

## IMPERVIOUS AREA CALCULATOR

### Tabulation of Impervious Areas

All square footages are based on actual identification of entities within the plan, digitally provided from Autodesk - AutoCAD Civil 3D (Version 2010)

Item	Area (sq-ft)	Area (Ac.)
Prop. Building	92742.00	2.129
Future Building	88998.00	2.043
Parking/Sidewalk/Driveway	78342.00	1.798
	260082.00	
		<b>5.971 Acres</b>

Received by  
City of Grove City  
08-16-19

## CRITICAL STORM CALCULATIONS

**PEAK VOLUME - UNDEVELOPED 1 YEAR STORM**  
**HydroCAD 10.00 Results:**

Volume = 0.304 Acre-Ft.  
 Flowrate = 4.52 cfs.

**PEAK VOLUME - DEVELOPED 1 YEAR STORM**  
**HydroCAD 10.00 Results:**

Volume = 0.733 Acre-Ft.  
 Flowrate = 12.78 cfs.

**PERCENT CHANGE IN VOLUME**

$$\begin{array}{rclcl} 0.733 & - & 0.304 & = & 0.429 \\ \hline 0.429 & = & 1.411 & = & \mathbf{141.1\%} \\ 0.304 & & & & \end{array}$$

THEREFORE, BASED ON INFORMATION FOUND IN THE MORPC STORMWATER MANUAL, THE CRITICAL STORM IS A **25 YEAR STORM**

PERCENT INCREASE IS EQUAL TO OR GREATER THAN:	AND LESS THAN:	CRITICAL STORM FOR RUNOFF LIMITATION WILL BE: (YEARS)
0%	10%	1
10%	20%	2
20%	50%	5
50%	100%	10
100%	250%	25
250%	500%	50
500%	-	100

## PEAK FLOW ALLOWABLE RELEASE RATES

CRITICAL STORM = 25 YEAR

Pre-Developed Peak Flow Conditions (Provided from HydroCAD 10.00)

1 YEAR STORM EVENT Q = 4.52 CFS

10 YEAR STORM EVENT Q = 16.81 CFS

The City of Grove City requires all post developed stormwater release rates as follows:

STORM EVENT (YEAR)	ALLOWABLE PEAK FLOW RATE (CFS)	PROPOSED PEAK FLOW RATE AT OUTLET STRUCT. (HydroCAD 10.00) (CFS)
1	4.52	1.31
2	4.52	1.64
5	4.52	2.04
10	4.52	2.32
25	16.81	3.69
50	16.81	5.58
100	16.81	6.96

Project: Cardinal Self Storage - Westerville  
 Location: 415 Maxtown Rd.  
 Westerville, Ohio

## WATER QUALITY CALCULATOR

PROJECT NUMBER: CW-14013  
 DATE: 05/01/2019

CALCULATED BY: RAB

Site Disturbance A = **9.47** Ac.

### Volume Determination

Determine  $WQv = Rv * P * (A/12)$   
 A = 9.47  
 Rv = 0.617  
 i = **0.63**  
 P = 0.90

= Site Disturbance (Acres)  
 = Volumetric Runoff Coefficient = 0.05+0.9i  
 = Fraction of Impervious Area  
 = Precipitation Depth (inch)

**WQv = 0.44 Ac.-Ft. = 19089.05 Cu.-Ft Required**

Provided in Pond = **71307 Cu.-Ft. Provided**

### Water Quality Flow Determination

$Q_{avg} = WQv/Td = WQv/(24hr)(3600s/hr) = 0.22 \text{ Cu.-Ft./sec.}$

$A_{orif} = Q_{avg}/[C*(2gH_{avg})^{0.5}]$        $H_{max} = 3 \text{ ft}$        $H_{avg} = 1.5 \text{ ft}$   
 $A_{orif} = 0.037465 \text{ Sq.-Ft.}$        $C = 0.6$   
 $g = 32.2 \text{ ft/s/s}$

$D_{orif} = [(4*A_{orif})/3.14]^{0.5} = 0.2184643 \text{ ft.} = 2.6 \text{ inches}$

100% WQv Elev = 920.24 => 32,798.20 C.F

50% WQv Elev = 919.42 => 16,399.10 C.F

Volume @ T(8) = **18858** ≥ 9544.52 **OK**

Volume @ T(24) = **1877** ≥ 0 **OK**

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## STORM DRAINAGE REQUIRED STORAGE VOLUME

### Difference in Increased Runoff Volume

(Based on HydroCAD 10.00 Report)

Outlet	100 YEAR (AF)	(CU-FT)	-	10 YEAR (AF)	(CU-FT)	=
	2.070	90169.20		0.979	42645.24	

### Wet Retention Basin

Elev.	S.F.	Volume / Ft.	=	
831.00 (Normal Pool)	17995	0	=	0.00
832.00	20879	19417	=	19417.00
833.00	23863	22352	=	22352.00
834.00	26948	25387	=	25387.00
			=	0.00
			=	0.00
			=	0.00
			=	<u>67156.00</u>

STORAGE VOLUME REQUIRED	=	47523.96 CU. FT.
Plus 20% WQv	=	3817.81 CU. FT.
<b>TOTAL STORAGE VOLUME REQUIRED</b>	=	<b>51341.77 CU. FT.</b>
	=	384036.4 GALLONS

STORAGE VOLUME AVAILABLE = **67156.00 CU. FT.**



