STREET AND STORM SEWER CALCULATIONS

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **STREET** | **LOCATION** | **DISTANCE** | **ELEVATION**  **& SLOPE** | | **TOTAL**  **RUNOFF** | **STREET FLOW**  **/ CAPACITY** | **PIPE**  **FLOW** | **TYPE PIPE, CATCH BASIN & SLOPE %** | |
| EXIST OUTLET |  |  | TOP=82.84 | | 19.1/41.5 |  | 49.9 | 5’ DIA RCP VERT, d=0.90’ | |
|  |  |  | WS 84.02  S=0.94% | |  |  | 49.9 | 8” PVC, CAP = 1.52 REPLACE  30” RCP S=0.97% MIN hi=1.65 WS=84.85 | |
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| **STREET AND STORM SEWER CALCULATIONS PROJECT: 16140 OLD DENVER ROAD**  **BY: O.E. WATTS DATE:** 1-27-17, 1-5-18 | | | | **OLIVER E. WATTS, CONSULTING ENGINEER, INC.**  614 ELKTON DRIVE COLORADO SPRINGS, CO 80907 | | | | | Page: 2 Of Pages7 |

|  |  |
| --- | --- |
| **Stormwater Detention and Infiltration Design Data Sheet** | **Stormwater Detention and Infiltration Design Data Sheet** |

Workbook Protected Worksheet Protected

**Stormwater Facility Name: 16140 Old Denver Road, All About Outdoor Storage, El Paso County Facility Location & Jurisdiction: Full Spectrum Detention Pond O.E. Watts 1-8-18**

**User Input: Watershed Characteristics**

|  |  |  |  |
| --- | --- | --- | --- |
| **User Defined** | **User Defined** | **User Defined** | **User Defined** |
| Stage [ft] | Area [ft^2] | Stage [ft] | Discharge [cfs] |
| 0.00 | 0 | 0.00 | 0.00 |
| 0.01 | 3,340 | 0.01 | 0.05 |
| 0.50 | 3,718 | 0.50 | 0.05 |
| 1.00 | 4,112 | 1.00 | 0.05 |
| 1.50 | 4,522 | 1.50 | 0.05 |
| 1.84 | 4,812 | 1.84 | 0.05 |
| 2.00 | 4,984 | 2.00 | 2.49 |
| 2.50 | 8,381 | 2.50 | 20.89 |
| 3.00 | 13,262 | 3.00 | 35.56 |
| 3.50 | 13,942 | 3.50 | 40.51 |
| 4.00 | 14,636 | 4.00 | 44.92 |
| 4.50 | 15,345 | 4.50 | 48.93 |
| 5.00 | 16,068 | 5.00 | 52.63 |
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| --- |
| 0.024 |
| 1130 |
| 11.56 |
| 48.0% |
| 0.0% |
| 100.0% |
| 0.0% |

100YR IN

45

100YR OUT

40 50YR IN

50YR OUT

Watershed Slope = Watershed Length = Watershed Area = Watershed Imperviousness =

Percentage Hydrologic Soil Group A = Percentage Hydrologic Soil Group B = Percentage Hydrologic Soil Groups C/D =

Location for 1-hr Rainfall Depths (use dropdown):

User Input

17

ft/ft ft acres

percent percent percent percent

35 10YR IN

10YR OUT

Doing\_Clear\_FoYes

CountA= 1

30

5YR IN

5YR OUT

25

**FLOW [cfs]**

2YR IN

20 2YR OUT

WQCV Treatment Method =

40.00 hours



|  |  |
| --- | --- |
| Extended Deten | tion |

WQCV IN

15

WQCV OUT

10

5

**After completing and printing this worksheet to a pdf, go to:** [**https://maperture.digitaldataservices.com/gvh/?viewer=cswdif**](https://maperture.digitaldataservices.com/gvh/?viewer=cswdif) **create a new stormwater facility, and**

**attach the pdf of this worksheet to that record.**

3.5

3

2.5

**PONDING DEPTH [ft]**

2

1.5

0

0.1

100YR

50YR

10YR

5YR

2YR WQCV

**TIME**1 **[hr]** 10

Design Storm Return Period = One-Hour Rainfall Depth = Calculated Runoff Volume =

**Routed Hydrograph Results**

1

Area

**0 1 2 3**

#N/A #N/A

**0 1 2 3**

#N/A #N/A

Discharge

Check Data Set 1 Check Data Set 1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| WQCV | 2 Year | 5 Year | 10 Year | 50 Year | 100 Year |
| 0.53 | 1.19 | 1.50 | 1.75 | 2.25 | 2.52 |
| 0.191 | 0.489 | 0.762 | 0.994 | 1.600 | 1.912 |
|  |  |  |  |  |  |
| 0.191 | 0.488 | 0.762 | 0.993 | 1.600 | 1.911 |
| 42.3 | 40.3 | **38.3** | 36.7 | 32.3 | 30.1 |
| 43.3 | 42.7 | 42.1 | 41.5 | 40.1 | **39.4** |
| 1.86 | 2.15 | 2.33 | 2.45 | 2.81 | 2.97 |
| 0.111 | 0.137 | 0.165 | 0.184 | 0.260 | **0.297** |
| 0.173 | 0.207 | 0.234 | 0.256 | 0.334 | 0.380 |

in

acre-ft

OPTIONAL Override Runoff Volume = acre-ft

Inflow Hydrograph Volume = Time to Drain 97% of Inflow Volume = Time to Drain 99% of Inflow Volume = Maximum Ponding Depth = Maximum Ponded Area =

Maximum Volume Stored =

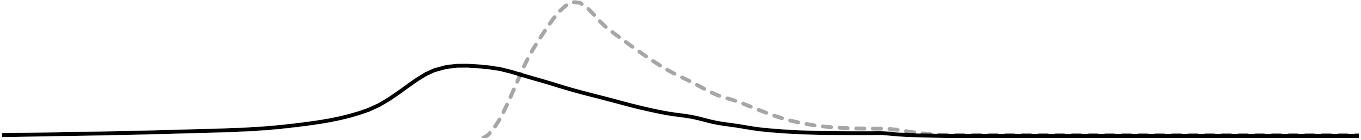
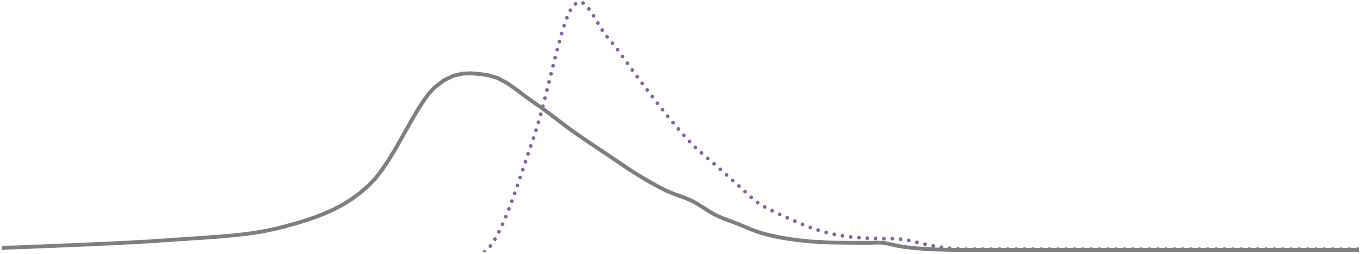
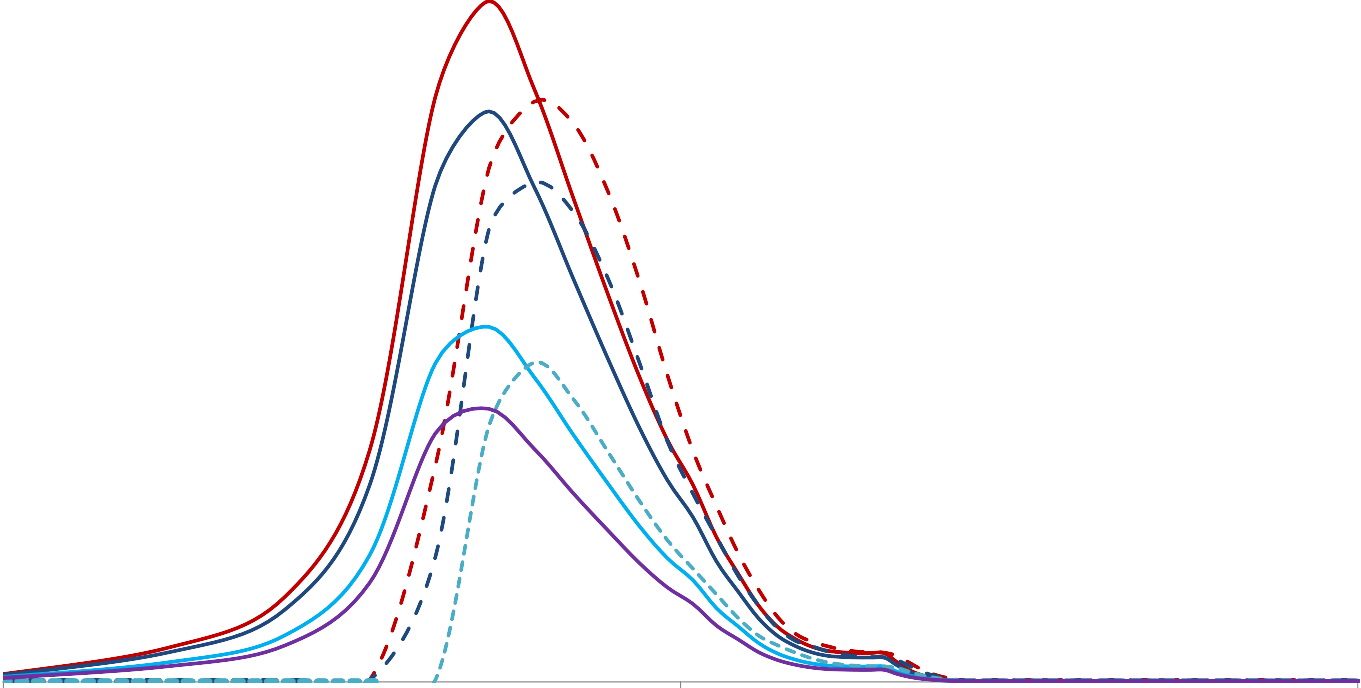
acre-ft hours hours ft acres acre-ft

0.5

0

0.1 1 10 100

**DRAIN TIME [hr]**

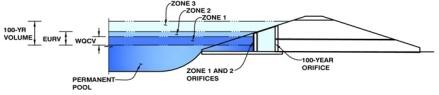


1-8-18 SDI\_Design\_Data\_v1.04.xlsm, Design Data 1/8/2018, 2:53 PM

**DETENTION BASIN STAGE-STORAGE TABLE BUILDER**

**UD-Detention, Version 3.07 (February 2017)**

**Project: All About Outdoor Storage, 16140 Old Denver Road, El Paso County, Colorado Basin ID: Full Spectrum Detention Pond**



**Example Zone Configuration (Retention Pond)**

**Required Volume Calculation**

|  |
| --- |
| **SF** |
| 11.55 |
| 1,130 |
| 0.024 |
| 48.00% |
| 0.0% |
| 100.0% |
| 0.0% |
| 12.0 |

Selected BMP Type = Watershed Area = Watershed Length = Watershed Slope =

Watershed Imperviousness =

Percentage Hydrologic Soil Group A = Percentage Hydrologic Soil Group B = Percentage Hydrologic Soil Groups C/D = Desired WQCV Drain Time =

Location for 1-hr Rainfall Depths = User Input

|  |
| --- |
| 0.155 |
| 0.591 |
| 0.474 |
| 0.650 |
| 0.887 |
| 1.253 |
| 1.505 |
| 1.836 |
| 0.000 |
| 0.444 |
| 0.610 |
| 0.814 |
| 0.894 |
| 0.935 |
| 1.049 |

acres 1130

ft ft/ft

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Depth Increment = | 0.5 | ft | | | | | | | |
| Stage - Storage Description | Stage (ft) | Optional Override  Stage (ft) | Length (ft) | Width (ft) | Area (ft^2) | Optional Override  Area (ft^2) | Area (acre) | Volume (ft^3) | Volume (ac-ft) |
| **Media Surface** | -- | 0.00 | -- | -- | -- | 3,341 | 0.077 |  |  |
|  | -- | 0.50 | -- | -- | -- | 3,718 | 0.085 | 1,727 | 0.040 |
|  | -- | 1.00 | -- | -- | -- | 4,112 | 0.094 | 3,681 | 0.085 |
|  | -- | 1.50 | -- | -- | -- | 4,522 | 0.104 | 5,835 | 0.134 |
|  | -- | 2.00 | -- | -- | -- | 4,948 | 0.114 | 8,199 | 0.188 |
|  | -- | 2.50 | -- | -- | -- | 8,381 | 0.192 | 11,580 | 0.266 |
|  | -- | 3.00 | -- | -- | -- | 13,262 | 0.304 | 16,991 | 0.390 |
|  | -- | 3.50 | -- | -- | -- | 13,942 | 0.320 | 23,792 | 0.546 |
|  | -- | 4.00 | -- | -- | -- | 14,636 | 0.336 | 30,937 | 0.710 |
|  | -- | 4.50 | -- | -- | -- | 15,345 | 0.352 | 38,432 | 0.882 |
|  | -- | 5.00 | -- | -- | -- | 16,068 | 0.369 | 46,285 | 1.063 |
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percent percent percent percent hours

Water Quality Capture Volume (WQCV) = Excess Urban Runoff Volume (EURV) = 2-yr Runoff Volume (P1 = 1.19 in.) =

5-yr Runoff Volume (P1 = 1.5 in.) = 10-yr Runoff Volume (P1 = 1.75 in.) = 25-yr Runoff Volume (P1 = 2 in.) = 50-yr Runoff Volume (P1 = 2.25 in.) =

100-yr Runoff Volume (P1 = 2.52 in.) =

acre-feet acre-feet acre-feet acre-feet acre-feet acre-feet acre-feet acre-feet

Optional User Override 1-hr Precipitation

inches inches inches inches inches inches

|  |
| --- |
| 1.19 |
| 1.50 |
| 1.75 |
| 2.00 |
| 2.25 |
| 2.52 |
|  |

500-yr Runoff Volume (P1 = 0 in.) = Approximate 2-yr Detention Volume = Approximate 5-yr Detention Volume = Approximate 10-yr Detention Volume = Approximate 25-yr Detention Volume = Approximate 50-yr Detention Volume = Approximate 100-yr Detention Volume =

**Stage-Storage Calculation**

Zone 1 Volume (WQCV) = Zone 2 Volume (EURV - Zone 1) =

Zone 3 Volume (100-year - Zones 1 & 2) = Total Detention Basin Volume = Initial Surcharge Volume (ISV) = Initial Surcharge Depth (ISD) =

Total Available Detention Depth (Htotal) = Depth of Trickle Channel (HTC) = Slope of Trickle Channel (STC) = Slopes of Main Basin Sides (Smain) = Basin Length-to-Width Ratio (RL/W) =

Initial Surcharge Area (AISV) = Surcharge Volume Length (LISV) = Surcharge Volume Width (WISV) = Depth of Basin Floor (HFLOOR) = Length of Basin Floor (LFLOOR) = Width of Basin Floor (WFLOOR) = Area of Basin Floor (AFLOOR) = Volume of Basin Floor (VFLOOR) = Depth of Main Basin (HMAIN) = Length of Main Basin (LMAIN) = Width of Main Basin (WMAIN) = Area of Main Basin (AMAIN) = Volume of Main Basin (VMAIN) =

Calculated Total Basin Volume (Vtotal) =

acre-feet inches

acre-feet acre-feet acre-feet acre-feet acre-feet acre-feet

acre-feet acre-feet acre-feet acre-feet ft^3

|  |
| --- |
| 0.155 |
| 0.436 |
| 0.458 |
| 1.049 |
| N/A |
| N/A |
| user |
| N/A |
| N/A |
| user |
| user |

ft ft ft

ft/ft H:V

ft^2 ft

|  |
| --- |
| user |
| user |
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| user |
| **user** |

ft ft ft ft

ft^2 ft^3 ft

ft ft

ft^2 ft^3

acre-feet

4-17 UD-Detention\_v3.07.xlsm, Basin 1/8/2018, 3:14 PM

**Area (acres)**

**Length, Width (ft.)**

**Volume (ac-ft)**

**Area (sq.ft.)**

**DETENTION BASIN STAGE-STORAGE TABLE BUILDER**

**UD-Detention, Version 3.07 (February 2017)**

1 User Defined Stage-Area Boolean for Message

1 Equal Stage-Area Inputs Watershed L:W

1 CountA

0 Calc\_S\_TC

H\_FLOOR

L\_FLOOR\_OTHER

0.00 ISV 0.00 ISV

0.00 Floor 0.00 Floor

1.69 Zone 1 (WQCV) 1.69 Zone 1 (WQCV)

3.64 Zone 2 (EURV) 3.64 Zone 2 (EURV)

4.97 Zone 3 (100-yea 4.97 Zone 3 (100-year)

20

400

15

300

10

200

5

100

0

0

0.00 1.50

3.00

**Stage (ft)**

4.50

6.00

Length (ft)

Width (ft)

Area (sq.ft.)

0.380

1.080

0.285

0.810

0.190

0.540

0.095

0.270

0.000

0.000

0.00 1.50

3.00

**Stage (ft.)**

4.50

6.00

Area (acres)

Volume (ac-ft)

4-17 UD-Detention\_v3.07.xlsm, Basin 1/8/2018, 3:14 PM