



VILLAGE OF KEY BISCAYNE

Department of Building, Zoning Planning and Public Works

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Mission Statement: "TO PROVIDE A SAFE, QUALITY ENVIRONMENT FOR ALL ISLANDERS THROUGH RESPONSIBLE GOVERNMENT"

DRAINAGE CALCULATIONS WORKSHEET

In order to help residential developments (single-family units), the Village's Building, Zoning and Planning Department has developed a worksheet to aid applicants in determining the volume of runoff generated during a 5-year, 1-hour storm. The calculations follow the methodology recommended by the South Florida Water Management District (SFWMD) in their publication "Management and Storage of Surface Waters, Permit Information Manual, Volume 4." Applicants must include the calculations on this worksheet with their permit application. A registered professional engineer, registered landscape architect or registered architect must perform these calculations.

Once the volume of runoff generated during a 5-year, 1-hour storm within the property or a sub-basin within the property is determined, the applicant must include calculations showing this volume will be contained within the property. Retention of this volume can be provided within shallow retention swales (including the swale at frontage of property), or drains.

The applicant must also provide plans showing existing and proposed elevations throughout the property demonstrating the volume of runoff generated during the design storm (5-year, 1-hour) will be contained within the retention areas. The existing and proposed elevations must also show no overflow from the property will occur to adjacent properties or Right-of-Ways during a 5-year, 1-hour storm.

DEFINITIONS OF WORKSH		EET VARIABLES	
P:	Rainfall depth, in inches	A:	Total area of property, in square feet
S:	Soil storage capacity, in inches	AP:	Total pervious areas within property, in square feet
R:	Runoff depth, in inches	V:	Volume of runoff, in cubic feet
AI:	Total area of roof, pavement and walkways within property, in square feet (i.e., total impervious area)		

STEP 1:

Determine A

A = _____ square feet

STEP 2:

Determine AP and AI

AP = _____ square feet

AI = _____ square feet

STEP 3:

Determine the average NGVD elevation of pervious areas within property or sub-basin within property.

Average Elevation of Pervious Areas = _____ NGVD

STEP 4:

Determine the distance between the average high ground water elevation and the average elevation of pervious areas. For design purposes, the average high ground water elevation for most of Key Biscayne is 2 feet NGVD. (Please check with your geotechnical engineer and/or geotechnical report for local conditions).

Distance = _____ feet

STEP 5:

Determine an Si value from the table below:

Distance between groundwater table and average elevation of pervious areas:	Si
1 foot	0.45 inches
2 feet	1.88 inches
3 feet	4.95 inches
4 feet	8.18 inches
>4 feet	8.18 inches

If necessary, compute a value of Si by interpolation.

Si = _____ inches

STEP 6:

Determine S as:

$$S = AP * Si A$$

S is computed in inches.

S = _____ inches

STEP 7:

Determine runoff depth (R) as:

$$R = \frac{(P - 0.2 * S)^2}{(3.3 + 0.8 * S)}$$

where P = 3.3 inches of rainfall produced during a 5-year, 1-hour storm.

Then:

$$R = \frac{(3.3 - 0.2 * S)^2}{(3.3 + 0.8 * S)}$$

R is computed in inches.

R = _____ inches

STEP 8:

Determine volume of runoff (V) as:

$$V = \frac{A * R}{12}$$

V is computed in cubic feet. V is the volume of runoff generated during a 5-year, 1-hour storm within the property or the sub-basin within the property. This is the volume of runoff that must be contained within the property.

V = cubic feet

STEP 9:

Compute retention volume provided (VP) as:

$$VP = AP * S / 12$$

VP is computed in cubic feet. VP is the retention volume capacity of swales, retention areas and drains within the property or sub-basin within the property.

**Attach calculations showing how this volume was computed.

**Calculations must be consistent with existing and proposed elevations shown on design plans.

VP = cubic feet

STEP 10:

Compare values of retention volume provided (VP in STEP 9) with retention volume needed (V in STEP 8). Retention volume provided (VP) must be larger than the retention volume needed (V).

(VP= cubic feet) > (V = cubic feet)

NOTE: These volume calculations are needed to satisfy the Village of Key Biscayne's code requirements.