Basin Watershed Data (Attachment 1A)

Project _____ Location_____ By_____ Date_____

Circle One: Present Developed_____ Frequency (yr) _____ Checked _____ Date _____

Subarea Name									
Drainage Area A_m (mi^2)									
Time of Concentration T_c (hr)									
Travel Time through subarea T_t (hr)									
Downstream Subarea names									
Travel time summation to outlet ΣT_t (hr)									
24-hr Rainfall P (in.)									
Runoff Curve number CN									
Runoff Q (in.)									
A_mQ (mi^2 - in.)									
Initial abstration I_a (in.)									
I_a /P									

Basin Watershed Data Example (Attachment 1B)

Project *Detention Example* Location_____ By ***WisDOT*** Date_____

Circle One: Present Developed_____ Frequency (yr) ***50*** Checked _____ Date _____

Subarea Name	**#1**								
Drainage Area A_m (mi^2)	**10 ACRE =.0156**								
Time of Concentration T_c (hr)	**.3**								
Travel Time through subarea T_t (hr)	**0**								
Downstream Subarea names	**--**								
Travel time summation to outlet ΣT_t (hr)	**--**								
24-hr Rainfall P (in.)	**5**								
Runoff Curve number CN	**75**								
Runoff Q (in.)	**2.45**								
A_mQ (mi^2 - in.)	**.038**								
Initial abstration I_a (in.)	**.667**								
I_a /P	**.1**								

Hydrograph Development Work Sheet (Attachment 2A)

Project _____ Location _____ By _____ Date _____

Circle One Present Developed _____ Frequency (yr) _____ Date _____

Subarea Name	Basic Watershed Data used *				Select and enter hydrography times in hours **												
	Sub-area T_c (hr)	ΣT_t to oulet (hr)	I_a/P	A_mQ (mi^2-in)													
					Discharge at selected hydrography time ** ----------(cfs)----------												
Composite hydrography at outlet																	

* From FDM 13-10-10, Attachment 1

** Use rainfall distribution Type II for Wisconsin

*** Hydrography discharge for selected times is AmQ multipled by tabular discharge.

Hydrograph Development Work Sheet Example (Attachment 2B)

Project ***Detention Example*** Location _____ By ***WisDOT*** Date _____

Circle One Present Developed _____ Frequency (yr) ***50*** Checked _____ Date _____

Subarea Name	Basic Watershed Data used *				Select and enter hydrography times in hours **												
	Sub-area T_c (hr)	ΣT_t to oulet (hr)	I_a/P	A_mQ (mi^2-in)	11.0	11.3	11.6	11.9	12.0	12.1	12.2	12.3	12.4	12.5	12.6	12.7	12.8
					Discharge at selected hydrography time ** ----------(cfs)----------												
#1	.3	.0	.1	.038	.76	1.1	1.6	4.5	8.9	17	25.7	25.7	17.4	10.6	7.4	5.5	4.3
								HOURS									
#1	.3	0	.1	.038	13.0	13.2	13.4	13.6									
					3	2.5	2.2	1.9									
Composite hydrography at outlet																	

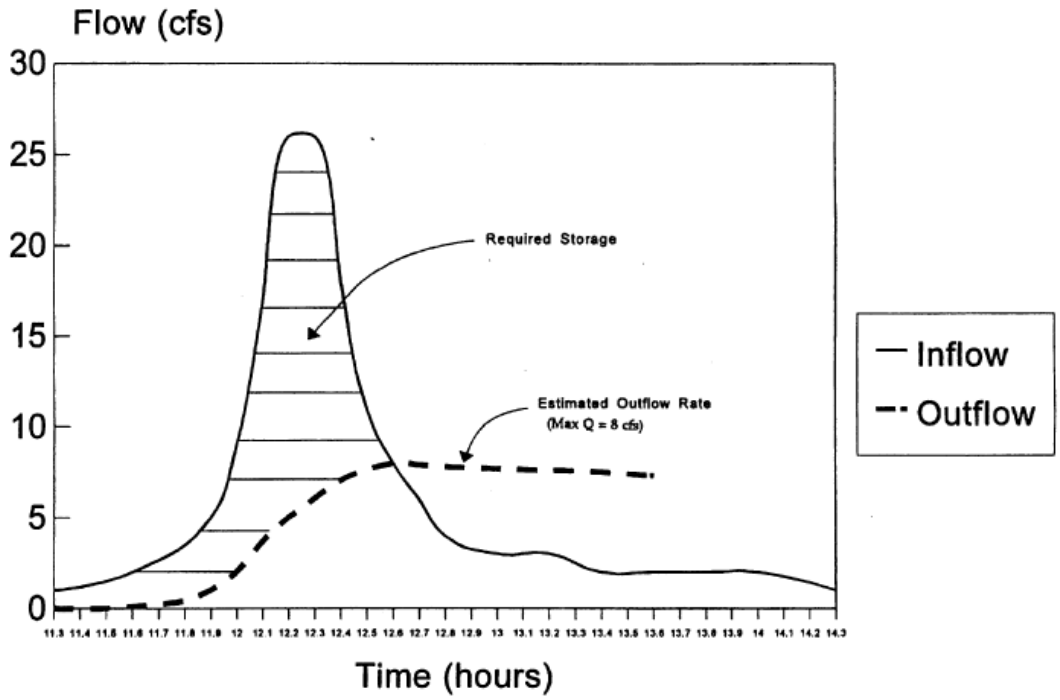
* From FDM 13-10-10, Attachment 1

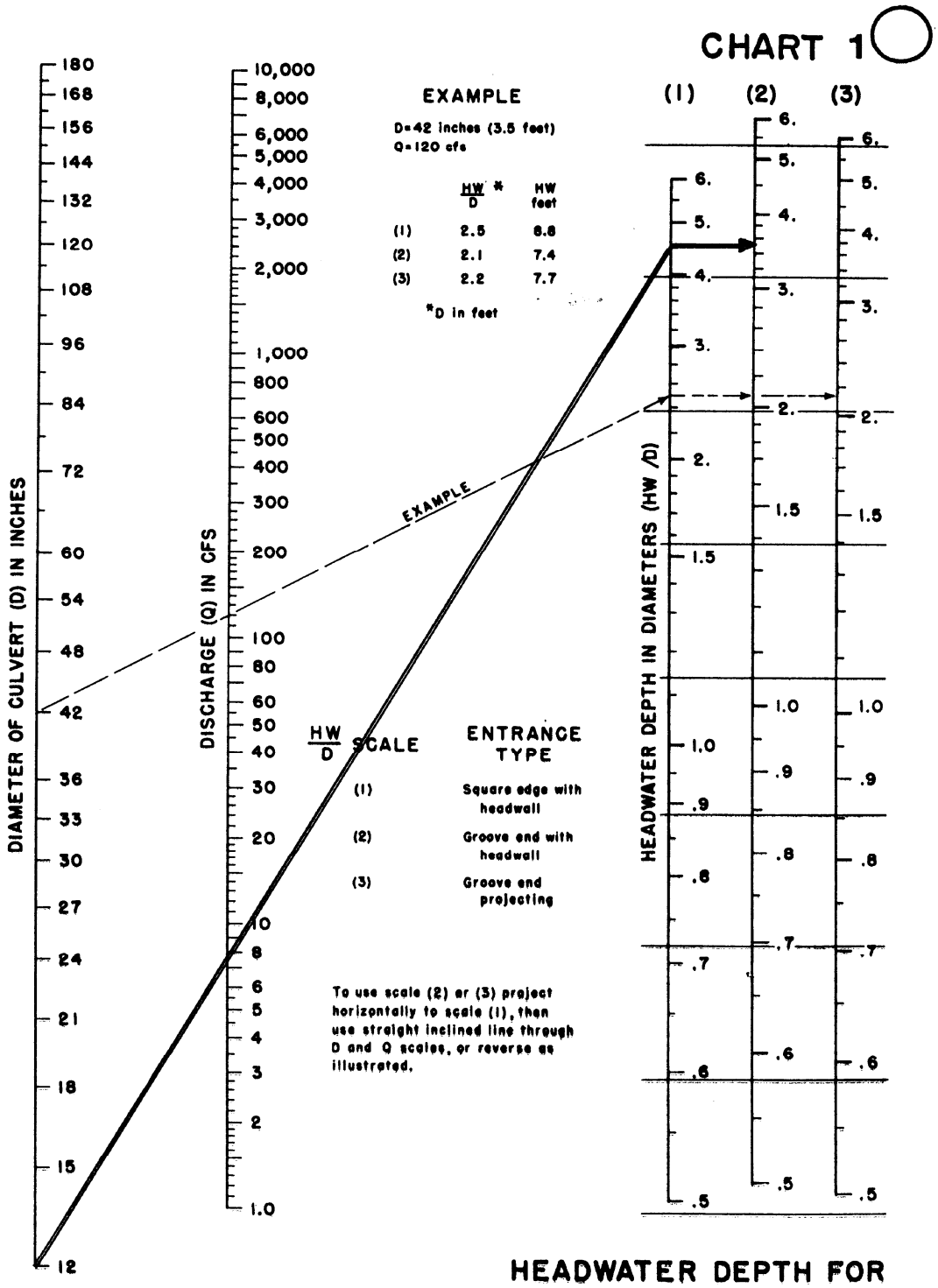
** Use rainfall distribution Type II for Wisconsin

*** Hydrography discharge for selected times is AmQ multipled by tabular discharge.

Detention Example

50 year, 24hr storm





HEADWATER DEPTH FOR CONCRETE PIPE CULVERTS WITH INLET CONTROL

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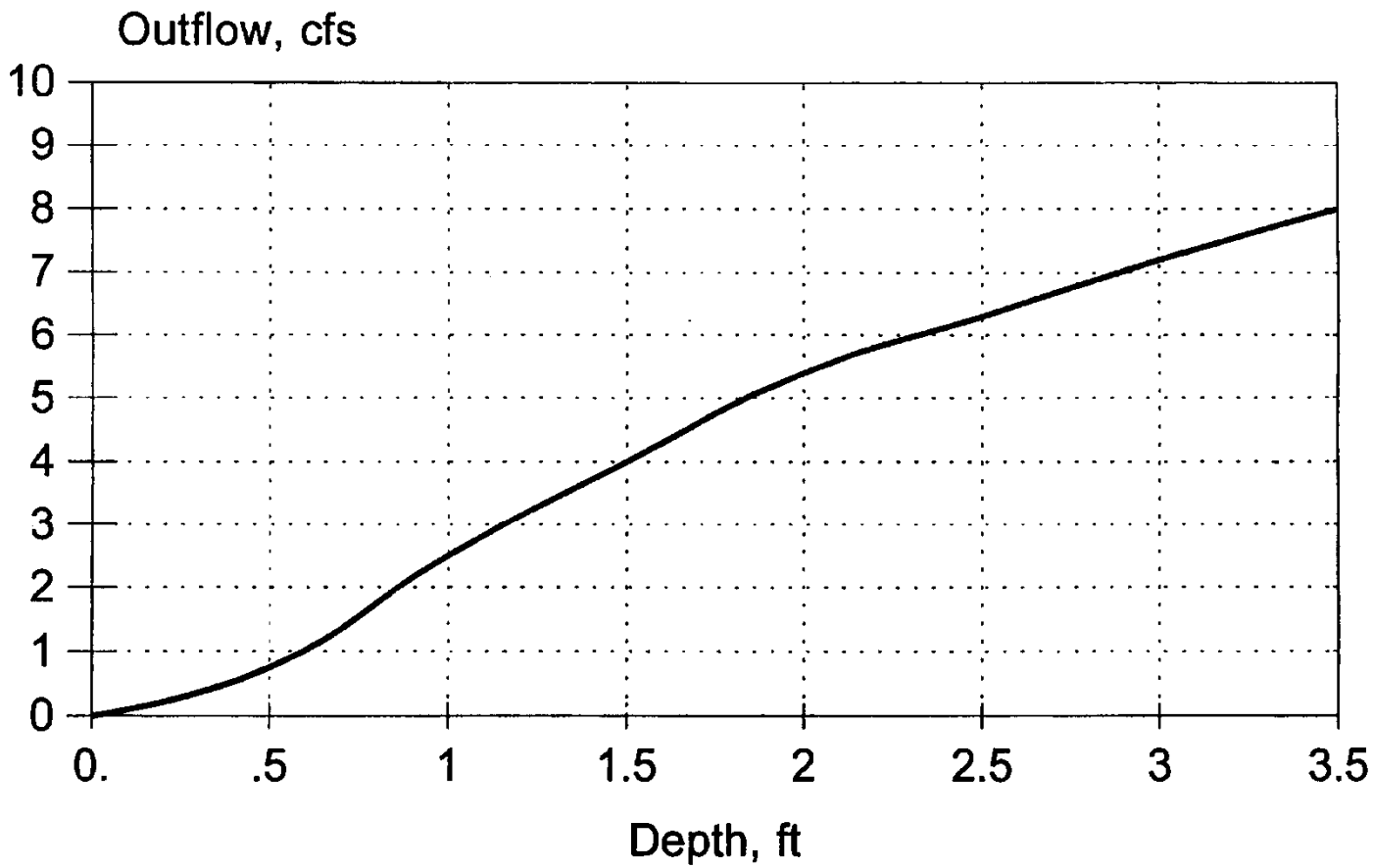
Depth - Outflow

12" RCP



Storage Indicator Curve Work Sheet (Attachment 6A)

Table Number 1

Elevation (ft) (1)	Discharge (ft) (2)	Storage (ft^3) (3)	$\frac{0_2}{2}$ (4)	$\frac{S_2}{\Delta T}$ (5)	$\frac{S_2}{\Delta T} + \frac{0_2}{2}$ (6)

ΔT = 360 sec.

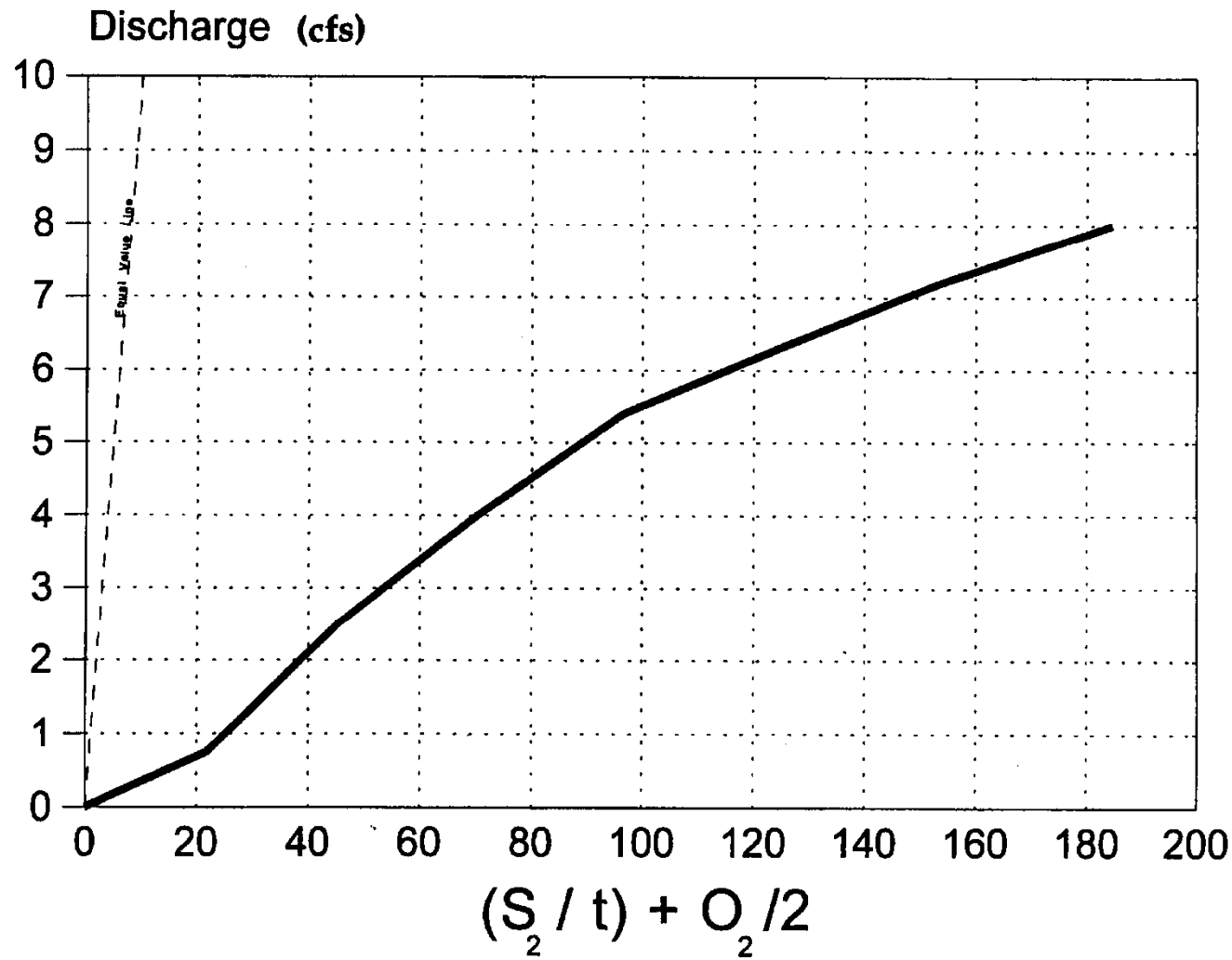
Storage Indicator Curve Work Sheet Example (Attachment 6B)

Table Number 1

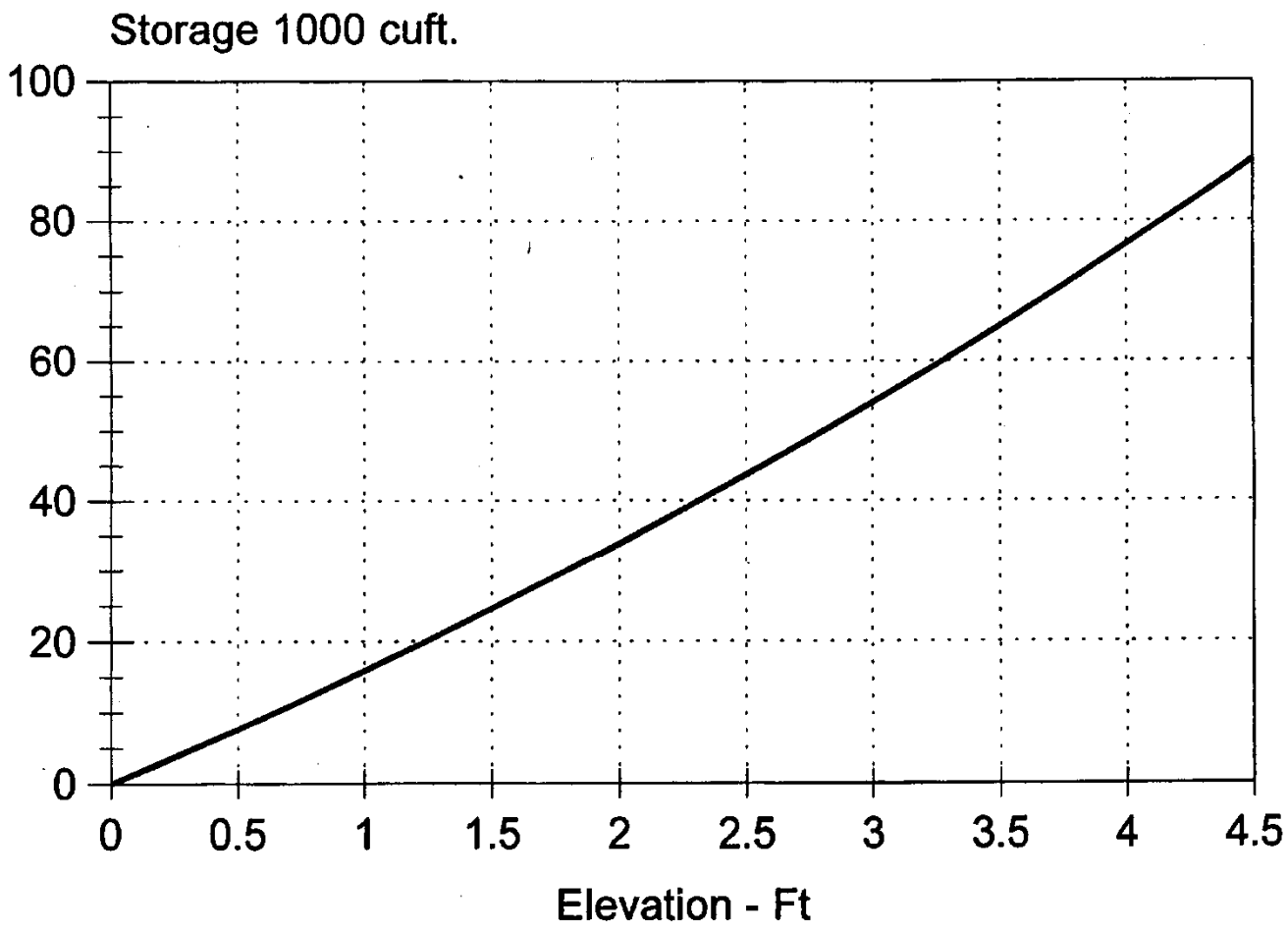
Elevation (ft) (1)	Discharge (ft) (2)	Storage (ft^3) (3)	$\frac{0_2}{2}$ (4)	$\frac{S_2}{\Delta T}$ (5)	$\frac{S_2}{\Delta T} + \frac{0_2}{2}$ (6)
0.0	0.0	0.0	0	0	0
0.5	.75	7688	0.38	21.4	21.78
1.0	2.5	15881	1.25	44.1	45.35
1.5	4.0	24594	2.0	68.3	70.3
2.0	5.4	33842	2.7	94	96.7
2.5	6.3	43643	3.15	121.2	124.35
3.0	7.2	54011	3.6	150.0	153.6
3.5	8.0	64963	4.0	180.5	184.5

ΔT = 360 sec.

Storage - Indicator Curve



Stage - Storage Curve



Hydrograph Data Work Sheet (Attachment 9A)

Table Number 2

Time (hrs) (1)	Inflow (cfs) (2)	$\frac{I_1 + I_2}{2}$ (3)	$\frac{S_1}{\Delta T} + \frac{O_1}{2}$ (4)	O_1 (cfs) (5)	$\frac{S_2}{\Delta T} + \frac{O_2}{2}$ (6)	O_2 (cfs) (7)

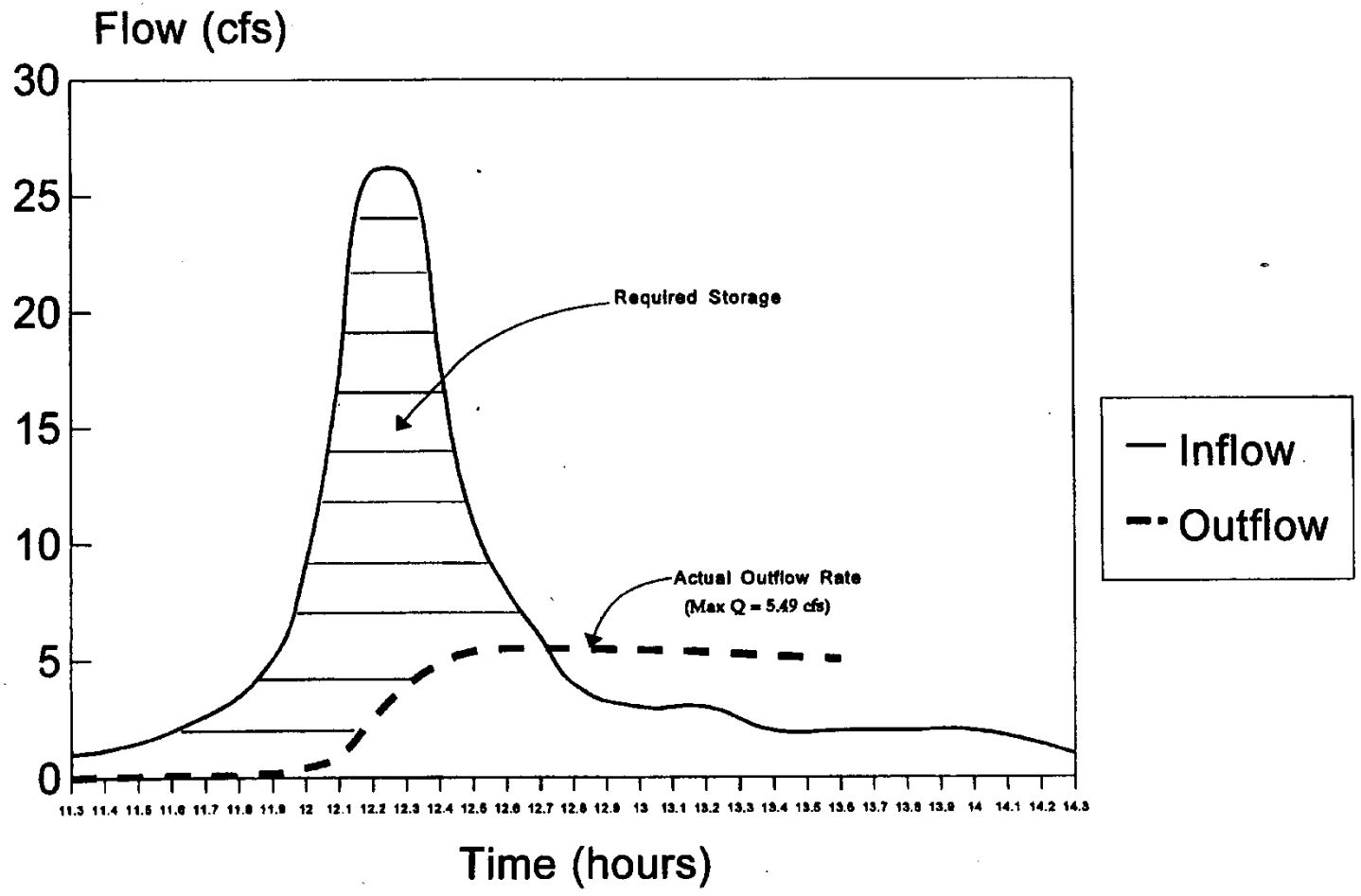
Hydrograph Data Work Sheet Example (Attachment 9B)

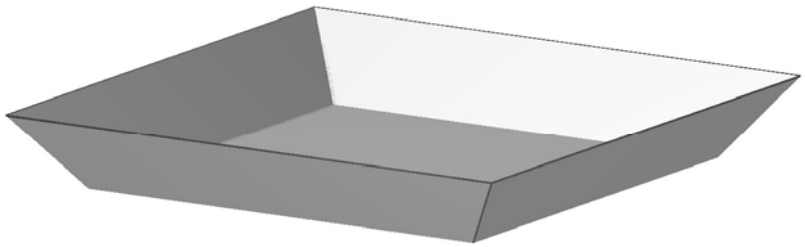
Table Number

Time (hrs) (1)	Inflow (cfs) (2)	$\frac{I_1 + I_2}{2}$ (3)	$\frac{S_1}{\Delta T} + \frac{O_1}{2}$ (4)	O_1 (cfs) (5)	$\frac{S_2}{\Delta T} + \frac{O_2}{2}$ (6)	O_2 (cfs) (7)
11.0	.76					
11.3	1.1	.093	0	0.0	.93	0.0
11.6	1.6	1.35	.93	0.0	2.28	0.11
11.9	4.5	3.1	2.28	0.11	5.27	0.19
12.0	8.9	6.7	5.27	0.19	11.8	0.42
12.1	17	12.95	11.8	0.42	24.3	0.94
12.2	25.7	21.35	24.3	0.94	44.7	2.52
12.3	25.7	25.7	44.7	2.52	67.9	3.89
12.4	17.4	21.6	67.9	3.89	85.6	4.84
12.5	10.6	14.0	85.6	4.84	94.8	5.37
12.6	7.4	9.0	94.8	5.37	98.4	5.47
12.7	5.5	6.45	98.4	5.47	99.4	5.49
12.8	4.3	4.90	99.4	5.49	98.8	5.47
13.0	3	3.65	98.8	5.47	97.0	5.43
13.2	2.5	2.75	97.0	5.43	94.3	5.33
13.4	2.2	2.35	94.3	5.33	91.3	5.16
13.6	1.9	2.10	91.3	5.16	88.2	5.03
13.8	1.8	1.85	88.2	5.03	85.02	4.95
14.0	1.7	1.75	85.02	4.95	81.82	5.40
14.3	1.0	1.35	81.82	4.50	78.67	4.40

Detention Example

50 year, 24hr storm





<u>Given :</u>

side slopes of pond = 4:1 = Z

depth = D = 3.5 feet, use 0.5 foot increments

dimensions of pond bottom = W = L = 122 feet

122 feet x 122 feet

<u>For a trapezoidal basin:</u>

Using equation : Volume = $LWD + (L + W)ZD^2 + 4/3Z^2D^3$

Volume $_{1.5\ feet}$ = $(122)(122)(1.5) + (122+122)(4)(1.5)^2 + 4/3(4)^2(1.5)^3$

Volume $_{1.5\ feet}$ = 24594 ft^3