Calcula Design Flow Depth= t Top of Freeboard = Colcula Design Flow Depth= t Top of Freeboard = 25 Year 2.00 0.983 0.981 0.64 9.4 15.7 10.2 1.1 Overflow Grate 1	Parameters for Ove Zone 3 Weir 3.75 3.09 5.56 6.96 3.48 s for Outlet Pipe w/ Zone 3 Restrictor 1.25 0.56 1.91 ted Parameters for S 0.84 6.34 0.36 50 Year 2.25 1.328 50 Year 2.25 1.328	rflow Weir Not Selected N/A N/A N/A N/A N/A N/A N/A N/A	feet feet should be ≥ 4 ft^2 ft^2 feet radians	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Front Edge Length = Overflow Weir Slope = Horiz. Length of Weir Sides = Overflow Grate Open Area % = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate (C Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert = User Input: Emergency Spillway (Rectang Spillway Invert Stage Spillway Crest Length = Spillway End Slopes = Freeboard above Max Water Surface = Routed Hydrograph Results Design Storm Return Period = One-Hour Rainfall Depth (in) = Calculated Runoff Volume (acre-ft) = Inflow Hydrograph Volume (acre-ft) = Predevelopment Unit Peak Flow, q (cfs/acre) = Predevelopment Deak Q (cfs) = Peak Inflow Q (cfs) = Peak Outflow Q (cfs) = Ratio Peak Outflow to Predevelopment Q = Structure Controlling Flow = Max Velocity through Grate 1 (fps) =	rate (Flat or Sloped) Zone 3 Weir 3.00 4.00 3.00 75% 50% Grcular Orifice, Restr Zone 3 Restrictor 0.50 18.00 12.00 gular or Trapezoidal) 5.50 10.00 3.00 WQCV 0.53 0.113 WQCV 0.53 0.113 0.112 0.00 1.8 0.0 N/A Plate N/A	Not Selected N/A N/A N/A N/A N/A N/A N/A ictor Plate, or Rectan Not Selected N/A N/A ft (relative to basin th feet H:V feet EURV 1.07 0.209 0.00 0.0 0.209 0.00 0.0 3.4 0.1 N/A Plate N/A	ft (relative to basin bo feet H:V (enter zero for fi feet %, grate open area/t % gular Orifice) ft (distance below bas inches inches bottom at Stage = 0 ft 0.149 0.149 0.149 0.149 0.149 0.149 0.149	ttom at Stage = 0 ft) at grate) total area in bottom at Stage = 0 Half-0 t) 5 Year 1.50 0.225 0.225 0.02 0.295 3.7 0.053 0.2 Plate N/A	Height of Gr Over Flow Grate Open Area / Overflow Grate Op Overflow Grate Op Overflow Grate Op (t) Control (C) Control (C) Co	Calculated ate Upper Edge, H _t = Weir Slope Length = 100-yr Orifice Area = ben Area w/ Debris = alculated Parameter Dutlet Orifice Area = et Orifice Centroid = ictor Plate on Pipe = Calcula Design Flow Depth= t Top of Freeboard = Calcula Design Flow Depth= t Top of Freeboard = 25 Year 2.00 0.983 0.981 0.64 9.4 15.7 10.2 1.1 Overflow Grate 1 1.4	Parameters for Ove Zone 3 Weir 3.75 3.09 5.56 6.96 3.48 s for Outlet Pipe w/ Zone 3 Restrictor 1.25 0.56 1.91 ted Parameters for S 0.84 6.34 0.36 50 Year 2.25 1.328 1.328 1.326 0.88 1.31 21.1 1.2.5 1.0 Outlet Piate 1 1.8	rflow Weir Not Selected N/A N/A N/A N/A N/A N/A N/A N/A	feet feet should be ≥ 4 ft ² ft ² ft ² feet radians 3.85 3.262 3.259 2.16 31.9 51.3 15.3 0.5 N/A 2.2	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Front Edge Length = Overflow Weir Slope = Horiz. Length of Weir Sides = Overflow Grate Open Area % = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate (C Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert = User Input: Emergency Spillway (Rectang Spillway Invert Stage Spillway Crest Length = Spillway End Slopes = Freeboard above Max Water Surface = Routed Hydrograph Results Design Storm Return Period = One-Hour Rainfall Depth (in) = Calculated Runoff Volume (acre-ft) = Inflow Hydrograph Volume (acre-ft) = Inflow Hydrograph Volume (acre-ft) = Predevelopment Unit Peak Flow, q (cfs/acre) = Peak Untflow Q (cfs) = Ratio Peak Outflow to Predevelopment Q = Structure Controlling Flow Max Velocity through Grate 1 ((ps) = Max Velocity through Grate 1 ((ps) =	rate (Flat or Sloped) Zone 3 Weir 3.00 3.00 3.00 75% 50% ircular Orifice, Restr Zone 3 Restrictor 0.50 18.00 12.00 2014 or Trapezoidal) 5.50 10.00 3.00 2015 0.113 0.112 0.00 0.0 1.8 0.00 1.8 0.0 N/A Plate N/A N/A	Not Selected N/A It (relative to basin the feet H:V feet H:V feet 0.209 0.209 0.00 0.0 3.4 0.1 N/A Plate N/A	ft (relative to basin bo feet H:V (enter zero for fi feet %, grate open area/t % gular Orifice) ft (distance below bas inches inches bottom at Stage = 0 ft 0.149 0.149 0.149 0.149 0.149 0.149 0.2 2.4 0.0 N/A Plate N/A N/A N/A	ttom at Stage = 0 ft) at grate) total area in bottom at Stage = 0 Half-0 t) 5 Year 1.50 0.225 0.225 0.02 0.225 0.02 0.225 0.02 0.295 3.7 0.053 0.2 Plate N/A N/A N/A	Height of Gr Over Flow Grate Open Area / Overflow Grate Op Overflow Grate Op (t) Contral Angle of Restr Spillway Stage a Basin Area a 0.435 0.19 2.8 7.0 2.2 0.8 Overflow Grate 1 0.3 N/A	Calculated ate Upper Edge, H _i = Weir Slope Length = 100-yr Orifice Area = en Area w/ o Debris = alculated Parameter Outlet Orifice Area = et Orifice Centroid = ictor Plate on Pipe = Calcula Design Flow Depth= t Top of Freeboard = Calcula Design Freeboard = 25 Year 2.00 0.983 0.981 0.64 9.4 15.7 10.2 1.1 Overflow Grate 1 1.4 N/A 67	Parameters for Ove Zone 3 Weir 3.75 3.09 5.56 6.96 3.48 s for Outlet Pipe w/ Zone 3 Restrictor 1.25 0.56 1.91 ted Parameters for S 0.84 6.34 0.36 50 Year 2.25 1.328 1.326 0.88 13.1 21.1 1.2.5 1.0 Outlet Plate 1 1.8 N/A 6.2	rflow Weir Not Selected N/A N/A N/A N/A N/A N/A N/A N/A	feet feet should be ≥ 4 ft ² ft ² feet radians $\frac{500 \text{ Year}}{3.85}$ 3.252 3.252 2.16 31.9 51.3 15.3 0.5 N/A 2.2 N/A 2.2 N/A 4.2	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Front Edge Length = Overflow Weir Slope = Horiz. Length of Weir Slotes = Overflow Grate Open Area % = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate (C Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert = User Input: Emergency Spillway (Rectang Spillway Invert Stage Spillway Crest Length = Spillway End Slopes = Freeboard above Max Water Surface = Routed Hydrograph Results Design Storm Return Period = One-Hour Rainfall Depth (in) = Calculated Runoff Volume (acre-ft) = Inflow Hydrograph Volume (acre-ft) = Predevelopment Unit Peak Flow, q (cfs/acre) = Predevelopment Unit Peak Altow Q (cfs) = Peak Untflow Q (cfs) = Ratio Peak Outflow to Predevelopment Q = Structure Controlling Flow = Max Velocity through Grate 1 (fps) = Time to Drain 97% of Inflow Volume (hourus) = Time to Drain 97% of Inflow Volume (hourus) = Time to Drain 97% of Inflow Volume (hourus) =	rate (Flat or Sloped) Zone 3 Weir 3.00 4.00 3.00 75% 50% ircular Orifice, Restr Zone 3 Restrictor 0.50 18.00 12.00 2017 0.50 10.00 3.00 WQCV 0.53 0.113 0.112 0.00 0.0 1.8 0.00 1.8 0.0 N/A Plate N/A N/A 42 44	Not Selected N/A It (relative to basin the feet H:V feet H:V 0.209 0.209 0.209 0.00 0.1 N/A Plate N/A A	ft (relative to basin bo feet H:V (enter zero for fi feet %, grate open area/t % gular Orifice) ft (distance below bas inches inches bottom at Stage = 0 ft 0.149 0.149 0.149 0.149 0.149 0.149 0.149 0.149	ttom at Stage = 0 ft) at grate) total area in bottom at Stage = 0 Half-0 t) S Year 1.50 0.225 0.022 0.225 0.022 0.225 0.022 0.225 0.022 0.225 0.022 0.295 3.7 0.053 0.22 Plate N/A N/A 69 72	Height of Gr Over Flow Grate Open Area / Overflow Grate Op Overflow Grate Op (ft) Central Angle of Rest Spillway Stage a Basin Area a 0.435 0.19 2.8 7.0 2.2 0.8 0.verflow Grate 1 0.3 N/A 74 78	Calculated ate Upper Edge, H, = Weir Slope Length = 100-yr Orifice Area = en Area w/o Debris = alculated Parameter Outlet Orifice Area = et Orifice Centroid = ictor Plate on Pipe = Calcula Design Flow Depth= t Top of Freeboard = Calcula Design Flow Depth= t Top of Freeboard = 25 Year 2.00 0.983 0.64 9.4 15.7 10.2 1.1 Overflow Grate 1 1.4 N/A 67 76	Parameters for Ove Zone 3 Weir 3.75 3.09 5.56 6.96 3.48 s for Outlet Pipe w/ Zone 3 Restrictor 1.25 0.56 1.91 ted Parameters for S 0.84 6.34 0.36 50 Year 2.25 1.328 50 Year 1.326 0.88 13.1 21.1 12.5 1.0 Outlet Plate 1 1.8 N/A 63 74	rflow Weir Not Selected N/A N/A N/A N/A N/A N/A N/A N/A	feet feet should be ≥ 4 ft^2 ft^2 feet radians	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Stope = Horiz. Length of Weir Sides = Overflow Grate Open Area % = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate (C Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert = User Input: Emergency Spillway (Rectang Spillway Invert Stage= Spillway Crest Length = Spillway Crest Length = Calculated Hydrograph Results Design Storm Return Period = One-Hour Rainfall Depth (in) = Calculated Runoff Volume (acre-ft) = Inflow Hydrograph Volume (acre-ft) = Predevelopment Unit Peak Flow, q (cfs/acre) = Predevelopment Volume (acre-ft) = Ratio Peak Outflow to Predevelopment Q = Structure Controlling Flow = Max Velocity through Grate 1 (fps) = Max Velocity through Grate 1 (fps) = Time to Drain 97% of Inflow Volume (hours) = Time to Drain 97% of Inflow Volume (hours) = Time to Drain 97% of Inflow Volume (hours) = Maximum Ponding Depth (ft) =	rate (Flat or Sloped) Zone 3 Weir 3.00 4.00 3.00 75% 50% Solution 200 Solution	Not Selected N/A ictor Plate, or Rectar Not Selected N/A N/A N/A N/A feet H:V feet 0.209 0.209 0.00 0.3.4 0.1 N/A Plate N/A A 66 68 2.77	ft (relative to basin bo feet H:V (enter zero for fi feet %, grate open area/t % gular Orifice) ft (distance below bas inches inches bottom at Stage = 0 ft 0.149 0.140 0.149 0.149 0.140 0.149 0.1400	ttom at Stage = 0 ft) at grate) total area in bottom at Stage = 0 Half-0 total total area Half-1 total	Height of Gr Over Flow Grate Open Area / Overflow Grate Op Overflow Grate Op (t) Control of the open Spillway Stage a Basin Area a 0.435 0.19 2.8 0.435 0.19 2.8 7.0 2.2 0.8 Overflow Grate 1 0.3 N/A 74 78 3.43	Calculated ate Upper Edge, H, = Weir Slope Length = 100-yr Orifice Area = en Area w/o Debris = alculated Parameter Dutlet Orifice Area = et Orifice Centroid = ictor Plate on Pipe = Calcula Design Flow Depth= t Top of Freeboard = t Top of Freeboard = t Top of Freeboard = 25 Year 2.00 0.983 0.981 0.64 9.4 9.4 15.7 10.2 1.1 0verflow Grate 1 1.4 N/A 67 76 3.97	Parameters for Ove Zone 3 Weir 3.75 3.09 5.56 6.96 3.48 s for Outlet Pipe w/ Zone 3 Restrictor 1.25 0.56 1.91 ted Parameters for S 0.84 6.34 0.36 50 Year 2.25 1.328 1.326 0.88 13.1 1.326 0.88 13.1 1.326 0.88 13.1 1.25 1.328 1.326 0.88 13.1 1.25 1.328 1.326 0.88 13.1 1.326 0.88 13.1 1.326 0.88 13.1 1.25 1.328 1.326 0.88 1.31 1.326 0.88 1.31 1.326 0.88 1.31 1.326 0.88 1.31 1.326 0.88 1.31 1.326 0.88 1.31 1.326 0.88 1.31 1.326 0.88 1.31 1.326 0.88 1.31 1.326 0.88 1.31 1.326 0.88 1.31 1.326 0.74 1.8 N/A 63 74 4.39	rflow Weir Not Selected N/A N/A N/A N/A N/A N/A N/A N/A	feet feet should be ≥ 4 ft^2 ft^2 fee fret radians 3.259 2.16 31.9 2.16 31.9 5.1.3 15.3 0.5 N/A 42 N/A 42 66 66 6.50	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Stope = Horiz. Length of Weir Sides = Overflow Grate Open Area % = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate (C Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert = User Input: Emergency Spillway (Rectang Spillway Invert Stage= Spillway Crest Length = Spillway Crest Length = Calculated Runoff Volume (acre-ft) = Calculated Runoff Volume (acre-ft) = Neak Inflow Hydrograph Volume (acre-ft) = Predevelopment Veak Q (cfs) = Peak Nufflow Q (cfs) = Peak Nufflow Q (cfs) = Peak Nufflow Q (cfs) = Ratio Peak Outflow to Predevelopment Q = Structure Controlling Flow = Max Velocity through Grate 1 (fps) = Maximum Ponding Depth (acres) =	rate (Flat or Sloped) Zone 3 Weir 3.00 4.00 3.00 75% 50% ircular Orifice, Restr Zone 3 Restrictor 0.50 18.00 12.00 200 201 200 200 200 200 200 2	Not Selected N/A ictor Plate, or Rectar Not Selected N/A N/A ft (relative to basin the feet EURV 1.07 0.209 0.00 0.00 0.00 0.00 0.1 N/A Plate N/A 66 68 2.77 0.17	ft (relative to basin bo feet H:V (enter zero for ff feet %, grate open area/t % gular Orifice) ft (distance below bas inches inches inches inches bottom at Stage = 0 ft 0.149 0.149 0.149 0.149 0.01 0.2 2.4 0.0 N/A Plate N/A Plate N/A N/A 52 54 2.42 0.16	ttom at Stage = 0 ft) at grate) total area in bottom at Stage = 0 Half-0 total total area Half-0 total Half-0 total Half-0 total total total Half-0 total Half-0 total Half-0 total total total total total total total Half-0 total	Height of Gr Over Flow Grate Open Area / Overflow Grate Open Overflow Grate Open Overflow Grate Open C (t) Central Angle of Restu Spillway Stage a Basin Area a Basin Area a 0.435 0.435 0.435 0.435 0.19 2.8 7.0 2.2 0.8 0verflow Grate 1 0.3 N/A 74 78 3.43 0.19	Calculated ate Upper Edge, H, = Weir Slope Length = 100-yr Orifice Area = en Area w/o Debris = alculated Parameter Dutlet Orifice Area = et Orifice Centroid = ictor Plate on Pipe = Calcula Design Flow Depth= t Top of Freeboard = t Top of Freeboard = t Top of Freeboard = 25 Year 2.00 0.983 0.981 0.64 9.4 15.7 10.2 1.1 0.verflow Grate 1 1.4 N/A 67 76 3.97 0.21	Parameters for Ove Zone 3 Weir 3.75 3.09 5.56 6.96 3.48 s for Outlet Pipe w/ Zone 3 Restrictor 1.25 0.56 1.91 ted Parameters for S 0.84 6.34 0.36 50 Year 2.25 1.328 1.326 0.88 1.321 1.325 1.328 1.326 0.88 1.321 1.326 0.88 1.321 1.326 0.88 1.321 1.32 0.00 0.01 0.02	rflow Weir Not Selected N/A N/A N/A N/A N/A N/A N/A N/A	Source feet should be ≥ 4 ft^2 ft^2 feet radians	



Detention Basin Outlet Structure Design

Outflow Hydrograph Workbook Filename:

	Storm Inflow H The user can o	ydrographs	UD-Det	ention, Version drographs from	n 3.07 (Februa this workbook v	ry 2017) <i>i</i> ith inflow hydro	graphs develop	ed in a separate	program.	
	SOURCE	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK
Time Interval	TIME	WQCV [cfs]	EURV [cfs]	2 Year [cfs]	5 Year [cfs]	10 Year [cfs]	25 Year [cfs]	50 Year [cfs]	100 Year [cfs]	500 Year [cfs]
5.17 min	0:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:05:10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hydrograph	0:10:20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Constant	0:15:31	0.08	0.15	0.11	0.17	0.31	0.69	0.92	1.22	2.16
0.966	0:20:41	0.22	0.41	0.30	0.44	0.84	1.86	2.50	3.32	5.97
	0:25:51	0.57	1.06	0.76	1.14	2.16	4.78	6.41	8.52	15.32
	0:36:11	1.56	3.40	2.09	3.66	7.01	15.14	21 11	23.39	42.02 51.29
	0:41:22	1.74	3.24	2.31	3.49	6.68	14.99	20.19	27.00	49.22
	0:46:32	1.58	2.94	2.10	3.17	6.08	13.65	18.38	24.57	44.79
	0:51:42	1.40	2.61	1.86	2.82	5.42	12.21	16.47	22.05	40.32
	0:56:52	1.19	2.24	1.59	2.41	4.67	10.57	14.29	19.15	35.20
	1:07:13	0.94	1.96	1.39	1 01	3.69	9.20	12.42	15.09	30.69
	1:12:23	0.76	1.44	1.02	1.51	3.03	6.91	9.36	12.57	23.21
	1:17:33	0.61	1.17	0.82	1.26	2.47	5.66	7.69	10.36	19.20
	1:22:43	0.46	0.88	0.62	0.95	1.89	4.39	5.99	8.11	15.16
	1:27:53	0.33	0.64	0.45	0.70	1.40	3.29	4.53	6.16	11.66
	1:33:04	0.24	0.47	0.33	0.51	1.02	2.38	3.30	4.52	8.67
	1:43:24	0.15	0.31	0.20	0.33	0.65	1.51	2.07	2.80	5.27
	1:48:34	0.14	0.26	0.18	0.28	0.55	1.28	1.75	2.37	4.44
	1:53:44	0.12	0.23	0.16	0.25	0.49	1.12	1.53	2.07	3.87
	1:58:55	0.11	0.21	0.15	0.22	0.44	1.01	1.37	1.86	3.46
	2:04:05	0.10	0.19	0.14	0.21	0.41	0.93	1.26	1.71	3.17
	2:14:25	0.05	0.14	0.10	0.13	0.30	0.50	0.68	0.92	1.71
	2:19:35	0.04	0.08	0.05	0.08	0.16	0.37	0.50	0.67	1.26
	2:24:46	0.03	0.05	0.04	0.06	0.12	0.27	0.37	0.50	0.94
	2:29:56	0.02	0.04	0.03	0.04	0.08	0.19	0.27	0.36	0.68
	2:35:06	0.01	0.03	0.02	0.03	0.06	0.14	0.19	0.26	0.49
	2:45:26	0.01	0.02	0.01	0.02	0.04	0.10	0.14	0.13	0.25
	2:50:37	0.00	0.01	0.00	0.01	0.02	0.04	0.06	0.08	0.16
	2:55:47	0.00	0.00	0.00	0.00	0.01	0.02	0.03	0.04	0.09
	3:00:57	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.04
	3:06:07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	3:16:28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:21:38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:26:48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:31:58	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:37:08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:47:29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:52:39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:57:49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:02:59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:08:10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:18:30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:23:40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:28:50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:34:01 4:39:11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:44:21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:49:31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:54:41 4:59:52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:05:02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:10:12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:15:22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:25:43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:30:53	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:36:03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:46:23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:51:34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:56:44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:07:04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:12:14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)

Summary Stage-Area-Volume-Discharge Relationships The user can create a summary S-A-V-D by entering the desired stage increments and the remainder of the table will populate automatically. The user should graphically compare the summary S-A-V-D table to the full S-A-V-D table in the chart to confirm it captures all key transition p

The user should graphically co	inpare trie sum	inary 0-A-V-D ta		-A-V-D table in		inini il capitiles ai	
Stage - Storage	Stage	Area	Area	Volume	Volume	Total	
Description	[#1	[#^2]	[acres]	[#^3]	[ac.ft]	[cfs]	
	US	[it 2]	[acres]	[it 5]	[ac-ic]	[CI3]	
	0.00	40	0.001	0	0.000	0.00	For best results, include the
	1.00	114	0.003	76	0.002	0.02	stages of all grade slope
	1.00	6.25.9	0.146	2 201	0.075	0.02	changes (e.g. ISV and Floor)
	2.00	6,358	0.146	3,281	0.075	0.03	from the S-A-V table on
WQCV	2.19	6,687	0.154	4,591	0.105	0.04	Sheet 'Basin'.
2 Yr	2.42	7,009	0.161	6,166	0.142	0.05	
FLIRV	2 77	7,499	0.172	8,705	0.200	0.05	Also include the inverts of all
E Ve	2.07	7.625	0 175	9 3 8 5	0.215	0.05	outlets (e.g. vertical orifice
5 11	2.80	7,023	0.175	3,385	0.215	0.05	overflow grate and chillway
	3.00	7,821	0.180	10,466	0.240	0.05	overnow grate, and spinway,
	4.00	9,335	0.214	19,044	0.437	10.75	where applicable).
	5.00	11,027	0.253	29,225	0.671	13.39	
100 %*	5 20	12 066	0 277	32 689	0.750	13 79	t
100 11	5.50	12,000	0.277	32,005	0.750	15.75	1
							4
							1
							1
							1
							+
							4
							1
							1
							4
							4
							1
							4
							4
							1
							1
							+
							1
							1
							1
							1
							4
							1
							1
							1
							1
							4
							1
							1
							-
							4
							1
							1
							4
							4
							4
							J
							1
							1
							1
							1
							1
							4
							4
-							4
							4
							1
]
							1
							1
							1
							1
							4
							4
							4
							1
							J

<complex-block></complex-block>						TORAG		DOILDLI	•				
			NOU 51 /	UD-D	etention, Version 3	.07 (Febru	ary 2017)						
	Project: Basin ID:	POND 2		UNU. 1									
	ZONE 3	2											
	100-YR	CONE 1	T	<u> </u>									
		1					_						
	I ZONE	1 AND 2	100-YI ORIFI	EAR	Depth Increment =	1	ft.						
	PERMANENT ORIFI	Configurati	on (Retent	tion Pond)	Stane - Storane	Stane	Optional	Length	Width	Area	Optional	Area	Volu
Texper Control of a set of	Example Eore	oomgaraa	011 (1101011	lion rondy	Description	(ft)	Stage (ft)	(ft)	(ft)	(ft^2)	Area (ft^2)	(acre)	(ft^:
	Required Volume Calculation		-		Top of Micropool	-	0.00	-			45	0.001	_
	Selected BMP Type =	EDB	-				1.00	-			3,103	0.071	1,54
	Watershed Area =	28.60	acres			-	2.00	-		-	7,895	0.181	6,99
Watering inproving information Boom Formation Boom Control Control <thcontro< th=""> Control <thcontro<< td=""><td>Watershed Slope =</td><td>0.020</td><td>ft/ft</td><td></td><td></td><td>-</td><td>4.00</td><td>-</td><td>-</td><td>-</td><td>10.942</td><td>0.210</td><td>25.9</td></thcontro<<></thcontro<>	Watershed Slope =	0.020	ft/ft			-	4.00	-	-	-	10.942	0.210	25.9
Number by heights is diama is a serie intermed by heights of dama is a serie intermed by heights dama is a serie intermed by heights of dama is a serie	Watershed Imperviousness =	9.50%	percent				5.00				12,677	0.291	37,7
matrix	Percentage Hydrologic Soil Group A =	0.0%	percent				6.00				14,446	0.332	51,2
Processe Description Description <thdescription< th=""> <thdescription< th=""> <t< td=""><td>Percentage Hydrologic Soil Group B =</td><td>100.0%</td><td>percent</td><td></td><td></td><td></td><td>7.00</td><td></td><td></td><td></td><td>19,320</td><td>0.444</td><td>68,1</td></t<></thdescription<></thdescription<>	Percentage Hydrologic Soil Group B =	100.0%	percent				7.00				19,320	0.444	68,1
	Percentage Hydrologic Soil Groups C/D =	0.0%	percent				8.00				25,278	0.580	90,4
	Location for 1-br Rainfall Denths =	40.0	nours									-	
Line Munder Wahmer (1997) Line Munder (1997) <thl< td=""><td>Water Quality Capture Volume (WQCV) =</td><td>0.153</td><td>acre-feet</td><td>Optional User Override</td><td></td><td>-</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></thl<>	Water Quality Capture Volume (WQCV) =	0.153	acre-feet	Optional User Override		-							
	Excess Urban Runoff Volume (EURV) =	0.254	acre-feet	1-hr Precipitation		-							
Sp Rod/ Volume (P1 - 13) a) O.22 Orego O.10 O.10 <tho.10< th=""> <tho.10< th=""> O.10 <th< td=""><td>2-yr Runoff Volume (P1 = 1.19 in.) =</td><td>0.174</td><td>acre-feet</td><td>1.19 inches</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></th<></tho.10<></tho.10<>	2-yr Runoff Volume (P1 = 1.19 in.) =	0.174	acre-feet	1.19 inches									
Display Display <t< td=""><td>5-yr Runoff Volume (P1 = 1.5 in.) =</td><td>0.272</td><td>acre-feet</td><td>1.50 inches</td><td></td><td></td><td></td><td>-</td><td></td><td>-</td><td></td><td></td><td></td></t<>	5-yr Runoff Volume (P1 = 1.5 in.) =	0.272	acre-feet	1.50 inches				-		-			
	10-yr Runoff Volume (P1 = 1.75 in.) = 25-yr Runoff Volume (P1 = 2 in.) =	0.635	acre-feet	1.75 inches									
100 pr lund Vunne (P1 + 25 n) - 270 270 resolution 230 pr lund Vunne (P1 + 25 n) - 270 resolution 4 promited > 20 betenix Vunne - 0.101 resolution 4 promited > 20 betenix Vunne - 0.101 resolution 4 promited > 20 betenix Vunne - 0.101 resolution 4 promited > 20 betenix Vunne - 0.101 resolution 4 promited > 20 betenix Vunne - 0.101 resolution 5 resolution resolution 4 promited > 20 betenix Vunne - 0.101 resolution 5 resolution resolution 7 red Availed Control Resolution resolution 8 resolution resolution 8 resolution resolution 9 resolution resolution 10 resolution resolution 10 resolution resolution 10 resolution resolution 10 resolution	50-vr Runoff Volume (P1 = 2.25 in.) =	2.389	acre-feet	2.25 inches						-			
BAP, Rund Values (P1 - 30) 0.02 rest Approximate Sy Detension Values - 0.03 0.04 rest end Approximate Sy Detension Values - 0.05 rest end Table Status (String Values (String Values - 0.05) rest end Table Status (String Values (String	100-yr Runoff Volume (P1 = 2.52 in.) =	3.270	acre-feet	2.52 inches									
Approximate / 2 Detension Visuuma /	500-yr Runoff Volume (P1 = 3.85 in.) =	6.102	acre-feet	3.85 inches						-			
Approximate by Detenton Vulnes 0.54 answhed Approximate by Detenton Vulnes 0.51 answhed Approximate by Detenton Vulnes 0.55 answhed Stape Stape Colume Vulnes 0.55 answhed Stape Stape Colume Vulnes 0.51 answhed Stape Stape Colume Vulnes 0.55 answhed Stape Stape Colume Vulnes 0.53 answhed Stape Stape Colume Vulnes 0.56 answhed Stape Stape Colume Vulnes 0.	Approximate 2-yr Detention Volume =	0.161	acre-feet			-							
Approximate 32p Deduced Volume 1 Difference of the second sec	Approximate 5-yr Detention Volume =	0.254	acre-feet		-								
Appointed by Debation Volume DPB Sourced Step-Storge Calculate	Approximate 25-yr Detention Volume =	0.540	acre-feet			-				-			
	Approximate 50-yr Detention Volume =	0.795	acre-feet										
spes-forge Suburg 0.1 0.1 0.1	Approximate 100-yr Detention Volume =	1.030	acre-feet										
Bits Construction Construction <thconstruction< th=""> Construction</thconstruction<>													
Long 1 Ware (EM) 0.01 arcsbedt Zong 3 Ware (EM) 0.01 arcsbedt Long 1 Ware (EM) 0.02 arcsbedt Lind 5 Gardage Varen (S) 0.02 arcsbedt Total Abateb Denton Denty Mull 0.02 0.02 Spead Traisb Channel (S): 0.02 0.02 Spead Traisb Channel (S): 0.02 n Base of Bain Don (No.02): 0.02 n Spead Traisb Channel (S): 0.02 n Base of Bain Don (No.02): 0.02 n Base of Bain Don (No.02): 0.02 n Spead Traisb Channel (S): 0.02 n Base of Bain Don (No.02): 0.02 n Base of Bain Don (No.02): 0.02 n Spead Traisb Channel (S): 0.02 n Base of Bain Don (No.02): 0.02 n Base of Bain Don (No.02): 0.02 n With of Bain No.02 0.02 n n <td>Stage-Storage Calculation</td> <td>0.452</td> <td>1</td> <td></td> <td></td> <td></td> <td></td> <td>-</td> <td></td> <td></td> <td></td> <td></td> <td></td>	Stage-Storage Calculation	0.452	1					-					
2.003 Volume (10)-year-Zone 3 k0 j 0.07 million year-Zone 3 k0 j<	Zone 2 Volume (FURV - Zone 1) =	0.153	acre-feet			-		-	-				
Total Detection Bank Volumes 100 user n -	Zone 3 Volume (100-year - Zones 1 & 2) =	0.776	acre-feet					-					
Initial Sucharge Detworks	Total Detention Basin Volume =	1.030	acre-feet			-		-					
Initial Surcharge Depth (BD) user n -	Initial Surcharge Volume (ISV) =	user	ft^3										
Index Analysis (betherbound (Spin) = user, in the second secon	Initial Surcharge Depth (ISD) =	user	ft					-	-	-			<u> </u>
Dipple of Thore Channel (n) use n n -	I otal Available Detention Depth (H _{total}) =	user	ft					-		-			-
Skope of Main Basin Skop (R ₁₀₀) = user ty India Skop (R ₁₀₀) = user n Skope of Main Basin (R ₁₀₀) = user n Skop of Main Basin (R ₁₀₀) = user n Skop of Main Basin (R ₁₀₀) = user n User of Basin Floor (N ₁₀₀₀) = user n Value of Basin Floor (N ₁₀₀₀) = user n Value of Basin Floor (N ₁₀₀₀) = user n Value of Basin Floor (N ₁₀₀₀) = user n Value of Basin Floor (N ₁₀₀₀) = user n Value of Basin Floor (N ₁₀₀₀) = user n Value of Main Basin (N ₁₀₀₀) = user n Value of Main Basin (N ₁₀₀₀) = user n Value of Main Basin (N ₁₀₀₀) = user n Value of Main Basin (N ₁₀₀₀) = user n Value of Main Basin (N ₁₀₀₀) = user n Value of Main Basin (N ₁₀₀₀) = user n user n Value of Main Basin (N ₁₀₀₀) = user n user n Value of Main Basin (N ₁₀₀₀) = user n user n Value of Main Basin (N ₁₀₀₀) =	Slope of Trickle Channel (Nrc) =	user	ft ft/ft			-		-	-	-			
Basin Longh-b-Width Raito (R _w) user -	Slopes of Main Basin Sides (Smain) =	user	H:V					-					
hital Surcharge Areas (Ang) # user n	Basin Length-to-Width Ratio (R _{L/W}) =	user				-		-		-			
Surcharge Volume Longh (Vanue) user N Surcharge Volume Longh (Vanue) user N Depth of Bain Floor (Vanue) user N Width of Bain Floor (Vanue) user N User of Main Bain (Vanue) user N Width of Main Bain (Vanue) user N Width of Main Bain (Vanue) user N Volume of Main Bain (Vanue) user N Volume of Main Bain (Vanue) user N Width of Main Bain (Vanue) user N Volume of Main Bain (Vanue) user N User of Main Bain (Vanue) us			-					-	-	-			<u> </u>
Surchings Volumine (hund)s user n	Initial Surcharge Area (A _{ISV}) =	user	ft^2					-					
Depth of Basin Floor (h_noo) = user h - <	Surcharge Volume Width (W _{ISV}) =	user	π θ					-					
Length of Basin Floor (Muod) = user h <td>Depth of Basin Floor (H_{FLOOR}) =</td> <td>user</td> <td>ft</td> <td></td>	Depth of Basin Floor (H _{FLOOR}) =	user	ft										
Widh d Bain Floor (Noco) A ce of Bain Floor (Noco) Deph of Min Bain (Noco) Length of Min Bain (Noco) Widh of Main Bain (Noc	Length of Basin Floor (L _{FLOOR}) =	user	ft					-					
Area or team from (Aucou) user Mr2 I <th< td=""><td>Width of Basin Floor (W_{FLODR}) =</td><td>user</td><td>ft</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td><u> </u></td></th<>	Width of Basin Floor (W _{FLODR}) =	user	ft										<u> </u>
Values of neur freque (Value) Length of Main Bain (Value)	Area of Basin Floor (A _{FLOOR}) =	user	ft^2					-			-		
1 1	volume of Basin Floor (V _{ROOR}) = Depth of Main Basin (H) =	User	ft^3 e			-		-	-	-			-
With of Main Basin (Augu) = Volume of Main Basin (Vugu) = Volume of Main Basin (Vugu) = User user m2 acre-feet -	Length of Main Basin (L _{MAIN}) =	user	ft			-		-					
Area of Main Basin (Vauu) = user P2 Uburne of Main Basin (Vauu) = user P3 - <td>Width of Main Basin (W_{MAIN}) =</td> <td>user</td> <td>ft</td> <td></td> <td></td> <td></td> <td></td> <td>-</td> <td>-</td> <td></td> <td></td> <td></td> <td></td>	Width of Main Basin (W _{MAIN}) =	user	ft					-	-				
Volume of Main Basin (Volume) user mod m	Area of Main Basin (A _{MAIN}) =	user	ft^2					-					
unument von (von (von (von (von (von (von (von	Volume of Main Basin (V _{MAIN}) =	user	ft^3					-	-		-		-
	Calculated Lotal Basin Volume (V _{total}) =	user	acre-feet					-					-
								-					
						-		-	-	-			
												-	
								-					
								-		-			
								-		-			
								-		-			
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $								-	-	-			-
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$						-		-	-	-			
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$								-					<u> </u>
$ \begin{vmatrix}$								-					
								-	-	-			
Image: sector of the								-		-	-		
Image: Provide the state of the st								-		-	-		-
								-		-			
												-	
								-	-	-			
					1				- 1	1 -	1		

UD-Detention, Version 3.07 (February 2017)



Detention Basin Outlet Structure Design										
Project:	REDTAIL RANCH F	FILING NO. 1	UD-Detention, Ve	rsion 3.07 (Februar	ry 2017)					
Basin ID:	POND 2									
ZONE 3 ZONE 2 ZONE 1										
				Stage (ft)	Zone Volume (ac-ft)	Outlet Type				
VOLOMET EURV WOCV			Zone 1 (WQCV)	1.95	0.153	Orifice Plate				
ZONE 1 AND 2	100-YEA	R	Zone 2 (EURV)	2.49	0.101	Orifice Plate				
PERMANENT ORIFICES	Configuration (De		'one 3 (100-year)	5.55	0.776	Weir&Pipe (Restrict)				
Example Zone	Configuration (Re	etention Pond)			1.030	Total				
User Input: Orifice at Underdrain Outlet (typically u	sed to drain WQCV i	n a Filtration BMP)				Calculate	ed Parameters for Un	nderdrain		
Underdrain Orifice Invert Depth =	N/A	ft (distance below th	ne filtration media su	rface)	Unde	rdrain Orifice Area =	N/A	ft ²		
Underdrain Orifice Diameter =	N/A	Inches			Underdra	in Orifice Centroid =	N/A	feet		
User Input: Orifice Plate with one or more orifices	or Elliptical Slot Wei	r (typically used to du	rain WOCV and/or EL	JRV in a sedimentati	ion BMP)	Calcu	lated Parameters for	Plate		
Invert of Lowest Orifice =	0.00	ft (relative to basin b	pottom at Stage = 0 f	t)	WQ.01	ifice Area per Row =	N/A	ft ²		
Depth at top of Zone using Orifice Plate =	3.00	ft (relative to basin b	oottom at Stage = 0 fi	t)	E	liptical Half-Width =	N/A	feet		
Orifice Plate: Orifice Vertical Spacing =	12.00	inches			Ellip	tical Slot Centroid =	N/A	feet		
Orifice Plate: Orifice Area per Row =	N/A	inches				Elliptical Slot Area =	N/A	ft ²		
User Input: Stage and Total Area of Each Orifice	Row (numbered fro	m lowest to highest)			D			1	
Change of Online Operated (4)	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 or Unifice Centroid (ft)	0.00	0.08	0.08						1	
Onnice Area (sq. inches)	0.70	0.30	0.00						1	
	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 (Circ	ular or Rectangular)	1	1			Calculated	Parameters for Vert	ical Orifice	1	
	Not Selected	Not Selected					Not Selected	Not Selected	. 2	
Invert of Vertical Orifice =	N/A	N/A N/A	ft (relative to basin t	oottom at Stage = 0 f	t) V	ertical Orifice Area =	N/A	N/A	ft ⁻	
Vertical Orfice Diameter =	N/A N/A	N/A N/A	inches	ottom at stage = 0 i	t) vertic	ai Office Centroid =	N/A	N/A	lieet	
User Input: Overflow Weir (Dropbox) and G	rate (Flat or Sloped)					Calculated	Parameters for Ove	rflow Weir		
User Input: Overflow Weir (Dropbox) and G	rate (Flat or Sloped) Zone 3 Weir	Not Selected]			Calculated	Parameters for Ove Zone 3 Weir	rflow Weir Not Selected]	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho =	rate (Flat or Sloped) Zone 3 Weir 3.00	Not Selected	ft (relative to basin bo	ttom at Stage = 0 ft)	Height of Gr	Calculated ate Upper Edge, $H_t =$	Parameters for Ove Zone 3 Weir 4.00	rflow Weir Not Selected N/A	feet	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length =	rate (Flat or Sloped) Zone 3 Weir 3.00 4.00	Not Selected N/A N/A	ft (relative to basin bo feet	ttom at Stage = 0 ft)	Height of Gr Over Flow	Calculated ate Upper Edge, H _t = Weir Slope Length =	Parameters for Ove Zone 3 Weir 4.00 4.12	rflow Weir Not Selected N/A N/A	feet feet	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Slope =	rate (Flat or Sloped) Zone 3 Weir 3.00 4.00 4.00	Not Selected N/A N/A N/A	ft (relative to basin bo feet H:V (enter zero for fl	ttom at Stage = 0 ft) at grate)	Height of Gr Over Flow Grate Open Area /	Calculated ate Upper Edge, H _t = Weir Slope Length = 100-yr Orifice Area =	Parameters for Ove Zone 3 Weir 4.00 4.12 8.39	rflow Weir Not Selected N/A N/A N/A	feet feet should be ≥4	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Slope = Horiz. Length of Weir Sides =	rate (Flat or Sloped) Zone 3 Weir 3.00 4.00 4.00 4.00	Not Selected N/A N/A N/A N/A	ft (relative to basin bo feet H:V (enter zero for fl feet	ttom at Stage = 0 ft) at grate)	Height of Gr Over Flow Grate Open Area / Overflow Grate Ope	Calculated ate Upper Edge, H _t = Weir Slope Length = 100-yr Orifice Area = en Area w/o Debris =	Parameters for Ove Zone 3 Weir 4.00 4.12 8.39 12.37	rflow Weir Not Selected N/A N/A N/A N/A	feet feet should be ≥ 4 ft ²	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Slope = Horiz. Length of Weir Sides = Overflow Grate Open Area % =	rate (Flat or Sloped) Zone 3 Weir 3.00 4.00 4.00 4.00 75% 5.00	Not Selected N/A N/A N/A N/A N/A	ft (relative to basin bo feet H:V (enter zero for fi feet %, grate open area/t	ttom at Stage = 0 ft) at grate) total area	Height of Gr Over Flow Grate Open Area / Overflow Grate Ope Overflow Grate Op	Calculated ate Upper Edge, H _t = Weir Slope Length = 100-yr Orifice Area = en Area w/o Debris = pen Area w/ Debris =	Parameters for Ove Zone 3 Weir 4.00 4.12 8.39 12.37 6.18	rflow Weir Not Selected N/A N/A N/A N/A N/A	feet feet should be ≥ 4 ft ² ft ²	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Slope = Horiz. Length of Weir Sides = Overflow Grate Open Area % = Debris Clogging % =	rate (Flat or Sloped) Zone 3 Weir 3.00 4.00 4.00 4.00 75% 50%	Not Selected N/A N/A N/A N/A N/A N/A	ft (relative to basin bo feet H:V (enter zero for fi feet %, grate open area/t %	ttom at Stage = 0 ft) at grate) :otal area	Height of Gr Over Flow Grate Open Area / Overflow Grate Ope Overflow Grate Op	Calculated ate Upper Edge, H, = Weir Slope Length = 100-yr Orifice Area = en Area w/ Debris = een Area w/ Debris =	Parameters for Ove Zone 3 Weir 4.00 4.12 8.39 12.37 6.18	rflow Weir N/A N/A N/A N/A N/A N/A	feet feet should be ≥ 4 ft ² ft ²	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Slope = Horiz. Length of Weir Sides = Overflow Grate Open Area % = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate (C	rate (Flat or Sloped) Zone 3 Weir 3.00 4.00 4.00 4.00 75% 50% Groular Orifice. Restr	Not Selected N/A N/A N/A N/A N/A N/A	ft (relative to basin bo feet H-V (enter zero for ff feet %, grate open area/t %	ttom at Stage = 0 ft) at grate) total area	Height of Gr Over Flow Grate Open Area / Overflow Grate Op Overflow Grate Op	Calculated ate Upper Edge, H, = Weir Slope Length = 100-yr Orifice Area = in Area w/ O Debris = ben Area w/ Debris = alculated Parameter	Parameters for Ove Zone 3 Weir 4.00 4.12 8.39 12.37 6.18 s for Outlet Pipe w/	rflow Weir N/A N/A N/A N/A N/A Elow Restriction Pla	feet feet should be ≥ 4 ft ² ft ²	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Slope = Horiz. Length of Weir Sides = Overflow Grate Open Area % = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate (C	rate (Flat or Sloped) Zone 3 Weir 3.00 4.00 4.00 75% 50% ircular Orifice, Restr Zone 3 Restrictor	Not Selected N/A N/A N/A N/A N/A N/A ictor Plate, or Rectar Not Selected	ft (relative to basin bo feet H-V (enter zero for fi feet %, grate open area/t % gular Orifice)	ttom at Stage = 0 ft) at grate) total area	Height of Gr Over Flow Grate Open Area / Overflow Grate Op Overflow Grate Op	Calculated ate Upper Edge, H, = Weir Slope Lengt 100-yr Orifice Area = 100-yr Orifice Area = n Area w/ Debris = ben Area w/ Debris = alculated Parameter	Parameters for Ove Zone 3 Weir 4.00 4.12 8.39 12.37 6.18 s for Outlet Pipe w/ Zone 3 Restrictor	rflow Weir N/A N/A N/A N/A N/A Flow Restriction Pla Not Selected	feet feet should be ≥ 4 ft^2 ft^2 te	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Slope = Horiz. Length of Weir Sides = Overflow Grate Open Area % = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate (C Depth to Invert of Outlet Pipe =	rate (Flat or Sloped) Zone 3 Weir 3.00 4.00 4.00 75% 50% ircular Orifice, Restr Zone 3 Restrictor 2.50	Not Selected N/A N/A N/A N/A N/A N/A ictor Plate, or Rectar Not Selected N/A	ft (relative to basin bo feet H:V (enter zero for fl feet %, grate open area/t % gular Orifice) ft (distance below bas	ttom at Stage = 0 ft) at grate) total area in bottom at Stage = 0	Height of Gr Over Flow Grate Open Area / Overflow Grate Op Overflow Grate Op C	Calculated ate Upper Edge, H, = Weir Slope Length = 100-yr Orifice Area = ben Area w/o Debris = alculated Parameter Outlet Orifice Area =	Parameters for Ove Zone 3 Weir 4.00 4.12 8.39 12.37 6.18 s for Outlet Pipe w/ Zone 3 Restrictor 1.47	rflow Weir N/A N/A N/A N/A N/A Flow Restriction Pla Not Selected N/A	feet feet should be ≥ 4 ft ² ft ² te ft ²	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Slope = Horiz. Length of Weir Sides = Overflow Grate Open Area % = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate (C Depth to Invert of Outlet Pipe = Outlet Pipe Diameter =	rate (Flat or Sloped) Zone 3 Weir 3.00 4.00 4.00 75% 50% ircular Orifice, Restr Zone 3 Restrictor 2.50 18.00	Not Selected N/A N/A N/A N/A N/A ictor Plate, or Rectar Not Selected N/A N/A	ft (relative to basin bo feet H:V (enter zero for fl feet %, grate open area/t % gular Orifice) ft (distance below bas inches	ttom at Stage = 0 ft) at grate) total area in bottom at Stage = 0	Height of Gr Over Flow Grate Open Area / Overflow Grate Op Overflow Grate Op (t)	Calculated ate Upper Edge, H, = Weir Slope Length = 100-yr Orifice Area = en Area w/o Debris = alculated Parameter Dutlet Orifice Area = et Orifice Centroid =	Parameters for Ove Zone 3 Weir 4.00 4.12 8.39 12.37 6.18 s for Outlet Pipe w/ Zone 3 Restrictor 1.47 0.64	rflow Weir N/A N/A N/A N/A N/A Flow Restriction Pla Not Selected N/A N/A	feet feet should be ≥ 4 ft^2 ft ft ft feet	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Slope = Horiz. Length of Weir Slobe = Overflow Grate Open Area % = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate (C Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert =	rate (Flat or Sloped) Zone 3 Weir 3.00 4.00 4.00 75% 50% dircular Orifice, Restri Zone 3 Restrictor 2.50 18.00 14.00	Not Selected N/A N/A N/A N/A N/A ictor Plate, or Rectar Not Selected N/A N/A	ft (relative to basin bo feet H:V (enter zero for fi feet %, grate open area/t % gular Orifice) ft (distance below bas inches inches	ttom at Stage = 0 ft) at grate) total area in bottom at Stage = 0 Half-1	Height of Gr Over Flow Grate Open Area / Overflow Grate Op Overflow Grate Op (t) ft) Outl Central Angle of Restr	Calculated ate Upper Edge, H, = Weir Slope Length = 100-yr Orifice Area = en Area w/o Debris = alculated Parameter Dutlet Orifice Area = et Orifice Centroid = ictor Plate on Pipe =	Parameters for Ove Zone 3 Weir 4.00 4.12 8.39 12.37 6.18 s for Outlet Pipe w/ Zone 3 Restrictor 1.47 0.64 2.16	rflow Weir N/A N/A N/A N/A N/A Flow Restriction Plat Not Selected N/A N/A N/A	feet feet should be ≥ 4 ft ² ft ² ft ² feet radians	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Sloge = Horiz. Length of Weir Sides = Overflow Grate Open Area % = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate (C Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert =	rate (Flat or Sloped) Zone 3 Weir 3.00 4.00 4.00 75% 50% Concerning Action Concerning Action Concer	Not Selected N/A N/A N/A N/A N/A ictor Plate, or Rectar Not Selected N/A N/A	ft (relative to basin bo feet H:V (enter zero for fi feet %, grate open area/t % agular Orifice) ft (distance below bas inches	ttom at Stage = 0 ft) at grate) total area in bottom at Stage = 0 Half-0	Height of Gr Over Flow Grate Open Area / Overflow Grate Ope Overflow Grate Op (Overflow Grate Op (Central Angle of Restr	Calculated ate Upper Edge, H, = Weir Slope Length = 100-yr Orifice Area = en Area w/o Debris = alculated Parameter Dutlet Orifice Area = et Orifice Centroid = ictor Plate on Pipe =	Parameters for Ove Zone 3 Weir 4.00 4.12 8.39 12.37 6.18 s for Outlet Pipe w/ Zone 3 Restrictor 1.47 0.64 2.16	rflow Weir N/A N/A N/A N/A N/A Flow Restriction Plating Not Selected N/A N/A N/A	feet feet should be ≥ 4 ft ² ft ² fte ftet radians	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Slope = Horiz. Length of Weir Sides = Overflow Grate Open Area % = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate (C Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert = User Input: Emergency Spillway (Rectang	rate (Flat or Sloped) Zone 3 Weir 3.00 4.00 4.00 75% 50% ircular Orifice, Restr Zone 3 Restrictor 2.50 18.00 14.00 gular or Trapezoidal)	Not Selected N/A N/A N/A N/A N/A ictor Plate, or Rectar Not Selected N/A N/A	ft (relative to basin bo feet H:V (enter zero for ff feet %, grate open area/t % gular Orifice) ft (distance below bas inches	ttom at Stage = 0 ft) at grate) :otal area in bottom at Stage = 0 Half-0	Height of Gr Over Flow Grate Open Area / Overflow Grate Ope Overflow Grate Op Overflow Grate Op (t) Central Angle of Restr	Calculated ate Upper Edge, H, = Weir Slope Length = 100-yr Orifice Area = en Area w/o Debris = en Area w/o Debris = alculated Parameter Dutlet Orifice Area = et Orifice Centroid = ictor Plate on Pipe = Calcula	Parameters for Ove Zone 3 Weir 4.00 4.12 8.39 12.37 6.18 s for Outlet Pipe w/ Zone 3 Restrictor 1.47 0.64 2.16 ted Parameters for S	rflow Weir N/A N/A N/A N/A N/A Flow Restriction Pla Rot Selected N/A N/A N/A N/A	feet feet should be ≥ 4 ft^2 ft^2 feet radians	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Slope = Horiz. Length of Weir Sloge = Overflow Grate Open Area % = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate (C Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert = User Input: Emergency Spillway (Rectang Spillway Invert Stage=	rate (Flat or Sloped) Zone 3 Weir 3.00 4.00 4.00 75% 50% Solve Cone 3 Restrictor 2.50 18.00 14.00 2.50 18.00 14.00 2.50 18.00 14.00 2.50 18.00 14.00 2.50 18.00 14.00 2.50 18.00 14.00 2.50 18.00 14.00 14.00 14.00 14.00 15.	Not Selected N/A N/A N/A N/A N/A N/A ictor Plate, or Rectar Not Selected N/A N/A	ft (relative to basin bo feet H:V (enter zero for fi feet %, grate open area/t % gular Orifice) ft (distance below bas inches inches	ttom at Stage = 0 ft) (at grate) (otal area in bottom at Stage = 0 Half-0	Height of Gr Over Flow Grate Open Area / Overflow Grate Ope Overflow Grate Op Overflow Grate Op (Contral Angle of Restr Spillway	Calculated ate Upper Edge, H _t = Weir Slope Length = 100-yr Orifice Area = en Area w/o Debris = alculated Parameter Outlet Orifice Area = et Orifice Centroid = ictor Plate on Pipe = Calcula Design Flow Depth=	Parameters for Ove Zone 3 Weir 4.00 4.12 8.39 12.37 6.18 s for Outlet Pipe w/ Zone 3 Restrictor 1.47 0.64 2.16 ted Parameters for S 0.83 7.02	rflow Weir Not Selected N/A N/A N/A N/A N/A Flow Restriction Plat Restriction Plat N/A N/A N/A N/A N/A	feet feet should be ≥ 4 ft ² ft ² te feet radians	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Stope = Horiz. Length of Weir Sides = Overflow Grate Open Area % = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate (C Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert = User Input: Emergency Spillway (Rectang Spillway Invert Stage= Spillway Crest Length =	rate (Flat or Sloped) Zone 3 Weir 3.00 4.00 4.00 75% 50% ircular Orifice, Restr Zone 3 Restrictor 2.50 18.00 14.00 2.50 18.00 2.00	Not Selected N/A N/A N/A N/A N/A N/A ictor Plate, or Rectar Not Selected N/A N/A ft (relative to basin t feet	ft (relative to basin bo feet H:V (enter zero for fi feet %, grate open area/t % gular Orifice) ft (distance below bas inches inches inches	ttom at Stage = 0 ft) at grate) :otal area in bottom at Stage = 0 Half-0 :)	Height of Gr Over Flow Grate Open Area / Overflow Grate Op Overflow Grate Op (Overflow Grate Op (Contral Angle of Restr Spillway Stage a	Calculated ate Upper Edge, H, = Weir Slope Length = 100-yr Orifice Area = In Area w/ o Debris = alculated Parameter Outlet Orifice Area = et Orifice Centroid = ictor Plate on Pipe = Calculat Design Flow Depth= Top of Freeboard =	Parameters for Ove Zone 3 Weir 4.00 4.12 8.39 12.37 6.18 s for Outlet Pipe w/ Zone 3 Restrictor 1.47 0.64 2.16 ted Parameters for S 0.83 7.83 0.15	rflow Weir N/A N/A N/A N/A N/A N/A Flow Restriction Plat Not Selected N/A N/A N/A N/A Spillway feet feet	feet feet should be ≥ 4 ft^2 ft^2 te ft^2 feet radians	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Slope = Horiz. Length of Weir Sides = Overflow Grate Open Area % = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate (C Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert = User Input: Emergency Spillway (Rectang Spillway Invert Stage= Spillway Crest Length = Spillway End Slopes = Erreeboard above Max Water Surface	rate (Flat or Sloped) Zone 3 Weir 3.00 4.00 4.00 75% 50% ircular Orifice, Restr Zone 3 Restrictor 2.50 18.00 14.00 2.50 18.00 14.00 8.00 3.00	Not Selected N/A N/A N/A N/A N/A N/A N/A N/A ictor Plate, or Rectar Not Selected N/A N/A ft (relative to basin t feet H:V feet	ft (relative to basin bo feet H:V (enter zero for fi feet %, grate open area/t % ngular Orifice) ft (distance below bas inches inches inches	ttom at Stage = 0 ft) at grate) :otal area in bottom at Stage = 0 Half-0	Height of Gr Over Flow Grate Open Area / Overflow Grate Op Overflow Grate Op th Contral Angle of Restr Spillway Stage a Basin Area a	Calculated ate Upper Edge, H, = Weir Slope Length = 100-yr Orifice Area = In Area w/ o Debris = alculated Parameter Outlet Orifice Area = et Orifice Centroid = ictor Plate on Pipe = Calcula Design Flow Depth= t Top of Freeboard = t Top of Freeboard =	Parameters for Ove Zone 3 Weir 4.00 4.12 8.39 12.37 6.18 s for Outlet Pipe w/ Zone 3 Restrictor 1.47 0.64 2.16 ted Parameters for S 0.83 7.83 0.56	rflow Weir N/A N/A N/A N/A N/A N/A N/A Flow Restriction Plat Not Selected N/A N/A N/A N/A Selected N/A N/A Selected N/A N/A Selected N/A N/A Selected N/A Selected N/A Selected Se	feet feet should be ≥ 4 ft^2 ft^2 fee feet radians	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Slope = Horiz. Length of Weir Sides = Overflow Grate Open Area % = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate (C Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert = User Input: Emergency Spillway (Rectang Spillway Invert Stage= Spillway Crest Length = Spillway End Slopes = Freeboard above Max Water Surface =	rate (Flat or Sloped) Zone 3 Weir 3.00 4.00 4.00 75% 50% ircular Orifice, Restr Zone 3 Restrictor 2.50 18.00 14.00 3.00 18.00 3.00	Not Selected N/A N/A N/A N/A N/A N/A ictor Plate, or Rectar Not Selected N/A N/A ft (relative to basin the feet H:V feet	ft (relative to basin bo feet H:V (enter zero for ff feet %, grate open area/t % gular Orifice) ft (distance below bas inches inches inches	ttom at Stage = 0 ft) (at grate) (otal area in bottom at Stage = 0 Half-(Height of Gr Over Flow Grate Open Area / Overflow Grate Op Overflow Grate Op (t) ft) Central Angle of Restr Spillway Stage a Basin Area a	Calculated ate Upper Edge, H, = Weir Slope Length = 100-yr Orifice Area = in Area w/ O Debris = alculated Parameter Outlet Orifice Area = et Orifice Centroid = ictor Plate on Pipe = Calcula Design Flow Depth= t Top of Freeboard = t Top of Freeboard =	Parameters for Ove Zone 3 Weir 4.00 4.12 8.39 12.37 6.18 s for Outlet Pipe w/ Zone 3 Restrictor 1.47 0.64 2.16 ted Parameters for S 0.83 7.83 0.56	rflow Weir N/A N/A N/A N/A N/A N/A Flow Restriction Plat Not Selected N/A N/A N/A N/A Selected N/A N/A N/A Selected N/A N/A N/A N/A N/A N/A N/A N/A	feet feet should be ≥ 4 ft ² ft ² te ft ² feet radians	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Stope = Horiz. Length of Weir Sides = Overflow Grate Open Area % = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate (C Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert = User Input: Emergency Spillway (Rectang Spillway Invert Stage= Spillway Crest Length = Spillway End Slopes = Freeboard above Max Water Surface =	rate (Flat or Sloped) Zone 3 Weir 3.00 4.00 4.00 75% 50% ircular Orifice, Restr Zone 3 Restrictor 2.50 18.00 14.00 3.00 3.00	Not Selected N/A N/A N/A N/A N/A N/A N/A ictor Plate, or Rectar Not Selected N/A N/A ft (relative to basin th feet H:V feet	ft (relative to basin bo feet H-V (enter zero for ff feet %, grate open area/t % gular Orifice) ft (distance below bas inches inches opottom at Stage = 0 ff	ttom at Stage = 0 ft) (at grate) (otal area in bottom at Stage = 0 Half-(Height of Gr Over Flow Grate Open Area / Overflow Grate Op Overflow Grate Op (t) ft) Central Angle of Restr Spillway Stage a Basin Area a	Calculated ate Upper Edge, H, = Weir Slope Length 100-yr Orifice Area = In Area w/ Debris = alculated Parameter Outlet Orifice Area = et Orifice Centroid = ictor Plate on Pipe = Calcula Design Flow Depth= t Top of Freeboard = t Top of Freeboard =	Parameters for Ove Zone 3 Weir 4.00 4.12 8.39 12.37 6.18 s for Outlet Pipe w/ Zone 3 Restrictor 1.47 0.64 2.16 ted Parameters for S 0.83 7.83 0.56	rflow Weir N/A N/A N/A N/A N/A N/A Flow Restriction Plat Not Selected N/A N/A N/A N/A Spillway feet feet feet feet feet	feet feet should be ≥ 4 ft ² ft ² te feet radians	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Slope = Horiz. Length of Weir Sides = Overflow Grate Open Area % = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate (C Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert = User Input: Emergency Spillway (Rectang Spillway Invert Stage= Spillway Crest Length = Spillway End Slopes = Freeboard above Max Water Surface = Routed Hydrograph Results Design Storm Return Period =	rate (Flat or Sloped) Zone 3 Weir 3.00 4.00 4.00 75% 50% Groular Orifice, Restr Zone 3 Restrictor 2.50 18.00 14.00 gular or Trapezoidal) 7.00 18.00 3.00 WQCV	Not Selected N/A N/A N/A N/A N/A N/A N/A ictor Plate, or Rectan Not Selected N/A N/A ft (relative to basin t feet H:V feet EURV	ft (relative to basin bo feet H-V (enter zero for fi feet %, grate open area/t % gular Orifice) ft (distance below bas inches inches bottom at Stage = 0 fi	ttom at Stage = 0 ft) at grate) total area in bottom at Stage = 0 Half-(t) 5 Year	Height of Gr Over Flow Grate Open Area / Overflow Grate Op Overflow Grate Op (t) ft) Central Angle of Restr Spillway Stage a Basin Area a	Calculated ate Upper Edge, H, = Weir Slope Lengt = 100-yr Orifice Area = ben Area w/ Debris = alculated Parameter Dutlet Orifice Area = et Orifice Centroid = ictor Plate on Pipe = Calcula Design Flow Depth= t Top of Freeboard = t Top of Freeboard =	Parameters for Ove Zone 3 Weir 4.00 4.12 8.39 12.37 6.18 s for Outlet Pipe w/ Zone 3 Restrictor 1.47 0.64 2.16 ted Parameters for S 0.83 7.83 0.56	rflow Weir N/A N/A N/A N/A N/A N/A Flow Restriction Pla Not Selected N/A N/A N/A N/A Spillway feet feet feet feet 100 Year	feet feet should be ≥ 4 ft ² ft ² feet radians	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Front Edge Length = Overflow Weir Slope = Horiz. Length of Weir Sides = Overflow Grate Open Area % = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate (C Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert = User Input: Emergency Spillway (Rectang Spillway Invert Stage= Spillway End Slopes = Freeboard above Max Water Surface = Routed Hydrograph Results Design Storm Return Period = One-Hour Rainfall Depth (in) =	rate (Flat or Sloped) Zone 3 Weir 3.00 4.00 4.00 75% 50% Grcular Orifice, Restr Zone 3 Restrictor 2.50 18.00 14.00 gular or Trapezoidal) 7.00 18.00 3.00 WQCV 0.53 0.12	Not Selected N/A N/A N/A N/A N/A N/A N/A ictor Plate, or Rectan Not Selected N/A N/A ft (relative to basin t feet H:V feet EURV 1.07	ft (relative to basin bo feet H-V (enter zero for fi feet %, grate open area/t % gular Orifice) ft (distance below bas inches inches bottom at Stage = 0 fi 2 Year 1.19	ttom at Stage = 0 ft) at grate) total area in bottom at Stage = 0 Half-0 t) 5 Year 1.50	Height of Gr Over Flow Grate Open Area / Overflow Grate Op Overflow Grate Op (ft) Central Angle of Restr Spillway Stage a Basin Area a	Calculated ate Upper Edge, H, = Weir Slope Length = 100-yr Orifice Area ben Area w/o Debris = alculated Parameter Outlet Orifice Area = et Orifice Centroid = ictor Plate on Pipe = Calcula Design Flow Depth= t Top of Freeboard = t Top of Freeboard = 25 Year 2.00 1 207	Parameters for Ove Zone 3 Weir 4.00 4.12 8.39 12.37 6.18 s for Outlet Pipe w/ Zone 3 Restrictor 1.47 0.64 2.16 ted Parameters for S 0.83 7.83 0.56 S0 Year 2.25 2.25 2.25	rflow Weir N/A N/A N/A N/A N/A N/A N/A Flow Restriction Play Not Selected N/A N/A N/A N/A ipillway feet feet feet acres 100 Year 2.52 2.52	feet feet should be \geq 4 ft ² ft ² fee feet radians	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Front Edge Length = Overflow Weir Slope = Horiz. Length of Weir Sides = Overflow Grate Open Area % = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate (C Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert = User Input: Emergency Spillway (Rectang Spillway Crest Length = Spillway Crest Length = Spillway End Slopes = Freeboard above Max Water Surface = Resting Storm Return Period = One-Hour Rainfall Depth (in) = Calculated Runoff Volume (area; ft) = OPEIONAL Override Runoff Volume (area; ft) =	rate (Flat or Sloped) Zone 3 Weir 3.00 4.00 4.00 4.00 75% 50% Groular Orifice, Restr Zone 3 Restrictor 2.50 18.00 14.00 3.00 WQCV 0.53 0.153	Not Selected N/A N/A N/A N/A N/A N/A N/A ictor Plate, or Rectan Not Selected N/A N/A ft (relative to basin t feet H:V feet EURV 1.07 0.254	ft (relative to basin bo feet H-V (enter zero for fi feet %, grate open area/t % gular Orifice) ft (distance below bas inches inches pottom at Stage = 0 fi 2 Year 1.19 0.174	ttom at Stage = 0 ft) (at grate) (otal area in bottom at Stage = 0 Half-0 (t) (t) (t) (t) (t) (t) (t) (t) (t) (t)	Height of Gr Over Flow Grate Open Area / Overflow Grate Ope Overflow Grate Op Overflow Grate Op t ft) Central Angle of Restr Spillway Stage a Basin Area a 10 Year 1.75 0.635	Calculated ate Upper Edge, H, = Weir Slope Length = 100-yr Orifice Area en Area w/o Debris = alculated Parameter Outlet Orifice Area = et Orifice Centroid = ictor Plate on Pipe = Calcula Design Flow Depth= t Top of Freeboard = t Top of Freeboard = 25 Year 2.00 1.715	Parameters for Ove Zone 3 Weir 4.00 4.12 8.39 12.37 6.18 s for Outlet Pipe w/ Zone 3 Restrictor 1.47 0.64 2.16 ted Parameters for S 0.83 7.83 0.56 50 Year 2.25 2.389	rflow Weir Not Selected N/A N/A N/A N/A N/A N/A N/A N/A	feet feet should be \geq 4 ft ² ft ² ft ² feet radians	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Slope = Horiz. Length of Weir Sloge = Horiz. Length of Weir Sloge = Overflow Grate Open Area % = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate (C Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert = User Input: Emergency Spillway (Rectang Spillway Invert Stage= Spillway Invert Stage= Spillway Invert Stage= Spillway Invert Stage= Spillway End Slopes = Freeboard above Max Water Surface = Routed Hydrograph Results Design Storm Return Period = One-Hour Rainfall Depth (n) = Calculated Runoff Volume (acre-ft) = Inflow Hydrograph Volume (acre-ft) =	rate (Flat or Sloped) Zone 3 Weir 3.00 4.00 4.00 4.00 75% 50% ircular Orifice, Restr Zone 3 Restrictor 2.50 18.00 14.00 18.00 10.05 1	Not Selected N/A N/A N/A N/A N/A N/A N/A ictor Plate, or Rectar Not Selected N/A N/A It (relative to basin the feet H:V feet EURV 1.07 0.254 0.254	ft (relative to basin bo feet H-V (enter zero for ff feet %, grate open area/t % gular Orifice) ft (distance below bas inches inches bottom at Stage = 0 ff 2 Year 1.19 0.174	ttom at Stage = 0 ft) at grate) total area in bottom at Stage = 0 Half-1 t) 5 Year 1.50 0.272	Height of Gr Over Flow Grate Open Area / Overflow Grate Op Overflow Grate Op (Central Angle of Restr Spillway Stage a Basin Area a 10 Year 1.75 0.635	Calculated ate Upper Edge, H, = Weir Slope Length = 100-yr Orifice Area en Area w/o Debris = alculated Parameter Dutlet Orifice Area = et Orifice Centroid = ictor Plate on Pipe = Calcula Design Flow Depth= t Top of Freeboard = t Top of Freeboard = 25 Year 2.00 1.715	Parameters for Ove Zone 3 Weir 4.00 4.12 8.39 12.37 6.18 s for Outlet Pipe w/ Zone 3 Restrictor 1.47 0.64 2.16 ted Parameters for S 0.83 7.83 0.56 50 Year 2.25 2.389	rflow Weir Not Selected N/A N/A N/A N/A N/A N/A N/A N/A	feet feet should be \geq 4 ft ² ft ² fee feet radians	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Slope = Horiz. Length of Weir Sloge = Overflow Grate Open Area % = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate (C Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert = User Input: Emergency Spillway (Rectang Spillway Invert Stage= Spillway Crest Length = Spillway Crest Surface = Cne-Hour Rainfall Depth (in) = Calculated Runoff Volume (acre-ft) = Inflow Hydorgraph Volume (acre-ft) = Inflow Hydorgraph Volume (acre-ft) = Inflow Hydorgraph Volume (acre-ft) = Predevelopment Unit Peak Flow, q (cfs/acre) =	rate (Flat or Sloped) Zone 3 Weir 3.00 4.00 4.00 75% 50% Cone 3 Restrictor 2.50 18.00 14.00 2.50 18.00 14.00 2.50 14.00 2.50 18.00 3.00 2.50 18.00 3.00 2.50 18.00 3.00 2.50 18.00 3.00 2.50 18.00 3.00 2.50 18.00 3.00 2.50 18.00 3.00 2.50 18.00 3.00 2.50 18.00 3.00 2.50 18.00 3.00 2.50 18.00 3.00 14.00 2.50 18.00 3.00 2.50 18.00 3.00 14.00 2.50 18.00 3.00 14.00 2.50 18.00 3.00 2.50 18.00 3	Not Selected N/A N/A N/A N/A N/A N/A N/A N/A ictor Plate, or Rectar Not Selected N/A N/A it (relative to basin the selected) feet H:V feet EURV 1.07 0.254 0.0254 0.00	ft (relative to basin bo feet H:V (enter zero for fi feet %, grate open area/t % ngular Orifice) ft (distance below bas inches inches bottom at Stage = 0 fi 2 Year 1.19 0.174 0.174	ttom at Stage = 0 ft) at grate) total area in bottom at Stage = 0 Half-0 to 5 Year 1.50 0.272 0.272 0.02	Height of Gr Over Flow Grate Open Area / Overflow Grate Op Overflow Grate Op (t) Central Angle of Restr Spillway Stage a Basin Area a 10 Year 1.75 0.635 0.16	Calculated ate Upper Edge, H, = Weir Slope Length = 100-yr Orifice Area = en Area w/o Debris = alculated Parameter Dutlet Orifice Area = et Orifice Centroid = ictor Plate on Pipe = Calcula Design Flow Depth= t Top of Freeboard = t Top of Freeboard = 25 Year 2.00 1.715 	Parameters for Ove Zone 3 Weir 4.00 4.12 8.39 12.37 6.18 s for Outlet Pipe w/ Zone 3 Restrictor 1.47 0.64 2.16 ted Parameters for S 0.83 7.83 0.56 S0 Year 2.25 2.389 - 2.390 0.77	rflow Weir Not Selected N/A N/A N/A N/A N/A Flow Restriction Plat Not Selected N/A N/A N/A N/A N/A N/A N/A N/A	feet feet should be ≥ 4 ft ² ft ² feet radians <u>500 Year</u> <u>3.85</u> 6.102 <u>6.104</u> 1.90	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Slope = Horiz. Length of Weir Slope = Horiz. Length of Weir Sloge = Overflow Grate Open Area % = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate (C Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert = User Input: Emergency Spillway (Rectang Spillway Invert Stage= Spillway Crest Length = Spillway Crest Stage= Freeboard above Max Water Surface = Routed Hydrograph Results Design Storm Return Period = One-Hour Rainfall Depth (in) = Calculated Runoff Volume (acre-ft) = Inflow Hydrograph Volume (acre-ft) = Predevelopment Unit Peak Flow, q (cfs/acre) = Predevelopment Peak Q (cfs) =	rate (Flat or Sloped) Zone 3 Weir 3.00 4.00 4.00 75% 50% Solver Zone 3 Restrictor 2.50 18.00 14.00 2.50 18.00 14.00 2.50 18.00 3.00 0.05 0.153 0.00 0.0 0.0 0.0 0.0 0.0 0.0 0	Not Selected N/A N/A N/A N/A N/A N/A N/A iotor Plate, or Rectar Not Selected N/A N/A iotor Plate, or Rectar Not Selected N/A ft (relative to basin the feet H:V feet 0.07 0.254 0.00 0.00	ft (relative to basin bo feet H:V (enter zero for fi feet %, grate open area/t % gular Orifice) ft (distance below bas inches inches bottom at Stage = 0 fi 0.174 0.174	ttom at Stage = 0 ft) at grate) :otal area in bottom at Stage = 0 Half-0 :) <u>5 Year</u> 1.50 0.272 0.272 0.272 0.02 0.494	Height of Gr Over Flow Grate Open Area / Overflow Grate Op Overflow Grate Op Overflow Grate Op (Contral Angle of Restr Spillway Stage a Basin Area a 10 Year 1.75 0.635 0.16 4.7	Calculated ate Upper Edge, H, = Weir Slope Length = 100-yr Orifice Area = en Area w/ o Debris = en Area w/ Debris = alculated Parameter Outlet Orifice Area = et Orifice Centroid = ictor Plate on Pipe = Calcula Design Flow Depth= t Top of Freeboard = t Top of Freeboard = 25 Year 2.000 1.715 1.715 0.56 1.5.9	Parameters for Ove Zone 3 Weir 4.00 4.12 8.39 12.37 6.18 s for Outlet Pipe w/ Zone 3 Restrictor 1.47 0.64 2.16 ted Parameters for S 0.83 7.83 0.56 S 50 Year 2.25 2.389 C 2.390 0.77 22.1 2.390	rflow Weir Not Selected N/A N/A N/A N/A N/A N/A Flow Restriction Plat Not Selected N/A N/A N/A N/A N/A Spillway feet feet feet acres 100 Year 2.52 3.270 	feet feet should be ≥ 4 ft ² ft ² fee feet radians <u>500 Year</u> <u>3.85</u> 6.102 <u>6.104</u> <u>1.90</u> 54.4	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Stope = Horiz. Length of Weir Sides = Overflow Grate Open Area % = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate (C Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert = User Input: Emergency Spillway (Rectang Spillway Invert Stage= Spillway Crest Length = Spillway Crest Length = Spillway End Slopes = Freeboard above Max Water Surface = Routed Hydrograph Results Design Storm Return Period = One-Hour Rainfall Depth (in) = Calculated Runoff Volume (acre-ft) = Inflow Hydrograph Volume (acre-ft) = Predevelopment Unit Peak Flow, (cfs/acre) = Peak Inflow Q (cfs) = Peak Inflow Q (cfs) = Peak Inflow Q (cfs) =	rate (Flat or Sloped) Zone 3 Weir 3.00 4.00 4.00 75% 50% Solution 2.50 18.00 14.00 2.50 18.00 14.00 3.00 3.00 3.00 3.00 0.53 0.153 0.153 0.00 0.0 0.153 0.00 0.0 0.153 0.00 0.0 0.153 0.00 0.0 0.0 0.0 0.0 0.0 0.0 0	Not Selected N/A Intervention Intervention N/A Intervention Interventinterevention Inter	ft (relative to basin bo feet H:V (enter zero for ff feet %, grate open area/t % gular Orifice) ft (distance below bas inches inches inches obttom at Stage = 0 ff 2 Year 1.19 0.174 0.01 0.3 2.5 0.1	ttom at Stage = 0 ft) at grate) :otal area in bottom at Stage = 0 Half-0 :) 5 Year 1.50 0.272 0.272 0.272 0.272 0.272 0.272 0.272 0.272 0.272	Height of Gr Over Flow Grate Open Area / Overflow Grate Op Overflow Grate Op Overflow Grate Op (C ft) Central Angle of Restr Spillway Stage a Basin Area a 10 Year 1.75 0.635 0.16 4.7 9.1 2 1	Calculated ate Upper Edge, H, = Weir Slope Length = 100-yr Orifice Area = en Area w/ Debris = alculated Parameter Dutlet Orifice Area = et Orifice Centroid = ictor Plate on Pipe = Calcula Design Flow Depth= t Top of Freeboard = t Top of Freeboard = 2.00 1.715 1.715 0.56 1.5.9 24.3 1.7	Parameters for Ove Zone 3 Weir 4.00 4.12 8.39 12.37 6.18 s for Outlet Pipe w/ Zone 3 Restrictor 1.47 0.64 2.16 ted Parameters for S 0.83 7.83 0.56 S 50 Year 2.25 2.389 	rflow Weir N/A N/A N/A N/A N/A N/A N/A Flow Restriction Plat Not Selected N/A N/A N/A N/A N/A N/A N/A N/A	feet feet should be \geq 4 ft ² ft ² feet radians	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Stope = Horiz. Length of Weir Sides = Overflow Grate Open Area % = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate (C Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert = User Input: Emergency Spillway (Rectang Spillway Invert Stage= Spillway Crest Length = Spillway Crest Length = Spillway Crest Length = Spillway Crest Length = Spillway Crest Surface = Freeboard above Max Water Surface = Noted Hydrograph Results Design Storm Return Period = One-Hour Rainfall Depth (in) = Calculated Runoff Volume (acre-ft) = Inflow Hydrograph Volume (acre-ft) = Predevelopment Unit Peak Flow, q (cfs/acre) = Predevelopment Deak Q (cfs) = Peak Inflow Q (cfs) = Peak Outflow Q (cfs) = Peak Outflow Q (cfs) =	rate (Flat or Sloped) Zone 3 Weir 3.00 4.00 4.00 75% 50% ircular Orifice, Restr Zone 3 Restrictor 2.50 18.00 14.00 3.00 3.00 WQCV 0.53 0.153 0.00 0.0 2.2 0.1 N/A	Not Selected N/A N/A N/A N/A N/A N/A N/A N/A ictor Plate, or Rectar Not Selected N/A N/A ft (relative to basin t feet H:V feet EURV 1.07 0.254 0.254 0.00 0.0 3.7 0.1 N/A	ft (relative to basin bo feet H-V (enter zero for ff feet %, grate open area/t % gular Orifice) ft (distance below bas inches inches inches obtom at Stage = 0 ff 2 Year 1.19 0.174 0.174 0.174 0.3 2.5 0.1 N/A	ttom at Stage = 0 ft) at grate) total area in bottom at Stage = 0 Half-4 t) 5 Year 1.50 0.272 0.272 0.272 0.272 0.272 0.272 0.272 0.272 0.272 0.272	Height of Gr Over Flow Grate Open Area / Overflow Grate Op Overflow Grate Op Overflow Grate Op (t) C th Central Angle of Restr Spillway Stage a Basin Area a 10 Year 1.75 0.635 0.635 0.635 0.16 4.7 9.1 3.1 0.7	Calculated ate Upper Edge, H, = Weir Slope Length = 100-yr Orifice Area = in Area w/ o Debris = ben Area w/ Debris = alculated Parameter Outlet Orifice Area = et Orifice Centroid = ictor Plate on Pipe = Calcula Design Flow Depth= t Top of Freeboard = Con of Freeboard = 25 Year 2.00 1.715 0.56 15.9 24.3 1.75 1.1	Parameters for Ove Zone 3 Weir 4.00 4.12 8.39 12.37 6.18 s for Outlet Pipe w/ Zone 3 Restrictor 1.47 0.64 2.16 ted Parameters for S 0.83 7.83 0.56 50 Year 2.25 2.389 2.390 0.77 22.1 33.7 18.8 0.9	rflow Weir N/A N/A N/A N/A N/A N/A N/A Flow Restriction Play Not Selected N/A N/A N/A N/A N/A N/A Spillway feet feet feet acres 100 Year 2.52 3.270 	feet feet should be \geq 4 ft ² ft ² feet radians 500 Year 3.85 6.102 6.102 6.104 1.90 5.4.4 84.7 2.2.3 0.4	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Stope = Horiz. Length of Weir Sides = Overflow Grate Open Area % = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate (C Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert = User Input: Emergency Spillway (Rectang Spillway Invert Stage= Spillway Crest Length = Spillway Crest Length = Spillway Crest Length = Spillway Crest Length = Spillway End Slopes = Freeboard above Max Water Surface = Routed Hydrograph Results Design Storm Return Period = One-Hour Rainfail Depth (n) = Calculated Runoff Volume (acre-ft) = Inflow Hydrograph Volume (acre-ft) = Predevelopment Unit Peak Flow, q (cfs/acre) = Predevelopment Deak Q (cfs) = Peak Inflow Q (cfs) = Peak Outflow Q (cfs) = Ratio Peak Outflow to Predevelopment Q = Structure Controlling Flow =	rate (Flat or Sloped) Zone 3 Weir 3.00 4.00 4.00 75% 50% ircular Orifice, Restr Zone 3 Restrictor 2.50 18.00 14.00 3.00 3.00 WQCV 0.53 0.153 0.05 0.153 0.00 0.0 2.2 0.1 N/A Plate	Not Selected N/A N/A N/A N/A N/A N/A N/A ictor Plate, or Rectar Not Selected N/A N/A ft (relative to basin b feet H:V feet EURV 1.07 0.254 0.254 0.00 0.0 3.7 0.1 N/A Plate	ft (relative to basin bo feet H-V (enter zero for ff feet %, grate open area/t % gular Orifice) ft (distance below bas inches inches inches obtoom at Stage = 0 ff 0.174 0.174 0.174 0.3 2.5 0.1 N/A Plate	ttom at Stage = 0 ft) at grate) total area in bottom at Stage = 0 Half-0 t) 5 Year 1.50 0.272 0.272 0.272 0.272 0.494 3.9 0.100 0.2 Plate	Height of Gr Over Flow Grate Open Area / Overflow Grate Op Overflow Grate Op Overflow Grate Op ft) Central Angle of Restr Spillway Stage a Basin Area a 10 Year 1.75 0.635 0.635 0.16 4.7 9.1 3.1 0.7 0.7	Calculated ate Upper Edge, H, = Weir Slope Length = 100-yr Orifice Area = ben Area w/ Debris = alculated Parameter Dutlet Orifice Area = et Orifice Centroid = ictor Plate on Pipe = Calcula Design Flow Depth= t Top of Freeboard = Calcula Design Flow Depth= t Top of Freeboard = 25 Year 2.00 1.715 0.56 15.9 24.3 1.715 0.15 1.1 Outlet Plate 1	Parameters for Ove Zone 3 Weir 4.00 4.12 8.39 12.37 6.18 s for Outlet Pipe w/ Zone 3 Restrictor 1.47 0.64 2.16 ted Parameters for S 0.83 7.83 0.56 50 Year 2.25 2.389 0.77 2.39 0.77 22.1 33.7 18.8 0.9 Outlet Plate 1	rflow Weir Not Selected N/A N/A N/A N/A N/A N/A N/A N/A	feet feet should be \geq 4 ft ² ft ² feet radians	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Stope = Horiz. Length of Weir Sides = Overflow Grate Open Area % = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate (C Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert = User Input: Emergency Spillway (Rectang Spillway Invert Stage Spillway Crest Length = Spillway End Slopes = Freeboard above Max Water Surface = Restrict Plate Height Above Pipe Invert Stage Spillway Crest Length = Spillway End Slopes = Freeboard above Max Water Surface = Routed Hydrograph Results Design Storm Return Period = One-Hour Rainfall Depth (in) = Calculated Runoff Volume (acre-ft) = Inflow Hydrograph Volume (acre-ft) = Predevelopment Veak Q (cfs) = Peak Inflow Q (cfs) = Peak Outflow Q (cfs) = Ratio Peak Outflow to Predevelopment Q = Structure Controlling Flow = Max Velocity through Grate 1 (fps) =	rate (Flat or Sloped) Zone 3 Weir 3.00 4.00 4.00 75% 50% ircular Orifice, Restr Zone 3 Restrictor 2.50 18.00 14.00 3.00 14.00 3.00 0.153 0.153 0.153 0.153 0.153 0.00 0.0 2.2 0.1 N/A Plate N/A	Not Selected N/A Ictor Plate, or Rectar Not Selected N/A N/A Ictor Plate, or Rectar feet H:V feet H:V feet 0.254 0.0254 0.00 3.7 0.1 N/A Plate N/A	ft (relative to basin bo feet H-V (enter zero for ff feet %, grate open area/t % gular Orifice) ft (distance below bas inches inches bottom at Stage = 0 ff 2 Year 1.19 0.174 0.174 0.174 0.3 2.5 0.1 N/A Plate N/A	ttom at Stage = 0 ft) at grate) total area in bottom at Stage = 0 Half-0 total area 0.272 0.272 0.272 0.272 0.294 3.9 0.100 0.2 Plate N/A	Height of Gr Over Flow Grate Open Area / Overflow Grate Op Overflow Grate Op Overflow Grate Op ft) Central Angle of Restr Spillway Stage a Basin Area a 0.635 0.635 0.635 0.16 4.7 9.1 3.1 0.7 0.7 0.7	Calculated ate Upper Edge, H, = Weir Slope Length = 100-yr Orifice Area = ben Area w/ Debris = ben Area w/ Debris = alculated Parameter Outlet Orifice Area = et Orifice Centroid = ictor Plate on Pipe = Calcula Design Flow Depth= t Top of Freeboard = Calcula Design Freeboard = 25 Year 2.00 1.715 0.56 15.9 24.3 1.7.5 1.1 Outlet Plate 1 1.4	Parameters for Ove Zone 3 Weir 4.00 4.12 8.39 12.37 6.18 s for Outlet Pipe w/ Zone 3 Restrictor 1.47 0.64 2.16 ted Parameters for S 0.83 7.83 0.56 50 Year 2.389 2.390 0.77 22.1 33.7 18.8 0.9 O.9 Outlet Plate 1 1.5	rflow Weir Not Selected N/A N/A N/A N/A N/A Flow Restriction Play Not Selected N/A N/A N/A N/A N/A N/A N/A Selected 100 Year 2.52 3.270 3.271 1.05 29.9 46.0 20.7 0.7 Outlet Plate 1 1.7	feet feet should be \geq 4 ft ² ft ² ft ² feet radians 6.102 6.104 1.90 5.4.4 8.4.7 2.2.3 0.4 N/A 1.8	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Slope = Horiz. Length of Weir Sloge = Horiz. Length of Weir Sloge = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate (C Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert = User Input: Emergency Spillway (Rectang Spillway Invert Stage Spillway Invert Stage Spillway Length = Spillway Espillway Ketsufts Design Storm Return Period = One-Hour Rainfall Depth (n) = Calculated Runoff Volume (acre-ft) = Inflow Hydrograph Volume (acre-ft) = Predevelopment Unit Peak Flow, q (cfs/acre) = Predevelopment Unit Peak Flow, q (cfs/acre) = Peak Inflow Q (cfs) = Peak Outflow Q (cfs) = Ratio Peak Outflow to Predevelopment Q = Structure Controlling Flow = Max Velocity through Grate 1 (fps) =	rate (Flat or Sloped) Zone 3 Weir 3.00 4.00 4.00 75% 50% ircular Orifice, Restr Zone 3 Restrictor 2.50 18.00 14.00 2.50 14.00 2.50 14.00 2.50 18.00 3.00 2.50 0.153	Not Selected N/A D.254 0.00 0.0 3.7 0.1 N/A Plate N/A	ft (relative to basin bo feet H-V (enter zero for fi feet %, grate open area/t % gular Orifice) ft (distance below bas inches inches bottom at Stage = 0 fi 0.174 0.174 0.174 0.174 0.3 2.5 0.1 N/A Plate N/A N/A N/A	ttom at Stage = 0 ft) at grate) total area in bottom at Stage = 0 Half-0 t) 5 Year 1.50 0.2720 0.2720 0.2720 0.2720 0.2720 0.2720 0.2720 0.2720 0.2720000000000	Height of Gr Over Flow Grate Open Area / Overflow Grate Op Overflow Grate Op (ft) Central Angle of Restr Spillway Stage a Basin Area a 0.635 0.635 0.16 4.7 9.1 3.1 0.7 Overflow Grate 1 0.2 N/A	Calculated ate Upper Edge, H, = Weir Slope Length = 100-yr Orifice Area = en Area w/o Debris = ben Area w/o Debris = alculated Parameter Outlet Orifice Area = et Orifice Centroid = ictor Plate on Pipe = Calcula Design Flow Depth= t Top of Freeboard = Calcula Design Flow Depth= t Top of Freeboard = 25 Year 2.00 1.715 0.56 15.9 24.3 17.5 1.1 0.0tlet Plate 1 1.4 N/A	Parameters for Ove Zone 3 Weir 4.00 4.12 8.39 12.37 6.18 s for Outlet Pipe w/ Zone 3 Restrictor 1.47 0.64 2.16 ted Parameters for S 0.83 7.83 0.56 S0 Year 2.25 2.389 C 2.389 C 2.390 0.777 22.1 33.7 18.8 0.9 Outlet Plate 1 1.5 N/A YO	rflow Weir Not Selected N/A N/A N/A N/A N/A N/A N/A N/A	feet feet should be \geq 4 ft ² ft ² feet radians	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Slope = Horiz. Length of Weir Sloge = Horiz. Length of Weir Sloge = Overflow Grate Open Area % = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate (C Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert = User Input: Emergency Spillway (Rectang Spillway Invert Stage= Spillway Invert Stage Spillway End Slopes = Freeboard above Max Water Surface = One-Hour Rainfall Depth (in) = Calculated Runoff Volume (acre-ft) = OPTIONAL Override Runoff Volume (acre-ft) = Inflow Hydrograph Volume (acre-ft) = Predevelopment Unit Peak Flow, q (cfs/acre) = Peak Inflow Q (cfs) = Peak Inflow Q (cfs) = Ratio Peak Outflow to Predevelopment Q = Structure Controlling Flow = Max Velocity through Grate 1 (fps) = Time to Drain 97% of Inflow Volume (hore) =	rate (Flat or Sloped) Zone 3 Weir 3.00 4.00 4.00 75% 50% Solv ircular Orifice, Restr Zone 3 Restrictor 2.50 18.00 14.00 2.50 14.00 2.50 14.00 0.153 0.15	Not Selected N/A N/A N/A N/A N/A N/A N/A N/A ictor Plate, or Rectar Not Selected N/A N/A ictor Plate, or Rectar Not Selected N/A ictor Plate, or Rectar N/A N/A ictor Plate, or Rectar N/A fet H:V feet U.07 0.254 0.00 0.1 N/A Plate N/A A N/A N/A	ft (relative to basin bo feet H:V (enter zero for fi feet %, grate open area/t % gular Orifice) ft (distance below bas inches inches bottom at Stage = 0 fi 0.174 0.174 0.174 0.174 0.174 0.174 0.174 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1	ttom at Stage = 0 ft) at grate) total area in bottom at Stage = 0 Half-0 t) S Year 1.50 0.2720 0.2720 0.2720 0.2720000000000	Height of Gr Over Flow Grate Open Area / Overflow Grate Ope Overflow Grate Op Overflow Grate Op (t) Contral Angle of Restr Spillway Stage a Basin Area a Basin Area a 0.635 0.16 4.7 9.1 3.1 0.7 Overflow Grate 1 0.2 N/A 69 77	Calculated ate Upper Edge, H, = Weir Slope Length = 100-yr Orifice Area ben Area w/o Debris = alculated Parameter Outlet Orifice Area = et Orifice Centroid = ictor Plate on Pipe = Calcula Design Flow Depth= t Top of Freeboard = t Top of Freeboard = 25 Year 2.00 1.715 0.56 15.9 24.3 17.5 1.1 0.0tlet Plate 1 1.4 N/A 54 70	Parameters for Ove Zone 3 Weir 4.00 4.12 8.39 12.37 6.18 s for Outlet Pipe w/ Zone 3 Restrictor 1.47 0.64 2.16 ted Parameters for S 0.83 7.83 0.56 50 Year 2.25 2.389 0.57 2.390 0.77 22.1 33.7 18.8 0.9 Outlet Plate 1 1.5 N/A 49 6.6	rflow Weir Not Selected N/A N/A N/A N/A N/A N/A N/A N/A	feet feet should be ≥ 4 ft^2 ft^2 feet radians	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Slope = Horiz. Length of Weir Slope = Horiz. Length of Weir Sloge = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate (C Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert = User Input: Emergency Spillway (Rectang Spillway Invert Stage Spillway Crest Length = Spillway Crest Length = Calculated Hydrograph Results Design Storm Return Period = One-Hour Rainfall Depth (in) = Calculated Runoff Volume (acre-ft) = Inflow Hydrograph Volume (acre-ft) = Predevelopment Volume (acre-ft) = Predevelopment Volume (acre-ft) = Predevelopment Paek R(cfs) = Peak Inflow Q (cfs) = Peak Nufflow Q (cfs) = Ratio Peak Outflow to Predevelopment Q = Structure Controlling Flow = Max Velocity through Grate 1 (fps) = Max Velocity through Grate 1 (fps) = Time to Drain 97% of Inflow Volume (hours) = Time to Drain 97% of Inflow Volume (hours) = Time to Drain 97% of Inflow Volume (hours) =	rate (Flat or Sloped) Zone 3 Weir 3.00 4.00 4.00 75% 50% Groular Orifice, Restr Zone 3 Restrictor 2.50 18.00 14.00 2.50 18.00 14.00 2.50 18.00 3.00 14.00 2.50 18.00 3.00 0.153	Not Selected N/A N/A N/A N/A N/A N/A N/A N/A N/A ictor Plate, or Rectar Not Selected N/A N/A ictor Plate, or Rectar N/A N/A ictor Plate, or Rectar N/A N/A feet H:V feet 0.07 0.254 0.00 0.0 0.3.7 0.1 N/A Plate N/A 61 65 2.40	ft (relative to basin bo feet H:V (enter zero for fi feet %, grate open area/t % gular Orifice) ft (distance below bas inches inches bottom at Stage = 0 ff 0.174 0.01 0.174 0.174 0.01 0.3 2.5 0.1 N/A Plate N/A N/A 52 55 2.00	ttom at Stage = 0 ft) at grate) :otal area in bottom at Stage = 0 Half-0 :) <u>5 Year</u> 0.272 0.02 0.272 0.02 0.272 0.02 0.494 3.9 0.100 0.2 Plate N/A N/A 63 67 67 2,49	Height of Gr Over Flow Grate Open Area / Overflow Grate Ope Overflow Grate Op Overflow Grate Op Overflow Grate Op Overflow Grate Op Spillway Stage a Basin Area a Basin Area a 0.635 0.16 4.7 9.1 0.7 0.635 0.16 4.7 9.1 0.7 0.7 0.2 N/A 69 77 3.45	Calculated ate Upper Edge, H, = Weir Slope Length = 100-yr Orifice Area = en Area w/ o Debris = en Area w/ Debris = alculated Parameter Outlet Orifice Area = et Orifice Centroid = ictor Plate on Pipe = Calcula Design Flow Depth= t Top of Freeboard = t Top of Freeboard = t Top of Freeboard = 25 Year 2.000 1.715 1.715 0.56 15.9 24.3 17.5 1.1 Outlet Plate 1 1.4 N/A 54 70 4.20	Parameters for Ove Zone 3 Weir 4.00 4.12 8.39 12.37 6.18 s for Outlet Pipe w/ Zone 3 Restrictor 1.47 0.64 2.16 ted Parameters for S 0.83 7.83 0.56 50 Year 2.25 2.389 50 Year 2.390 0.77 22.1 3.3.7 1.8.8 0.9 Outlet Plate 1 1.5 N/A 49 66 5,13	rflow Weir Not Selected N/A N/A N/A N/A N/A N/A Plow Restriction Plat Not Selected N/A N/A N/A N/A N/A Spillway feet feet feet acres 100 Year 2.52 3.270 1.05 29.9 46.0 20.7 0.7 Outlet Plate 1 1.7 N/A 43 62 6.63	feet feet should be ≥ 4 ft^2 ft² feet radians	
User Input: Overflow Weir (Dropbox) and G Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Slope = Horiz. Length of Weir Slope = Horiz. Length of Weir Sloge = Overflow Grate Open Area % = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate (C Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert = User Input: Emergency Spillway (Rectang Spillway Invert Stage= Spillway Crest Length = Spillway Crest Length = Calculated Runoff Volume (acre-ft) = Predevelopment Vnethore (acre-ft) = Predevelopment Vnethore (acre-ft) = Predevelopment Peak Q (cfs) = Peak Nuflow Q (cfs) = Peak Nuflow Q (cfs) = Peak Nuflow Q (cfs) = Max Velocity through Grate 1 (fps) = Maxium Ponding Depth (ft) = Area at Maximum Ponding Depth (acres) =	rate (Flat or Sloped) Zone 3 Weir 3.00 4.00 4.00 75% 50% Solution 2.50 18.00 14.00 2.50 18.00 14.00 2.50 18.00 3.00 0.153 0.153 0.00 0.153 0.00 0.153 0.00 0.153 0.153 0.00 0.153 0.00 0.153 0.153 0.00 0.153 0.153 0.00 0.153 0.00 0.153 0.158 0.00 0.158 0.158 0.00 0.158 0.15	Not Selected N/A ictor Plate, or Rectar Not Selected N/A N/A ft (relative to basin the feet H:V feet 0.07 0.254 0.00 0.01 N/A Plate N/A 61 65 2.40 0.20	ft (relative to basin bo feet H:V (enter zero for ff feet %, grate open area/t % gular Orifice) ft (distance below bas inches inches inches inches obttom at Stage = 0 ff 0.174 0.17	ttom at Stage = 0 ft) at grate) :otal area in bottom at Stage = 0 Half-0 :) 5 Year 1.50 0.272 0.20	Height of Gr Over Flow Grate Open Area / Overflow Grate Op Overflow Grate Op Overflow Grate Op Overflow Grate Op Overflow Grate Op Spillway Stage a Basin Area a Basin Area a 0.635 0.16 4.7 9.1 0.635 0.16 4.7 9.1 0.7 Overflow Grate 1 0.2 N/A 69 77 3.45 0.23	Calculated ate Upper Edge, H, = Weir Slope Length = 100-yr Orifice Area = en Area w/ o Debris = en Area w/ Debris = alculated Parameter Dutlet Orifice Area = et Orifice Centroid = ictor Plate on Pipe = Calcula Design Flow Depth= t Top of Freeboard = t Top of Freeboard = t Top of Freeboard = 2.00 1.715 	Parameters for Ove Zone 3 Weir 4.00 4.12 8.39 12.37 6.18 s for Outlet Pipe w/ Zone 3 Restrictor 1.47 0.64 2.16 ted Parameters for S 0.83 7.83 0.56 ted Parameters for S 0.83 7.83 0.56 S 0.9 0.77 22.1 33.7 18.8 0.9 Outlet Plate 1 1.5 N/A 49 66 5.13 0.30	rflow Weir Not Selected N/A N/A N/A N/A N/A N/A N/A N/A	feet feet should be ≥ 4 ft^2 ft^2 feet radians	



Detention Basin Outlet Structure Design

Outflow Hydrograph Workbook Filename:

	Storm Inflow H	lydrographs verride the calc	UD-Det	ention, Version drographs from	n 3.07 (Februa this workbook v	ry 2017) vith inflow hydro	graphs develop	ed in a separate i	program.	
	SOURCE	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK
Time Interval	TIME	WOCV [cfs]	FURV [cfs]	2 Year [cfs]	5 Year [cfs]	10 Year [cfs]	25 Year [cfs]	50 Year [cfs]	100 Year [cfs]	500 Year [cfs]
5 70 min	0:00:00		20117 [015]	2 1001 [015]	0 00	20 1001 [0:5]		0.00	200 1001 [010]	0.00
5.79 min	0:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
the day was a b	0:05:47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hydrograph	0:11:35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.864	0:23:10	0.10	0.17	0.12	0.18	1.09	2.86	3.95	5 35	9.56
0.004	0:28:57	0.27	1 14	0.31	1.22	2 79	7 35	10.14	13 72	24.55
	0:34:44	1.92	3.14	2.17	3.35	7.67	20.18	27.83	37.65	67.23
	0:40:32	2.23	3.69	2.54	3.94	9.10	24.31	33.73	45.95	84.68
	0:46:19	2.12	3.51	2.41	3.75	8.69	23.27	32.32	44.10	82.07
	0:52:07	1.93	3.19	2.19	3.41	7.91	21.18	29.42	40.13	74.99
	0:57:54	1.71	2.84	1.94	3.03	7.06	19.00	26.44	36.12	67.60
	1:03:41	1.46	2.43	1.66	2.60	6.10	16.50	23.02	31.54	59.30
	1:09:29	1.28	2.13	1.45	2.27	5.31	14.34	20.03	27.50	51.86
	1:15:10	1.15	1.92	1.31	2.05	4.81	13.00	18.14	24.86	46.67
	1:26:51	0.94	1.37	0.96	1.00	3.97	10.85	13.14	17.21	39.50
	1:32:38	0.57	0.96	0.65	1.03	2.50	6.98	9.83	13.59	26.01
	1:38:26	0.41	0.71	0.47	0.76	1.86	5.30	7.52	10.45	20.19
	1:44:13	0.30	0.52	0.35	0.55	1.35	3.89	5.55	7.77	15.19
	1:50:01	0.24	0.40	0.27	0.43	1.04	2.96	4.20	5.85	11.32
	1:55:48	0.20	0.33	0.23	0.36	0.86	2.41	3.41	4.72	9.04
	2:01:35	0.17	0.28	0.19	0.30	0.73	2.04	2.87	3.98	7.60
	2:07:23	0.15	0.25	0.17	0.27	0.64	1.78	2.51	3.47	6.59
	2:13:10	0.13	0.23	0.15	0.24	0.58	1.60	2.25	3.10	5.89
	2:18:58	0.13	0.21	0.14	0.22	0.53	1.47	2.06	2.84	5.38
	2:24:45	0.09	0.15	0.10	0.16	0.39	1.08	1.53	2.11	4.06
	2:36:20	0.07	0.08	0.08	0.09	0.29	0.79	0.82	1.55	2.95
	2:42:07	0.04	0.06	0.04	0.06	0.15	0.43	0.61	0.84	1.61
	2:47:55	0.02	0.04	0.03	0.05	0.11	0.31	0.44	0.61	1.19
	2:53:42	0.02	0.03	0.02	0.03	0.08	0.22	0.31	0.44	0.86
	2:59:29	0.01	0.02	0.01	0.02	0.06	0.16	0.23	0.32	0.62
	3:05:17	0.01	0.01	0.01	0.01	0.04	0.11	0.16	0.22	0.44
	3:11:04	0.00	0.01	0.00	0.01	0.02	0.07	0.10	0.14	0.29
	3:16:52	0.00	0.00	0.00	0.00	0.01	0.04	0.05	0.08	0.17
	3:22:39	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.04	0.08
	3.26.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02
	3:40:01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:45:49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:51:36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:57:23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:03:11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:08:58	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:14:46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:20:33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:32:08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:37:55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:43:43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:49:30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:55:17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:01:05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:06:52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:18:27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:24:14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:30:02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:35:49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:47:24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:53:11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:58:59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:10:24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:16:21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:22:08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:27:56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:33:43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:39:31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:51:05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:56:53	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)

Summary Stage-Area-Volume-Discharge Relationships
The user can create a summary S-A-V-D by entering the desired stage increments and the remainder of the table will populate automatically.
The user should graphically compare the summary S-A-V-D table to the full S-A-V-D table in the chart to confirm it captures all key transition points

The user should graphically oc	inpure the burn	mary 0-71-V-D to				innin it ouptures u	in Rey danshorr points.
Stage - Storage	Stage	Area	Area	Volume	Volume	Total	
Description	[#1]	[#47]	[acros]	[#42]	[ac.ft]	[cfr]	
	[iq	[it 2]	[acres]	[it 5]	[ac-it]	[CI3]	
	0.00	45	0.001	0	0.000	0.00	For best results, include the
	1.00	3.072	0.071	1.543	0.035	0.02	stages of all grade slope
	1.00	7.047	0.100	6.004	0.4.64	0.07	changes (e.g. ISV and Floor)
	2.00	7,847	0.180	6,994	0.161	0.07	from the S-A-V table on
	3.00	9,422	0.216	15,731	0.361	0.12	Sheet 'Basin'.
	4.00	10,942	0.251	25,913	0.595	12.95	
	5.00	12,677	0.291	37,723	0.866	18.60	Also include the inverts of all
	6.00	14,446	0.332	51,284	1,177	19.91	outlets (e.g. vertical orifice.
	0.00	10,220	0.444	69.167	1.565	21.14	overflow grate and spillway
	7.00	19,320	0.444	68,167	1.565	21.14	where applicable)
	8.00	25,278	0.580	90,466	2.077	22.30	where applicable).
							1
							-
							1
							1
							1
							{
							4
]
							1
							-
							1
							1
							-
							1
							-
]
							1
							1
							4
							4
							4
							ļ
							ļ
]
							1
							1
]
]
]
							1
							1
							1
							1
							1
							1
							4
		1	1	1	1	1	İ.

DRAINAGE MAP





TOT	AL FLC	ws	
(2) (13)	Q(5) (<i>c</i> fs)	Q(100) (<i>cfs</i>)	
0.8	2	8	
0.3	0.7	3	
0.3	0.8	4	
0.2	0.5	3	
2	7	48	
1	2	10	
1	3	17	
1	2	10	
1	2	5	
2	3	13	
1	3	12	
2	4	21	
2	4	17	
0.6	1.1	4	
0.5	0.8	3	
0.4	1.0	5	
1	2	10	

	FINAL DRA	NAGE RE	PORT~SL	JRFACE R	OUTINGS	SUMMAR	Y		
					Inten	sity	FI	wo	
Design Point(s)	Contributing Basins	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	I(5)	I(100)	Q(5)	Q(100)	Outfall / Inlet Size
D1	A, OS-1 (8.5 AC.)	1.05	3.12	20.1	3.08	5.17	3	16	
D2	B (8.9 AC.)	1.07	3.47	21.8	2.96	4.97	3	17	
D3	E (5.1 AC.)	1.00	2.27	17.3	3.31	5.56	3	13	24" RCP CULVERT
D4	DP-D3, D, F (12.3 AC.) (POND 1)	2.41	5.48	20.5	3.05	5.12	7	28	POND 1
D5	Pond 1 Outfall, Basin C (17.4 AC.)		SEE PC	OND PACK MOI	DEL		1.7	24	
D6	OS-2, OS-3, EX-5, G (18.3 AC.)	2.46	7.31	31.9	2.39	4.01	6	29	30" RCP CULVERT
D7	DP-D6, OS-4, H (28.6 AC.) (POND 2)	4.09	11.61	32.9	2.34	3.93	10	46	POND 2
08 (TOTAL FLOWS INCL. OFF-SITE)	L (5.4 AC.) & OS-5 (40.6 AC.)	4.42	16.80	42.0	1.98	3.32	8	56	EXIST. 24" CULVERT
D8 (ON-SITE FLOWS ONLY)	L (5.4 AC.)	0.77	2.18	25.4	2.73	4.59	2	10	EXIST. 24" CULVERT
D9	I (1.6 AC.)	0.32	0.72	16.1	3.42	5.74	1	4	18" RCP CULVERT
D10	Pond 2 Outfall, Basins I, J, K (33.0 AC.)		SEE PC	OND PACK MOI	DEL		2.4	29	