City of Westlake, Ohio   Project: _____
Storm Water Retention Design   Location: _____
Ordinance No. 1973-8   Owner: _____
Standard Design Form   Engineer: _____

A. Site Data

    1.) Gross Area = _____ Acres
    2.) Existing Land Use = _____
    3.) Proposed Land Use

(1)	(2)	(3)	(4)	(5)	(6)
Land Use	Area Acres	Run-Off Coefficient	Weighted "C" (2) x (3)	Impervious Factor "P"	Weighted "P" (2) x (5)
Undeveloped	_____	0.30	_____	0	_____
Rural	_____	0.35	_____	0.10	_____
Residential	_____	0.45	_____	0.25	_____
Apartment	_____	0.75	_____	0.75	_____
Commercial	_____	0.84	_____	0.90	_____
Industrial	_____	0.75	_____	0.75	_____
Totals A=	_____	A x C=	_____	A x P=	_____

    4.) Run-Off Coefficient
        C = (4) ÷ (2) = _____ ÷ _____ = _____

    5.) Percent Impervious
        P = (6) ÷ (2) = _____ ÷ _____ = _____

    6.) Infiltration Rate Inches Per Hours: F= _____
(Use 0.50 for most locations. Certain areas of city may require different values).

    7.) Allowable Peak Discharge: D= _____ CFS acre CFS/acre x A

    8.) Site Concentration Time: Tc = _____ Minutes

B. Equations for use in Calculations
        1.) Peak inflow rate (cubic feet per second): $Q = C \times I \times A$
        2.) Run-off rate (inches per hour): $R = (I \times P) + (1.00 - P)(I - F)$
        3.) Total inflow volume (cubic feet): $VI = 60.5 \times R \times A \times T$
           (T = Duration of rainfall in minutes)
        4.) End of run-off time: $Te = [V \div (Q \times 30)] - (T - Tc)$
        5.) Total discharge during reservoir fill period (cubic feet):
           $Vo = D \times [Te \div 2] \times 60$

Project: _____

B. Calculation of Maximum Required Storage

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Storm Duration T	Uniform Inflow Period T-Tc	Rainfall Rate I	Peak Inflow Rate Q	Run-Off R	Total Inflow Volume Vi	End of Run-Off Time Te	Total Discharge Vo	Storage Required S
Minutes	Minutes	In/Hr	CFS	In/Hr	Cu Ft	Minutes	Cu Ft	Cu Ft

Explation of Each Column
1.) Check durations from site concentration time to 120 minutes to find time requiring largest storage volume.
2.) Storm duration less site concentration time.
3.) From rainfall intensity duration table.
4.) Calculated by equation (1).
5.) Calculated by equation (2).
6.) Calculated by equation (3).
7.) Calculated by equation (4).
8.) Calculated by equation (5).
9.) Subtract column (8) from Column (6).

Flow Control Device or Regulator Sketch with Discharge Calculations

Seal

P.E.

_____   _____
Date   Engineer's Signature