Area (Ac)	23.3
R_{VU}	0.05 table 4-13
R_{VD}	0.25 table 4-13
R_{VI}	0.95 table 4-13
I	0.3 percent of impervious area /100
U	0 percent of wooded area /100

Table 4-13 Volumetric Runoff Coefficients by Land Use and Hydrologic Soil Group

Land Use	Hydrologic Soil Group A	B	C	D
Undisturbed Woods, Meadow or Ag. Land (R_{VU})	0.02	0.03	0.04	0.05
Turf or Disturbed Soils (R_{VD})	0.15	0.20	0.22	0.25
Impervious Cover (R_{VI})	0.95	0.95	0.95	0.95

Table 4-4 Average Imperviousness per Land Use (Source NRCS, TR-55)

Land Use	Average % Impervious
Urban Districts:	
Commercial and business	85%
Industrial	72%
Residential districts by average lot size:	
1/8 acre or less (town house)	65%
1/4 acre	38%
1/3 acre	30%
1/2 acre	25%
1 acre	20%
2 acres	12%

R_{VU}	0.05
U	0
R_{VD}	0.25
D	0.7
R_{VI}	0.95
I	0.3

$R_V = R_{VU}U + R_{VD}D + R_{VI}I$ *volumetric runoff coefficient*

R_V = 0.4600

$WQ_V = \frac{PR_VA}{12}$ *water quality protection volume (acre-feet)*

P	1.2 *water quality rainfall depth (1.2 inches for Sedgwick County)*
R_v	see above
A	see above

WQ_V = 1.0718 ac-ft (Use 1/2 this volume when a permanent wet pond is used for detention)

$Q_{WV} = PR_V$ *water quality protection volume (inches)*

P	1.2 *water quality rainfall depth (1.2 inches for Sedgwick County)*
R_v	see above

Q_{WV} = 0.5520 inches

$CN = \frac{1000}{10 + 5P + 10Q_{WV} - 10(Q_{WV}2 + 1.25Q_{WV}P)^{0.5}}$

CN = 91.94 *curve number*

S = (1000/CN) - 10

S = 0.88 *inch*

$I_a = 0.2\ S$

I_a = 0.175 *inch*

$\frac{I_a}{P}$ = 0.1462

q_u = 700 from figure 4-6 using 15 min Tc

$Q_{WQ} = q_u * A * Q_{WV}$

Q_{wq} = 14.07 cfs *water quality peak flow*

$Q = \frac{(P - I_a)^2}{(P - I_a) + S}$ *rainfall excess for 1 year, 24 hour rainfall*

P	2.8 inch *2.8 inches (the 1 year, 24 hour rainfall)*
CN	see above
S	2.2 inch
I_a	see above
T_c	15 min
A	see above

Q = 1.43 *inch*

q_o/q_i 0.025 from figure 4-17 using T=24 hr - (this is going to be very close to the same value for every situation)

$V_s/V_r =$ 0.682 - 1.43 (q_o/q_i) + 1.64 $(q_o/q_i)^2$ - 0.804 $(q_o/q_i)^3$

$V_s/V_r =$ 0.647

$V_S = \frac{(V_s/V_r)QA}{12}$ *required storage volume acre-feet*

CP$_v$ for Q = (see above) inches

V_S = 1.79 *acre-feet*

STORAGE VOLUME AVAILABLE IN POND 3 = 8.5 Ac-Ft

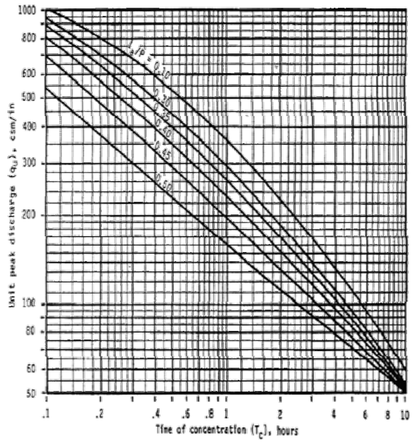

Figure 4-6 SCS Type II Unit Peak Discharge Graph

CHANNEL PROTECTION VOLUME

USING HEC-HMS:
INFLOW HYDROGRAPH CENTROID = 14.4 HOURS
PROPOSED OUTFLOW HYDROGRAPH CENTROID = 40.6 HOURS

CENTROID DIFFERENCE = 26.2 HOURS

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