

STORMWATER MANAGEMENT CALCULATIONS

I. GIVEN:

A. ACREAGE:

1. Buildings = 0.000 ac.
2. Impervious = 0.008 ac.
3. Pervious = 0.005 ac.
4. Water / Retention Area = 0.000 ac.
4. Total Site Area = 0.013 ac.

B. ZONING:

1. Commercial

II. DESIGN CRITERIA:

A. WATER QUALITY CRITERIA:

1. If a wet detention system, then whichever is the greater of the following:
 - a. The first inch of runoff from the entire project site.
 - b. The amount of 2.5 inches times the percent impervious for the project site.
2. If a dry detention system, then 75% of the volume required for the wet detention system.
3. If a retention system, then 50% of the volume required.
4. If the property is zoned "Commercial", at least 1/2 inch of retention or dry detention pre-treatment will be required.
5. Any detention system shall be designed to discharge no more than 0.5 inches of the detained volume per day.

III. COMPUTATIONS

A. WATER QUALITY COMPUTATIONS:

1. Compute the first inch of runoff from the entire developed project site:

$$= 1.00 \text{ inch} \times 0.013 \text{ acres} \times (1 \text{ foot} / 12 \text{ inches})$$

$$= 0.001 \text{ ac-ft for the first inch of runoff}$$
2. Compute 2.5 inches times the percent impervious for the developed project site:
 - a. Site area for water quality pervious / impervious calculations only:
 - b. Total Project Area - (Water / Retention Area + Buildings)

AAC

AAC

$$= 0.013 \text{ acres} - (0.000 \text{ acres} + 0.000 \text{ acres})$$

$$= \boxed{0.013} \text{ acres of site area for water quality calculations}$$

b. Impervious area for water quality pervious / impervious calculations only:

$$= \text{Site area for water quality} - \text{Pervious area}$$

$$= 0.013 \text{ acres} - 0.005 \text{ acres}$$

$$= \boxed{0.008} \text{ acres of impervious area for water quality calculations}$$

c. Percentage of impervious area for water quality:

$$= \text{Impervious area for water quality} / \text{Site area for water quality} \times 100\%$$

$$= 0.008 \text{ acres} / 0.013 \text{ acres} \times 100\%$$

$$= \boxed{61.5\%} \text{ Impervious}$$

d. For 2.5 inches times the percentage of impervious area:

$$= 2.5 \text{ inches} \times 61.5\%$$

$$= \boxed{1.538} \text{ inches to be treated}$$

e. Compute volume required for quality:

$$= \text{Inches to be treated} \times (\text{Total Site Area} - \text{Water / Retention Area})$$

$$= 1.538 \text{ inches} \times (0.013 \text{ acres} - 0.000 \text{ acres}) \times (1 \text{ foot} / 12 \text{ inches})$$

$$= \boxed{0.002} \text{ ac-ft required for detention storage}$$

3. → The first inch of runoff from the entire developed site = $\boxed{0.001}$ ac-ft

→ 2.5 inches times the percentage of impervious area = $\boxed{0.002}$ ac-ft

→ Volume of $\boxed{0.002}$ ac-ft controls

4. If the project is zoned "Commercial" or if the project were discharging directly to a sensitive receiving body and is more than 40% impervious, 0.5 inches of dry detention pre-treatment must be provided:

$$= 0.5 \text{ inches} \times (\text{Total Site Area} - \text{Water / Retention Area})$$

$$= 0.5 \text{ inches} \times (0.013 \text{ acres} - 0.000 \text{ acres}) \times (1 \text{ foot} / 12 \text{ inches})$$

$$= \boxed{0.001} \text{ ac-ft required for pre-treatment}$$

5. Compute total volume required:

$$= \text{Total required detention} + \text{Pre-treatment}$$

$$= 0.002 \text{ ac-ft} + 0.001 \text{ ac-ft}$$

$$= \boxed{0.002} \text{ ac-ft of total volume required}$$

6. Compute credit for using one of the following systems:

a. Wet detention volume to be provided:

$$= \text{Total required detention} - \text{Pre-treatment}$$

$$= 0.002 \text{ ac-ft} - 0.001 \text{ ac-ft}$$

$$= \boxed{0.001} \text{ ac-ft of volume required for wet detention}$$

b. Dry detention volume to be provided (75% of the total required detention volume)

AAC

AAC

$$\begin{aligned}
 &= \text{Total required detention volume} \times 75\% \\
 &= 0.002 \text{ ac-ft} \times 0.75\% \\
 &= \boxed{0.001} \text{ ac-ft of volume required for dry detention}
 \end{aligned}$$

c. Dry retention volume to be provided (50% of the total required detention volume):

$$\begin{aligned}
 &= \text{Total required detention volume} \times 50\% \\
 &= 0.002 \text{ ac-ft} \times 0.50\% \\
 &= \boxed{0.001} \text{ ac-ft of volume required for dry retention}
 \end{aligned}$$

B. SUMMARY OF WATER QUALITY COMPUTATIONS:

Item	Description	Quantity
A.1	First inch of runoff from the entire developed project site	0.001 ac-ft
A.2	2.5 inches times percent impervious for the developed project site	0.002 ac-ft
A.3	Detention volume to be treated	0.002 ac-ft
A.4	Pre-treatment required for Commercial site	0.001 ac-ft
A.5	Total volume to be treated	0.002 ac-ft
A.6.a	Wet detention volume required	0.001 ac-ft
A.6.b	Dry detention volume required	0.001 ac-ft
A.6.c	Dry retention volume required	0.001 ac-ft

C. STAGE - STORAGE TABLE:

WSEL (ft)	Area (sf)	Average Area (sf)	Head Diff (ft)	Change in Volume (cf)	Total Volume (cf)	Total Volume (ac-ft)	Site Feature
7.15	31				0	0.000	
		111	1.00	111			
8.15	190				111	0.003	

IV. CONCLUSIONS

The required storage volume to treat 100% of the impervious area to the raingarden is **0.002 ac-ft**.

The proposed storage volume in the raingarden is **0.003 ac-ft**.

This item has been digitally signed and sealed by Justin Thompson, PE, on the date adjacent to the seal.

Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.



AAC

AAC