**STARK COUNTY SUBDIVISION ENGINEERING DEPARTMENT**
**SIMPLIFIED METHOD FOR DESIGN OF**
**STORM WATER RUNOFF CONTROL STRUCTURES**

## I. VOLUME DETERMINATION

1. Decide on where the point of analysis will be. This is the point on the earth's surface where storm water from the pre-developed and post-developed drainage areas flow to. This point must be coincidental for both drainage areas, which are determined in the next step. Most of time this point should be located just downstream of the proposed development, however there can be cases where the characteristics of the drainage area are such that the point of analysis should be located further downstream.

2. Determine the size of the pre-developed and post-developed drainage areas (A) from which storm water flows to the point of analysis. The site on which the proposed development is to occur has to be included in both of these drainage areas.

3. Determine the average runoff coefficient (c) for both the pre-developed and post-developed drainage areas. The post-developed drainage area will have two average runoff coefficient values. One will be for the post-developed drainage area during the site's construction period and one will be for the post-developed drainage area after the site's proposed development is completed. Typical values for the average runoff coefficient are as follows:

   a. 0.20 to 0.30 for pre-developed drainage areas depending on the site's existing surface conditions.

   b. 0.80 to 0.90 for post-developed drainage areas involving single-family subdivisions or commercial sites during construction. Use 0.90 when the average slope along the path of the hydraulically most distant point in the post-developed drainage areas is greater than 30%.

   c. 0.50 to 0.60 for post-developed drainage areas involving single-family subdivisions when completed. Use 0.60 when the average slope along the path of the hydraulically most distant point in the post-developed drainage areas is greater than 30%.

   d. 0.90 for post-developed drainage areas involving commercial sites when completed.

   The values given are appropriate to use unless a detailed analysis shows higher or lower value should be used.

4. Select the rainfall data that the storm water control structure is to be sized for. The Stark County Subdivision Engineering Department is currently using the following rainfall values as a minimum:

   a. 3.55 inches (0.30 feet) of rainfall falling in a 24-hour period based upon a 10-year frequency storm. This value is used for determining the size of the control structure during the site's construction period.

   b. 5.74 inches (0.48 feet) of rainfall falling in a 24-hour period based upon a 100-year frequency storm. This value is used for determining the size of the control structure after the site's proposed development is completed.

The rainfall data given is taken from NOAA Atlas 14, Volume 2, Version 2 issued by the National Weather Service for Stark County location N40.785, W81.416.

5. Calculate the total volume of storm water (Q) that flows to the point of analysis from the pre-developed and post-developed drainage areas using the formula Q=c x i x A. Make sure that the values used for i and A are in the same units such as feet and square feet respectively. Subtract the difference in runoff volume values between the pre-developed and post-developed (during construction and when completed) drainage areas. The larger of the two values found is the minimum size that the control structure needs to be.

6. Check that an adequate downstream outlet exists for the post-developed drainage area. The smallest or most restrictive channel, pipe or culvert just downstream of the post-developed drainage area is selected for this check. Determine what the maximum rate of flow that the most restrictive outlet downstream can pass. Determine a volume using this rate of flow for a 24-hour period. Subtract this volume from the larger of the two volumes found in previous Step 5 for the post-developed (during construction and when completed) drainage area. If this volume is larger than volume determined in the Step 5, then this is the minimum size that the control structure needs to be and adequate outlet criteria governs the size required.

## II. STORM WATER RUNOFF CONTROL STRUCTURES

1. Design related to the construction of a storm water runoff control structure and it's associated outlet device(s) shall be in accordance with requirements given in Section 620 of the Stark County Subdivision Regulations, latest edition.

NOTES:

- The simplified method yields results accurate enough for the sizing of storm water runoff control structures serving drainage areas less than 100 acres, but may yield overly conservative results for larger drainage areas.

- This document was prepared by Joseph E. Underwood on August 17, 2006.