

CERTIFIED ENGINEERING DESIGN, P.A.

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July 12, 2001

Ms. Vicki Huang, P.E.
Engineering Division
City of Wichita
7th Floor, City Hall
455 North Main
Wichita, KS 67202

Re: Drainage Plan
[Reddi Addition] - Hindu Temple

Dear Ms. Huang:

Attached please find the revised drainage plan and the drainage agreement for the above referenced addition. Please review this information at your earliest convenience and notify me of your comments. If you have questions, please call me at 262-8808.

Sincerely,



Harlan D. Foraker, P.E.
Kansas P.E. No. 10891

CERTIFIED ENGINEERING DESIGN, P.A.

RUNOFF AND DETENTION POND CALCULATIONS

Worksheet 2: Runoff curve number and runoff

Project Himan Tamao Adaha By _____ Date _____

Location _____ Checked _____ Date _____

Circle one: Present Developed _____

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN ^{1/}			Area <input type="checkbox"/> acres <input type="checkbox"/> mi ² <input type="checkbox"/> %	Product of CN x area
		Table 2-2	Fig. 2-3	Fig. 2-4		
		Totals =				

^{1/} Use only one CN source per line.

$$\text{CN (weighted)} = \frac{\text{total product}}{\text{total area}} = \frac{\text{UNDEVELOPED}}{\text{total area}} = \text{---} = \text{---}$$
 Use CN = 70

2. Runoff

Frequency yr

Rainfall, P (24-hour) in

Runoff, Q in
(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

Storm #1	Storm #2	Storm #3
5	100	
4.6	7.8	
1.748	4.293	

$S = \frac{1000}{70} - 10 = 6.286$

$Q_2 = \frac{(4.6 - 1.2(6.286))^2}{4.6 + 0.8(6.286)} = 1.748$

$Q_{100} = \frac{(7.8 - 1.2(6.286))^2}{7.8 + 0.8(6.286)} = 4.293$

$(7.8 + 0.8(6.286))$

Worksheet 4: Graphical Peak Discharge method

Project HINDU TEMPLE AREA By _____ Date _____
 Location _____ Checked _____ Date _____
 Circle one: Present Developed _____

1. Data:

Drainage area $A_m = \underline{.0032}$ mi² (acres/640)
 Runoff curve number CN = 70 (From worksheet 2)
 Time of concentration .. $T_c = \underline{25}$ hr (From worksheet 3)
 Rainfall distribution type = II (I, IA, II, III)
 Pond and swamp areas spread throughout watershed = 0 percent of A_m (____ acres or mi² covered)

		Storm #1	Storm #2	Storm #3
2. Frequency	yr	5	100	
3. Rainfall, P (24-hour)	in	4.6	7.8	
4. Initial abstraction, I_a	in	.857	.857	
(Use CN with table 4-1.)				
5. Compute I_a/P186	.110	
6. Unit peak discharge, q_u	csm/in	700	720	
(Use T_c and I_a/P with exhibit 4-___)				
7. Runoff, Q	in	1.748	4.293	
(From worksheet 2).				
8. Pond and swamp adjustment factor, F_p		1.0	1.0	
(Use percent pond and swamp area with table 4-2. Factor is 1.0 for zero percent pond and swamp area.)				
9. Peak discharge, q_p	cfs	392	989	
(Where $q_p = q_u A_m Q F_p$)				

Worksheet 2: Runoff curve number and runoff

Project HINDU TEMPLE Addition By _____ Date _____
 Location _____ Checked _____ Date _____
 Circle one: Present Developed

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN \downarrow			Area <input type="checkbox"/> acres <input type="checkbox"/> mi ² <input type="checkbox"/> %	Product of CN x area
		Table 2-2	Fig. 2-3	Fig. 2-4		
$\frac{1}{}$ Use only one CN source per line.		Totals =				

CN (weighted) = $\frac{\text{total product}}{\text{total area}}$ = _____ Use CN = 75

2. Runoff

Frequency yr
 Rainfall, P (24-hour) in
 Runoff, Q in
 (Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

Storm #1	Storm #2	Storm #3
5	100	
4.6	7.8	
2.13	4.86	

$S = \frac{1000}{75} - 10 = 3.33$
 $Q_2 = \frac{(4.6 - 2(3.33))^2}{(4.6 + 8(3.33))} = 2.13$
 $Q_{100} = \frac{(7.8 - 2(3.33))^2}{(7.8 + 8(3.33))} = 4.86$

Worksheet 4: Graphical Peak Discharge method

Project Huron Temple Addition By _____ Date _____

Location _____ Checked _____ Date _____

Circle one: Present Developed

1. Data:

Drainage area $A_m = \underline{.0032}$ mi² (acres/640)
 Runoff curve number CN = 75 (From worksheet 2)
 Time of concentration .. $T_c = \underline{.25}$ hr (From worksheet 3)
 Rainfall distribution type = II (I, IA, II, III)
 Pond and swamp areas spread throughout watershed = 0 percent of A_m (____ acres or mi² covered)

D.A. = 2.066 ac.
 Imp = 0.90 ac
 G.A.S.S. = 1.66 ac
 Wt CN = $\frac{98(.1) + 70(1.66)}{2.066} = 75.2$

- 2. Frequency yr
- 3. Rainfall, P (24-hour) in
- 4. Initial abstraction, I_a in
(Use CN with table 4-1.)
- 5. Compute I_a/P
- 6. Unit peak discharge, q_u csm/in
(Use T_c and I_a/P with exhibit 4-____)
- 7. Runoff, Q in
(From worksheet 2).
- 8. Pond and swamp adjustment factor, F_p
(Use percent pond and swamp area with table 4-2. Factor is 1.0 for zero percent pond and swamp area.)
- 9. Peak discharge, q_p cfs
(Where $q_p = q_u A_m Q F_p$)

Storm #1	Storm #2	Storm #3
5	100	
4.6	7.8	

.667	.667	
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0.145	.086	
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720	790	
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2.13	4.86	
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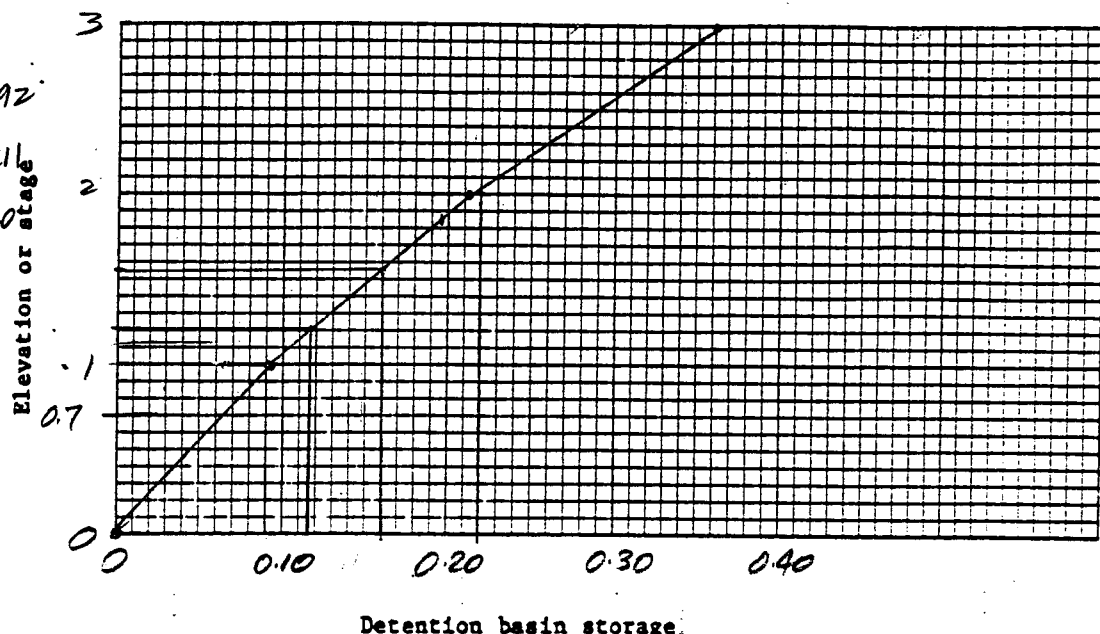
1	1	
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4.91	11.51	
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**Worksheet 6a: Detention basin storage,
peak outflow discharge (q_o) known**

Project Hindu Temple Addition By LOF Date _____
 Location WICHITA, KS Checked _____ Date _____
 Circle one: Present **Developed** 50' x 70' Retention Pond

0 3500 0
1 452A 0.067 0.092
2 576 0.157 0.211
3 696 0.275 0.340



1. Data:
 Drainage area $A_d = \underline{.0032}$ mi²
 Rainfall distribution type (I, IA, II, III) = II
2. Frequency yr

5	100
---	-----
3. Peak inflow discharge, q_1 cfs

9.91	1.51
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 (From worksheet 4 or 5b)
4. Peak outflow discharge, q_o cfs

3	7
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^{1/}
5. Compute $\frac{q_o}{q_1}$

0.61	0.61
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6. $\frac{v_s}{v_r}$

.24	.24
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 (Use $\frac{q_o}{q_1}$ with figure 6-1)
7. Runoff, Q in

2.13	4.86
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 (From worksheet 2)
8. Runoff volume, v_r ac-ft

0.363	0.829
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 ($v_r = QA_d 53.33$)
9. Storage volume, v_s ac-ft

.09	.199
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 ($v_s = v_r (\frac{v_s}{v_r})$)
10. Maximum stage, E_{max}

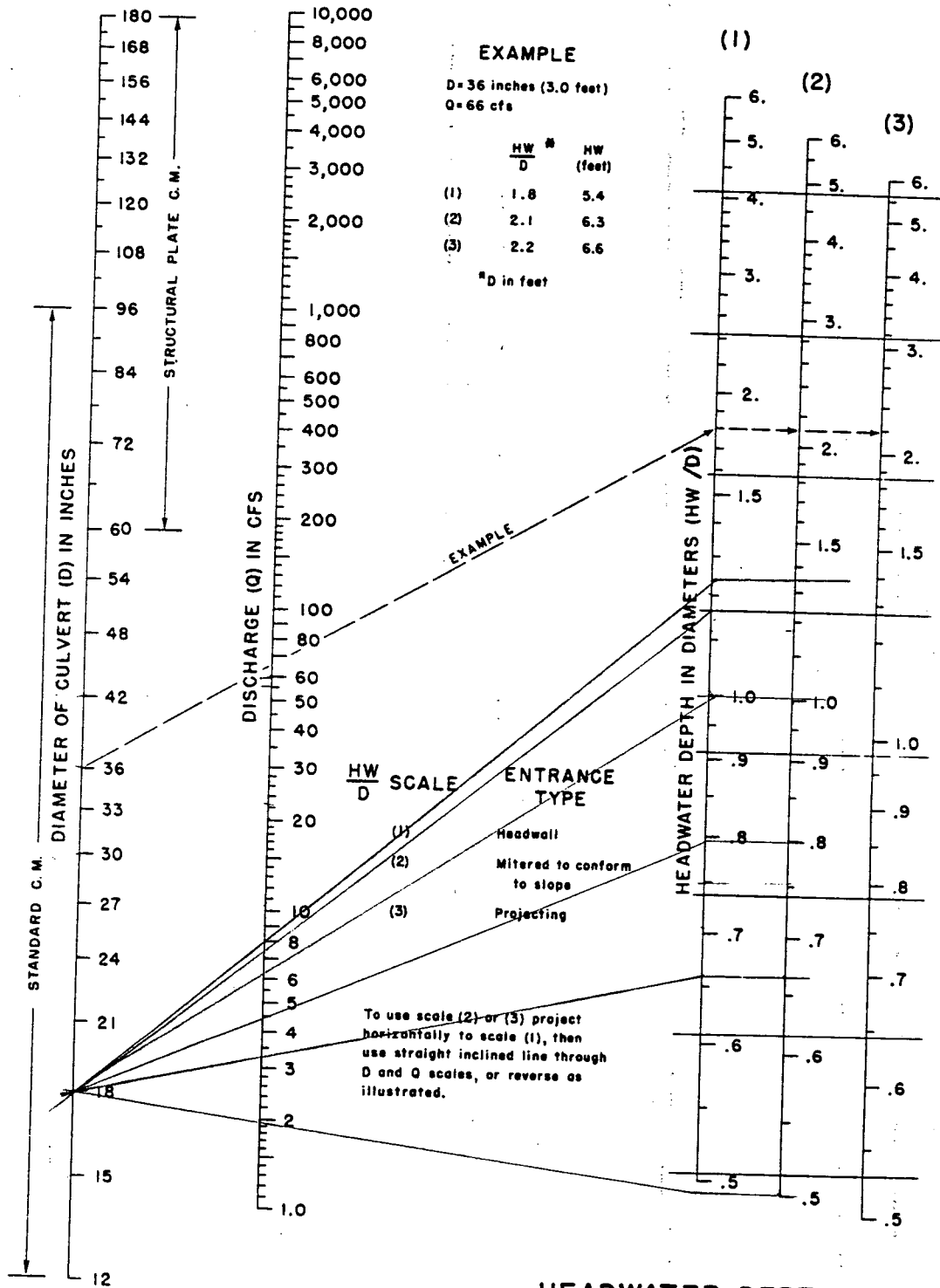
1.0'	1.85'
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 (From plot)

^{1/} 2nd stage q_o includes 1st stage q_o .



CHART 2



HEADWATER DEPTH FOR C. M. PIPE CULVERTS WITH INLET CONTROL