RUNOFF DETENTION

CITY OF LANSING
DEPARTMENT OF PUBLIC SERVICE

SITE LOCATION _____

(A) DRAINAGE AREA = _____ Ac   **(B)** MAXIMUM ALLOWABLE DISCHARGE = _____ CFS

IMPERVIOUS AREA = _____ Ac   Existing "C" = _____

PERVIOUS AREA = _____ Ac   **(H)** POND SIZE REQUIRED = _____ CFT

DURATION	(C) RAINFALL INTENSITY 30−YEAR STORM			(D) AVE COEF	(E) 30−YEAR RUNOFF (CFT)	(F) PERMITTED OUTFLOW (CFT)	(G) REQUIRED STORAGE (CFT)
	t(HR)	I(in/HR)	R(in)				
10 MIN	0.17 *	7.15 =	1.19				
20 MIN	0.33 *	5.05 =	1.68				
30 MIN	0.50 *	3.96 =	1.98				
40 MIN	0.67 *	3.28 =	2.19				
50 MIN	0.83 *	2.82 =	2.35				
60 MIN	1.00 *	2.48 =	2.48				
70 MIN	1.17 *	2.22 =	2.59				
80 MIN	1.33 *	2.02 =	2.69				
90 MIN	1.50 *	1.85 =	2.77				
100 MIN	1.67 *	1.71 =	2.85				
110 MIN	1.83 *	1.59 =	2.92				
120 MIN	2.00 *	1.49 =	2.98				
24 HRS	24.00 *	0.21 =	5.02				

INSTRUCTIONS

A) DRAINAGE AREAS shall be calculated in acres and divided into impervious and pervious areas.

B) MAXIMUM ALLOWABLE DISCHARGE {Q} (CFS) shall be for a 10 yr storm − 30 min. duration

$Q = C I A$ C = 0.40 for Previously Residential areas

$I = 2.40$ Inches/Hour   C = 0.15 for Previously Undeveloped areas

A = Drainage area in acres   C = 0.00 for Non−Storm sewer areas

                                               or C = Design Value for storm system

C) Inches of rainfall, given for a 30 year storm, source: Camp, Dresser & McKee, Inc., December 1986 $\{I = 76.6/(t + 8.62)^{0.811}\}$

D) AVERAGE COEFFICIENT for runoff, used for all durations, is calculated by the weighted average of pervious and impervious areas, using a pervious coefficient of 0.15 and an impervious coefficient of 0.90
(ie: AVE COEF = (IMPERVIOUS AREA * 0.90)+(PERVIOUS AREA * 0.15)/DRAINAGE AREA

E) Runoff: multiply the total drainage area by the average coefficient then by inches of rainfall converted into feet, then by 43,560 to convert acres into square feet, result will be in cubic feet.
(ie: RUNOFF = DRAIN AREA * AVE COEF * (RAINFALL/12) * 43,560 SFT/ACRE

F) Permitted Outflow: multiply maximum allowable outflow by time in hours, then by 3600
(ie: PERMITTED OUTFLOW = MAXIMUM ALLOWABLE DISCHARGE(CFT/SEC) * TIME(HR) * 3600(SEC/HR))

G) REQUIRED STORAGE: Subtract PERMITTED OUTFLOW from 30−YEAR RUNOFF. Storage volume will increase to a peak volume and then decrease.

H) The POND SIZE REQUIRED is the peak volume from REQUIRED STORAGE (column G).

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