

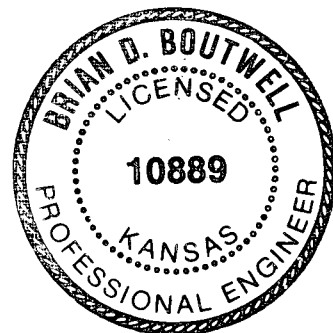
**P**ROFESSIONAL  
**E**NGINEERING  
**C**ONSULTANTS  
PROFESSIONAL ASSOCIATION

**DRAINAGE PLAN  
AND  
SUPPORTING CALCULATIONS**

**FOR  
SOCORA VILLAGE  
AN ADDITION TO WICHITA  
SEDGWICK COUNTY, KANSAS**

**PREPARED BY:  
PROFESSIONAL ENGINEERING CONSULTANTS, P.A.  
WICHITA, KANSAS**

**FEBRUARY 1993**



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Project Socora Village

Item Drainage Plan - Existing Conditions

A portion of the subject property is in the benefit district of Storm Water Sewer 145. City of Wichita calculations are unavailable.

Determine estimated  $Q_2$  used in the design of SWS # 145:

Use Rational Method  $Q = CIA$

$C = 0.5$  (Assumed)

$I = 4.06$  From Tech Paper 40  $t_c = 15$  min.

$A = \frac{34.6}{37.2} A_c$  (Area of Lots in Benefit Dist.)

$$Q_2 = 0.5 \times 4.06 \times \frac{37.2}{34.6}$$
$$= \frac{70.2}{75.5} \text{ cfs}$$

$$\left[ (950)(1750) - \left(\frac{1}{2}\right)(250)(350) \right] \div 43560 = 37.2$$

RECOMPUTE HYDROLOGY BASED  
ON ORIG. SWS #145

KERBY'S COMP'S @ 17TH & NW PKWY  
78 AC

SOCORA VILLAGE  
36-12201-1104 1/2  
MWB 2/12/93

$$T_C = 38 \text{ MIN} \quad \text{OLD } i_{100} = 5.64 \quad \text{OLD } i_2 = 2.41 \quad \Rightarrow C_2 = 0.4$$

$$Q_2 = 75 \text{ CFS}$$

$$Q_{100} = 232 \text{ CFS}$$

$$C_{100} = 0.5$$

CSB COMP'S @ 17TH & WOODCHUCK

$$DA = 38 \text{ AC}$$

$$C \approx 0.45$$

$$Q_2 = 66 \text{ CFS} \quad T_C = 15 \text{ MIN.}$$

REVISED COMP'S @ 17TH & WOODCHUCK

$$DA = 36 \text{ AC}$$

$$C = 0.46$$

$$Q_2 = \underline{56} \text{ CFS} \quad T_C = \underline{22} \text{ MIN}$$

2/2

MIB 2/12/93

KERBY HAD DESIGN  $T_c = 38$  MIN @ 17TH & NW PKWY

48" RCP  $A = 12.57$  ft<sup>2</sup>  $Q = 75$  CFS  $V = 6$  ft/sec

LENGTH FROM 17TH & WOODCHUCK TO 17TH & NW PKWY

$$= 404 + 123 + 300 + 177 + 146 = 1150 \text{ L.F.}$$

$$T_t = \frac{1150}{6} \times \frac{1}{60} = 3.2 \text{ MIN}$$

$$\therefore T_c @ 17TH \& \text{ WOODCHUCK} = 38 \text{ MIN} - 3 \text{ MIN} = 35 \text{ MIN}$$

RECOMPUTE  $Q$  @ 17TH & WOODCHUCK WITH

DESIGN  $C$

$$C = 0.4$$

DESIGN  $T_c$

$$T_c = 35 \text{ MIN} \quad i_2 = 2.57 \text{ in/hr (old)}$$

$$DA = 36 A_c \quad (46\% \text{ AREA}) \text{ ASSUMED BY KERBY}$$

DESIGN  $Q$

$$Q_2 = 0.4 \times 2.57 \times 36 = 37 \text{ CFS}$$

(50% CAPACITY)  
CLAMPS BY  
KERBY

HGL OF LINE IN 17TH

$$\text{AT HGL} = 0.003 \text{ FT/FT} \quad (42" \text{ CAPACITY FOR } 56 \text{ CFS} : \left(\frac{56}{1000}\right)^2 = 0.0031)$$

$$K = Q/\sqrt{S} = 37/\sqrt{0.003} = 675 \Rightarrow 36" \phi$$

$$i = 14.06 \text{ in/yr} \quad 2 \text{ yr}$$

$$35 \text{ min 1 yr} = i = 2.14 \text{ in/yr}$$



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 Project Socora Village  
 Item Drainage Plan System 100

I HYDROLOGY Use Rational Method  $Q = CIA$

Determine "C"

Note: Use  $C_2 = 0.4$  for all nodes

Node	Soil Type	Hyd. Group	Land Use	$C_2$	$C_{100}$
110	Ma	B	Res - 1/4 Ac	0.44	0.61
109	Ma	B	Res - 1/4 Ac	0.44	0.61
108	50% Ma 50% Ba	B C	Res - 1/4 Ac	0.46	0.65
107	Ma	B	Res - 1/4 Ac	0.44	0.61
106	60% Ma 40% Ba	B C	Res - 1/4 Ac	0.45	0.63
105	40% Ma 60% Ba	B C	Res - 1/4 Ac	0.47	0.66
104	50% Ma 50% Ba	B C	Res - 1/4 Ac	0.46	0.65
103	Ba	C	Res - 1/4 Ac	0.48	0.68
102	Deleted				
101	Manhole				
100	Connection Point				

Determine "I"

Assume  $t_c = \frac{35}{15}$  minutes all nodes  $\therefore I_2 = \frac{2.57}{3.83} I_{100} = 7.37$

118	Ma	B	Res - 1/4 Ac	0.44	0.61
117	Ma	B	Res - 1/4 Ac	0.44	0.61
116	60% Ma, 40% Ba	BC	Res - 1/4 Ac	0.45	0.63
115	60% Ma, 40% Ba	B, C	Res - 1/4 Ac	0.45	0.63
114	Ba	C	Res - 1/4 Ac	0.48	0.68
113	Ba	C	Res - 1/4 Ac	0.48	0.68
112	Manhole				
111	Manhole				



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Project Socora Village

Item Drainage Plan System 100

Determine "A"

<u>Node</u>	<u>Plan. Units</u>	<u>Area (SF)</u>	<u>Area (Ac.)</u>
110	5.78	57,800	1.33
109	32.75	327,500	7.52
108	0.49	4,900	0.11
107	23.93	239,300	5.49
106	5.91	59,100	1.35
105	14.88	148,800	3.42
104	6.57	65,700	1.51
103	10.96	109,600	2.52
102	Deleted		
101	Manhole		
100	Connection Point		
118	10.69	106,900	2.45
117	19.91	199,100	4.57
116	7.02	70,200	1.61
115	7.98	79,800	1.83
114	6.22	62,200	1.43
113	3.23	32,300	0.74
112	Manhole		
111	Manhole		



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 Project Socora Village  
 Item Drainage Plan System 100

Determine "Q<sub>2</sub>"

<u>Node</u>	<u>C<sub>2</sub></u>	<u>I<sub>2</sub></u>	<u>A</u>	<u>Q<sub>2</sub></u>
110	0.40	2.57	1.33	1.4
118	0.40	2.57	2.45	2.5
109	0.40	2.57	7.52	7.7
117	0.40	2.57	4.57	4.7
108	0.40	2.57	0.11	0.1
116	0.40	2.57	1.61	1.7
107	0.40	2.57	5.49	5.6
115	0.40	2.57	1.83	1.9
106	0.40	2.57	1.35	1.4
114	0.40	2.57	1.43	1.5
105	0.40	2.57	3.42	3.5
113	0.40	2.57	0.74	0.8
104	0.40	2.57	1.51	1.6
112	Manhole			
103	0.40	2.57	2.52	2.6
111	Manhole			
102	Deleted			
101	Manhole			
100	Connection point			

Σ = 37.0 cfs

Total Q<sub>2</sub> of 37.0 cfs is less than the estimated existing Q<sub>2</sub> used for design of SWS 145, see section entitled "Existing Conditions".



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 Project Socora Village  
 Item Drainage Plan System 100

Determine "Q<sub>100</sub>"

<u>Node</u>	<u>C<sub>100</sub></u>	<u>I<sub>100</sub></u>	<u>A</u>	<u>Q<sub>100</sub></u>
110	0.61	7.37	1.33	6.0
118	0.61	7.37	2.45	11.0
109	0.61	7.37	7.52	33.8
117	0.61	7.37	4.57	20.5
108	0.65	7.37	0.11	0.5
116	0.63	7.37	1.61	7.5
107	0.61	7.37	5.49	24.7
115	0.63	7.37	1.83	8.5
106	0.63	7.37	1.35	6.3
114	0.68	7.37	1.43	7.2
105	0.66	7.37	3.42	16.6
113	0.68	7.37	0.74	3.7
104	0.65	7.37	1.51	7.2
112	Manhole			
103	0.68	7.37	2.52	12.6
111	Manhole			
102	Deleted			
101	Manhole			
100	Connection Point			

$\Sigma = 166.1$  cfs



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 Project Socora Village  
 Item Drainage Plan - System 100

II INLET SIZING

Node	Inlet Condition	Q <sub>in</sub> †	5' inlet * Q <sub>allow</sub>	10' inlet * Q <sub>allow</sub>	USE
110	On Grade	1.4 { 0.6 in to 189 } 0.8 by	11.0	22.0	1 - 5' ✓ Type 1A
109	On Grade	7.7 { 3.6 in (10' inlet) to 107 } 4.1 by	11.0	22.0	1 - 10' ✓ Type 1A
108	On Grade	0.1 + 0.8 = 0.9 (0.5 in; 0.4 by to 106)	11.0	22.0	1 - 5' Type 1A
107	Sump	5.6 + 7.7 = 13.3	11.0	22.0	1 - 10' Type 1A
106	Sump	1.4 + 0.4 = 1.8	11.0	22.0	1 - ' Type 1A
105	Sump	6.2	11.0	22.0	1 - 5' Type 1A
104	Sump	1.6	11.0	22.0	1 - 5' Type 1A
103	Sump	4.6	11.0	22.0	1 - 5' Type 1A
102	Deleted				
101	Manhole				
100	Connection Point				

† Input Q in computer program "storm"

\* Based on Ponding elev. @ T.C.

118	Sump	2.5	11.0	22.0	1 - 5' Type 1A
117	Sump	4.7	11.0	22.0	1 - 5' Type 1A
116	Sump	1.7	11.0	22.0	1 - 5' Type 1A
115	Sump	1.9	11.0	22.0	1 - 5' Type 1A
114	Sump	1.5	11.0	22.0	1 - 5' Type 1A
113	Sump	0.8	11.0	22.0	1 - 5' Type 1A
112	Manhole				
111	Manhole				

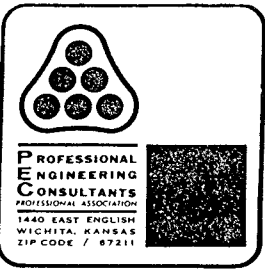


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Project Socora Village

Item Drainage Plan - System 100

III STREET FLOW - 2 yr						
Node	$Q_2$	Distribution	st. slope	d	$d_{max}$	Comment
110	1.4	100% (w) = 1.4	1.0%	0.18'	0.55'	OK
109	7.7	100% (w) = 7.7	1.0%	0.34'	0.55'	OK
108	0.1	≈ 100% (w) = 0.1	0.7%	0.10'	0.55'	OK
107	5.6	75% (w) = 4.2	0.7%	0.26'	0.55'	OK
		25% (N) = 1.4	0.32%	0.22'	0.30'	OK
106	1.4	90% (w) = 1.3	0.32%	0.22'	0.55'	OK
		10% (S) = 0.1	0.40%	0.10'	0.55'	OK
105	3.5	80% (w) = 2.8	0.32%	0.29'	0.55'	OK
		20% (N) = 0.7	0.32%	0.17'	0.30'	OK
104	1.6	80% (w) = 1.3	0.32%	0.22'	0.55'	OK
		20% (S) = 0.3	0.40%	0.12'	0.55'	OK
103	2.6	100% (w) = 2.6	0.32%	0.27'	0.55'	OK
102	Deleted					
101	Manhole					
118	2.5	80% (w) = 2.0	0.32%	0.25'	0.55'	OK
		20% (E) = 0.5	0.32%	0.15'	0.55'	OK
117	4.7	90% (w) = 4.2	0.32%	0.34'	0.55'	OK
		10% (E) = 0.5	0.32%	0.15'	0.55'	OK
116	1.7	60% (w) = 1.0	0.44%	0.18'	0.55'	OK
		40% (E) = 0.7	0.32%	0.17'	0.55'	OK
115	1.9	60% (w) = 1.1	0.44%	0.19'	0.55'	OK
		40% (E) = 0.8	0.32%	0.18'	0.55'	OK
114	1.5	50% (E) = 0.75	0.60%	0.16'	0.55'	OK
		50% (w) = 0.75	0.32%	0.17'	0.55'	OK
113	0.8	50% (E) = 0.4	0.60%	0.13'	0.55'	OK
		50% (w) = 0.4	0.32%	0.14'	0.55'	OK
112	Manhole					

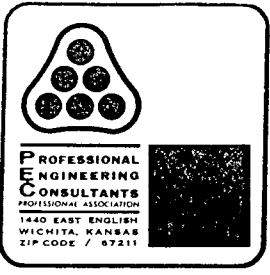


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Project Socora Village

Item Drainage Plan System 100

Location	Contributing Area		FLOW -		100-YR	Q <sub>street</sub> = Q <sub>100</sub> - Q <sub>pipe</sub>	
	Q <sub>100</sub>	Q <sub>pipe</sub>	Q <sub>street</sub>	street slope	Q <sub>max</sub>	Comment	
Approaching Nodes 110, 109 (w)	100% 110 = 6.0 100% 109 = 33.8 <u>39.8</u>	0.0	39.8	1.0%	88.2	OK Std. Cb. 0.3' Wk Gr	
Approaching Nodes 108, 107 (w)	100% 110 = 6.0 100% 109 = 33.8 100% 108 = 0.5 75% 107 = 18.5 <u>58.8</u>	2.2 <u>12.7</u>	14.9	0.7%	73.8	OK Std. Cb. 0.3' Wk Gr	
Approaching Nodes 106, 105 (w)	100% 110 = 6.0 100% 109 = 33.8 100% 108 = 0.5 100% 107 = 24.7 50% 106 = 3.2 80% 105 = 13.3 <u>81.5</u>	2.2 12.7 0.2 <u>9.3</u>	24.4	0.32%	67.3	OK Std. Cb. <del>0.3'</del> Wk Gr. 0.4'	
Approaching Nodes 104, 103 (w)	100% 110 = 6.0 100% 109 = 33.8 100% 108 = 0.5 100% 107 = 24.7 100% 106 = 6.3 100% 105 = 16.4 100% 104 = 7.2 100% 103 = 12.6 <u>107.7</u>	2.2 12.7 0.2 9.3 2.3 <u>6.2</u>	32.9	0.32%	86.8	OK Std. Cb. 0.5' Wk Gr	



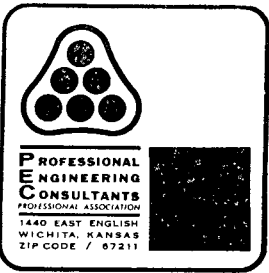
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Project Socora Village

Item Drainage Plan System 100

Location	Contributing Area	Q <sub>100</sub>	Q <sub>pipe</sub>	Q <sub>street</sub>	street slope	Q <sub>max</sub>	Comment
Approaching Nodes 106 & 105 (S)	50% 106 =	3.2					
	<del>100%</del> 104 =	2.9		6.1		49.9	
	40%	6.1	0.0	<del>6.1</del>	0.32%	75.1	OK Std. Cb. <del>0.5'</del> Wk.Gr. 0.3'
	From Basin 200 =	47.0					
Approaching Nodes 117 & 118 (W)	100% 118 =	11.0					
	100% 117 =	20.5					
		78.5	0.0	78.5	0.32%	93.2	OK Std. Cb. 0.6' Wk.Gr.
	From Basin 200 =	47.0					
Approaching Nodes 115 & 116 (W)	100% 118 =	11.0	4.1				
	100% 117 =	20.5	7.7				
	60% 115 =	5.1					
	60% 116 =	4.5					
		88.1	11.8	76.3	0.44%	88.0	OK Std. Cb. 0.5' Wk.Gr.
	From Basin 200 =	47.0					
Approaching Nodes 113 & 114 (W)	100% 118 =	11.0	4.1				
	100% 117 =	20.5	7.7				
	100% 116 =	7.5	2.8				
	100% 115 =	8.5	3.2				
	50% 114 =	3.6					
	50% 113 =	1.9					
		100.0	17.8	82.2	0.60%	102.8	OK Std. Cb. 0.5' Wk.Gr.



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Project Socora Village

Item Drainage Plan Revision

Estimate  $Q_{100yr}$  from System 200 basin:

Determine "c"

Soil type = Ma (Hydrologic Group B)

Land use =  $\frac{1}{4}$  Acre Residential

$$C_{100} = 0.61$$

Determine "I"

Assume  $t_c = 15$  minutes  $\rightarrow I_{100} = 7.37$  in/hr

Determine "A"

Scale area of Basin 200 from plat:

$$\begin{array}{l} (250)(900) + (560)(900) = 729k \text{ ft}^2 = 16.7 \text{ AC} \\ \text{(Church/Fire Sta.)} \quad \text{(Lots)} \end{array}$$

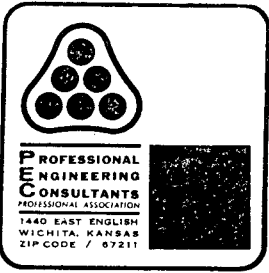
Determine  $Q_{100yr} = cIA$

$$Q_{100} = (0.61)(7.37)(16.7) = 75.1 \text{ cfs}$$

$$\therefore Q_{100} \text{ entering Basin 100} = Q_{100-yr} - Q_2(\text{system 200})$$

$$= 75.1 - Q_2(\text{sys. 200})$$

see next sheet



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Project Socora Village

Item Drainage Plan Revision

Estimate  $Q_2$  from System 200 basin

soil type = Ma (Group B)

$\frac{1}{4}$  Ac Res

$$\Rightarrow C_2 = 0.44$$

$T_e = 15$  min (Assumed)

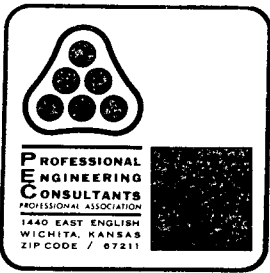
$$\Rightarrow I_2 = 3.83$$

$$A = 16.7 \text{ Ac}$$

$$\therefore Q_2 = CIA = (0.44)(3.83)(16.7) = \underline{\underline{28.1 \text{ cfs}}}$$

Assumes  $Q_2$  all goes in pipe and exits basin 200 to the south.

$$\Rightarrow Q_{100\text{yr}} \text{ entering Basin 100} = Q_{100\text{yr}} - Q_{2\text{yr}} = 75.1 - 28.1 = \underline{\underline{47.0 \text{ cfs}}}$$

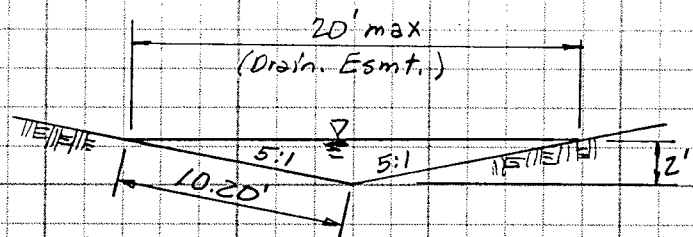


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Project Socora Village

Item Drainage Plan Revision

Check overflow swale capacity: (Reserve "A")



Use Manning's Eq.

$$Q = \frac{1.486}{n} A R^{2/3} S^{1/2}$$

$$n = 0.030$$

$$S = 0.50\% = 0.005$$

$$A = (2)(20) = 40 \text{ ft}^2$$

$$P = 20 + (2)(10.20) = 40.40$$

$$R = 40 / 40.40 = 0.9902$$

$$\Rightarrow Q = \frac{1.486}{0.030} (40)(0.9902)^{2/3} (0.005)^{1/2}$$

$$= 139.2 \text{ cfs max flow in swale}$$

$$\text{Actual } Q = 47.0 < 139.2 \quad \underline{\text{OK}}$$

SOCORA 4.5TM 2-Year Storm

100 j, 156.1000 100 2 18 17

110 t, SOCORA VILLAGE REVISED DRAINAGE PLAN

120 t, SYSTEM 100

130 i, 118	0.00	0.00	0.00	0.00	2.52	35.00	161.70
140 i, 117	0.00	0.00	0.00	0.00	4.70	35.00	161.70
150 i, 116	0.00	0.00	0.00	0.00	1.66	35.00	161.30
160 i, 115	0.00	0.00	0.00	0.00	1.88	35.00	161.30
170 i, 114	0.00	0.00	0.00	0.00	1.47	35.00	160.50
180 i, 113	0.00	0.00	0.00	0.00	0.76	35.00	160.50
190 m, 112	161.00						
200 m, 111	160.80						
210 i, 106	0.00	0.00	0.00	0.00	1.39	35.00	160.60
220 i, 110	0.00	0.00	0.00	0.00	1.37	35.00	163.80
230 i, 109	0.00	0.00	0.00	0.00	7.73	35.00	163.80
240 i, 108	0.00	0.00	0.00	0.00	0.11	35.00	161.60
250 i, 107	0.00	0.00	0.00	0.00	5.64	35.00	161.60
260 i, 105	0.00	0.00	0.00	0.00	3.52	35.00	160.60
270 i, 104	0.00	0.00	0.00	0.00	1.55	35.00	159.50
280 i, 103	0.00	0.00	0.00	0.00	2.59	35.00	159.50
290 m, 101	159.80						
300 m, 100	156.10						
310 p, 118 117	38.00	15	0.013	90.00	0.00		
320 p, 117 115	370.00	24	0.013	0.00	0.00		
330 p, 116 115	38.00	15	0.013	90.00	0.00		
340 p, 115 113	300.00	24	0.013	45.00	0.00		
350 p, 114 113	38.00	15	0.013	60.00	0.00		
360 p, 113 112	30.00	30	0.013	35.00	0.00		
370 p, 112 111	220.00	30	0.013	45.00	0.00		
380 p, 111 106	25.00	30	0.013	45.00	0.00		
390 p, 106 105	38.00	30	0.013	90.00	0.00		
400 p, 110 109	38.00	15	0.013	90.00	0.00		
410 p, 109 107	305.00	18	0.013	0.00	0.00		
420 p, 108 107	38.00	15	0.013	90.00	0.00		
430 p, 107 105	305.00	24	0.013	0.00	0.00		
440 p, 105 103	305.00	30	0.013	45.00	0.00		
450 p, 104 103	38.00	15	0.013	45.00	0.00		
460 p, 103 101	25.00	36	0.013	45.00	0.00		
470 p, 101 100	300.00	36	0.013	0.00	0.00		
480 e							

Date: 02-15-1993

Time: 13:21:12

Input File: SOCORA4.STM

SOCORA VILLAGE REVISED DRAINAGE PLAN  
SYSTEM 100

Storm Frequency - 2-Year

\* \* \* H Y D R O L O G Y \* \* \*

Node to Node		Tributary Area				Hydrology Summation						Conduit Data					
C	Area (Ac)	Slope (%)	Length (Ft)	TC(0) (Min)	I(0) (In/Hr)	Q(0) (CFS)	TC (Min)	I (In/Hr)	Q (CFS)	Sum Q (CFS)	Size	Velocity (Ft/Sec)	Length (Ft)	TT (Min)	TT+TC (Min)		
118	117	.00	.00	.00	.0	35.00	2.44	2.52	35.00	2.44	2.52	2.52	15"	2.05	38.00	.31	35.31
117	115	.00	.00	.00	.0	35.00	2.44	4.70	35.00	2.44	4.70	7.20	24"	2.29	370.00	2.69	37.69
116	115	.00	.00	.00	.0	35.00	2.44	1.66	35.00	2.44	1.66	1.66	15"	1.35	38.00	.47	35.47
115	113	.00	.00	.00	.0	35.00	2.44	1.88	37.69	2.33	1.80	10.59	24"	3.37	300.00	1.48	39.17
114	113	.00	.00	.00	.0	35.00	2.44	1.47	35.00	2.44	1.47	1.47	15"	1.20	38.00	.53	35.53
113	112	.00	.00	.00	.0	35.00	2.44	.76	39.17	2.27	.71	12.69	30"	2.58	30.00	.19	39.37
112	111	.00	.00	.00	.0	.00	.00	.00	39.37	2.27	.00	12.69	30"	2.58	220.00	1.42	40.79
111	106	.00	.00	.00	.0	.00	.00	.00	40.79	2.22	.00	12.69	30"	2.58	25.00	.16	40.95
106	105	.00	.00	.00	.0	35.00	2.44	1.39	40.95	2.21	1.26	13.95	30"	2.84	38.00	.22	41.17
110	109	.00	.00	.00	.0	35.00	2.44	1.37	35.00	2.44	1.37	1.37	15"	1.12	38.00	.57	35.57
109	107	.00	.00	.00	.0	35.00	2.44	7.73	35.00	2.44	7.73	9.08	18"	5.14	305.00	.99	35.99
108	107	.00	.00	.00	.0	35.00	2.44	.11	35.00	2.44	.11	.11	15"	.09	38.00	7.07	42.07
107	105	.00	.00	.00	.0	35.00	2.44	5.64	35.99	2.40	5.54	14.72	24"	4.68	305.00	1.09	37.07
105	103	.00	.00	.00	.0	35.00	2.44	3.52	41.17	2.20	3.18	30.91	30"	6.30	305.00	.81	41.98
104	103	.00	.00	.00	.0	35.00	2.44	1.55	35.00	2.44	1.55	1.55	15"	1.26	38.00	.50	35.50
103	101	.00	.00	.00	.0	35.00	2.44	2.59	41.98	2.18	2.31	34.62	36"	4.90	25.00	.09	42.06
101	100	.00	.00	.00	.0	.00	.00	.00	42.06	2.17	.00	34.62	36"	4.90	300.00	1.02	43.08

Date: 02-15-1993

Time: 13:21:12

Input File: SOCORA4.STM

SOCORA VILLAGE REVISED DRAINAGE PLAN  
SYSTEM 100

Storm Frequency = 2-Year

\* \* \* H Y D R A U L I C S \* \* \*

Node	Hyd-Slope (Ft/Ft)	Friction (Ft)	Bend (Ft)	Transition (Ft)	Manhole (Ft)	Deflection (Ft)	Junction (Ft)	Total (Ft)	Hyd-Gl Elevation	Desired Elevation	Diff. (Ft)
118	.00152	.0578	.0000	.0000	.0000	.0000	.0000	.0578	161.8832	161.7000	-.18
117	.00101	.3746	.0000	.0016	.0000	.0327	.1675	.5765	161.8253	161.7000	-.13
116	.00066	.0251	.0000	.0000	.0000	.0000	.0000	.0251	161.2740	161.3000	.03
115	.00219	.6578	.0000	.0095	.0000	.0000	.1985	.8658	161.2489	161.3000	.05
114	.00052	.0197	.0000	.0000	.0000	.0000	.0000	.0197	160.4027	160.5000	.10
113	.00096	.0287	.0000	.0146	.0000	.0384	-.0216	.0601	160.3831	160.5000	.12
112	.00096	.2105	.0000	.0000	.0052	.0167	.0048	.2371	160.3230	161.0000	.68
111	.00096	.0239	.0000	.0000	.0052	.0226	.0048	.0565	160.0858	160.8000	.71
106	.00116	.0439	.0000	.0022	.0000	.0226	.0487	.1173	160.0293	160.6000	.57
110	.00045	.0171	.0000	.0000	.0000	.0000	.0000	.0171	164.8297	163.8000	-1.03
109	.00747	2.2780	.0000	.0390	.0000	.0097	.9572	3.2839	164.8126	163.8000	-1.01
108	.00000	.0001	.0000	.0000	.0000	.0000	.0000	.0001	161.5288	161.6000	.07
107	.00423	1.2908	.0000	.0138	.0000	.0000	.3121	1.6167	161.5287	161.6000	.07
105	.00568	1.7326	.0000	.0275	.0000	.0000	.9968	2.7569	159.9120	160.6000	.69
104	.00058	.0219	.0000	.0000	.0000	.0000	.0000	.0219	157.1770	159.5000	2.32
103	.00269	.0674	.0000	.0487	.0000	.1340	-.1166	.1335	157.1551	159.5000	2.34
101	.00269	.8084	.0000	.0000	.0186	.0811	.0135	.9216	157.0217	159.8000	2.78
100	.00000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	156.1000	156.1000	.00



Date: 02-15-1993  
 Time: 14:07:19

Input File: SOCORA5.STM

SOCORA VILLAGE REVISED DRAINAGE PLAN  
 SYSTEM 100

Storm Frequency - <sup>1</sup>/<sub>2</sub>-Year

\* \* \* H Y D R O L O G Y \* \* \*

*****																	
Tributary Area				Hydrology				Summation				Conduit Data					
Node to	C	Area	Slope	Length	TC(0)	I(0)	Q(0)	TC	I	Q	Sum Q	Size	Velocity	Length	TT	TT+TC	
Node		(Ac)	(%)	(Ft)	(Min)	(In/Hr)	(CFS)	(Min)	(In/Hr)	(CFS)	(CFS)		(Ft/Sec)	(Ft)	(Min)	(Min)	
*****																	
118	117	.00	.00	.00	.0	35.00	2.44	2.10	35.00	2.44	2.10	2.10	15"	1.71	38.00	.37	35.37
117	115	.00	.00	.00	.0	35.00	2.44	3.91	35.00	2.44	3.91	5.99	24"	1.91	370.00	3.24	38.24
116	115	.00	.00	.00	.0	35.00	2.44	1.38	35.00	2.44	1.38	1.38	15"	1.12	38.00	.56	35.56
115	113	.00	.00	.00	.0	35.00	2.44	1.57	38.24	2.31	1.49	8.79	24"	2.80	300.00	1.79	40.02
114	113	.00	.00	.00	.0	35.00	2.44	1.22	35.00	2.44	1.22	1.22	15"	.99	38.00	.64	35.64
113	112	.00	.00	.00	.0	35.00	2.44	.63	40.02	2.24	.58	10.51	30"	2.14	30.00	.23	40.25
112	111	.00	.00	.00	.0	.00	.00	.00	40.25	2.23	.00	10.51	30"	2.14	220.00	1.71	41.97
111	106	.00	.00	.00	.0	.00	.00	.00	41.97	2.18	.00	10.51	30"	2.14	25.00	.19	42.16
106	105	.00	.00	.00	.0	35.00	2.44	1.16	42.16	2.17	1.03	11.54	30"	2.35	38.00	.27	42.43
110	109	.00	.00	.00	.0	35.00	2.44	1.14	35.00	2.44	1.14	1.14	15"	.93	38.00	.68	35.68
109	107	.00	.00	.00	.0	35.00	2.44	6.44	35.00	2.44	6.44	7.56	18"	4.28	305.00	1.19	36.19
108	107	.00	.00	.00	.0	35.00	2.44	.09	35.00	2.44	.09	.09	15"	.07	38.00	8.64	43.64
107	105	.00	.00	.00	.0	35.00	2.44	4.70	36.19	2.39	4.61	12.24	24"	3.90	305.00	1.30	37.49
105	103	.00	.00	.00	.0	35.00	2.44	2.93	42.43	2.16	2.60	25.47	30"	5.19	305.00	.98	43.41
104	103	.00	.00	.00	.0	35.00	2.44	1.29	35.00	2.44	1.29	1.29	15"	1.05	38.00	.60	35.60
103	101	.00	.00	.00	.0	35.00	2.44	2.16	43.41	2.13	1.89	28.49	36"	4.03	25.00	.10	43.51
101	100	.00	.00	.00	.0	.00	.00	.00	43.51	2.13	.00	28.49	36"	4.03	300.00	1.24	44.76
*****																	

Date: 02-15-1993  
Time: 14:07:19

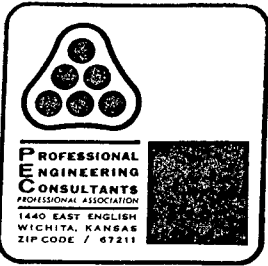
Input File: SOCORA5.STM

SOCORA VILLAGE REVISED DRAINAGE PLAN  
SYSTEM 100

Storm Frequency - <sup>1</sup>/<sub>2</sub>-Year

\* \* \* H Y D R A U L I C S \* \* \*

Node	Hyd-Slope (Ft/Ft)	Friction (Ft)	Bend (Ft)	Transition (Ft)	Manhole (Ft)	Deflection (Ft)	Junction (Ft)	Total (Ft)	Hyd-Gl Elevation	Desired Elevation	Diff. (Ft)
118	.00106	.0402	.0000	.0000	.0000	.0000	.0000	.0402	160.0344	161.7000	1.67
117	.00070	.2592	.0000	.0011	.0000	.0227	.1158	.3988	159.9942	161.7000	1.71
116	.00046	.0173	.0000	.0000	.0000	.0000	.0000	.0173	159.6127	161.3000	1.69
115	.00151	.4534	.0000	.0065	.0000	.0000	.1363	.5963	159.5954	161.3000	1.70
114	.00036	.0136	.0000	.0000	.0000	.0000	.0000	.0136	159.0127	160.5000	1.49
113	.00066	.0197	.0000	.0101	.0000	.0265	-.0156	.0407	158.9991	160.5000	1.50
112	.00066	.1444	.0000	.0000	.0036	.0115	.0033	.1627	158.9585	161.0000	2.04
111	.00066	.0164	.0000	.0000	.0036	.0155	.0033	.0388	158.7957	160.8000	2.00
106	.00079	.0301	.0000	.0015	.0000	.0155	.0330	.0801	158.7570	160.6000	1.84
110	.00031	.0118	.0000	.0000	.0000	.0000	.0000	.0118	162.0821	163.8000	1.72
109	.00518	1.5791	.0000	.0271	.0000	.0067	.6635	2.2763	162.0703	163.8000	1.73
108	.00000	.0001	.0000	.0000	.0000	.0000	.0000	.0001	159.7940	161.6000	1.81
107	.00293	.8926	.0000	.0097	.0000	.0000	.2148	1.1171	159.7939	161.6000	1.81
105	.00385	1.1756	.0000	.0182	.0000	.0000	.6696	1.8634	158.6769	160.6000	1.92
104	.00040	.0152	.0000	.0000	.0000	.0000	.0000	.0152	156.8286	159.5000	2.67
103	.00182	.0456	.0000	.0331	.0000	.0910	-.0804	.0893	156.8134	159.5000	2.69
101	.00182	.5475	.0000	.0000	.0126	.0549	.0091	.6241	156.7242	159.8000	3.08
100	.00000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	156.1000	156.1000	.00



Date 6/20/92 Page 1 of 1

Project Socora Village

Item Drainage Plan System 200

System 200 as shown on the enclosed  
Drainage Plan Drawing is covered by  
Northwest Village Drainage Plan dated  
Sept. 10, 1980 (revised edition)

Sizes shown on this drainage plan are  
in accordance with the Northwest Village  
Drainage Plan.



## EXHIBIT NO. 1

## SOIL LEGEND

<u>SYMBOL</u>	<u>HYDROLOGIC GROUP</u>	<u>NAME</u>
Aa	B	Albion-Shellabarger sandy loams, 1 to 4 percent slopes
Ab	B	Albion and Shellabarger sandy loams, 7 to 15 percent slopes
Ba	C	Blanket silt loam, 0 to 1 percent slopes
Bb	C	Blanket silt loam, 1 to 3 percent slopes
Ca	B	Canadian fine sandy loam
Cb	B	Canadian-Waldeck fine sandy loams
Cc	D	Carwile fine sandy loam
Cd	B	Clark-Ost clay loams, 1 to 4 percent slopes
Ce	C	Cline silty clay, 3 to 6 percent slopes
Ea	B	Elandco silt loam
Eb	B	Elandco silt loam, occasionally flooded
Ec	B	Elandco silt loam, frequently flooded
Fa	B	Farnum loam, 0 to 1 percent slopes
Fb	B	Farnum loam, 1 to 3 percent slopes
Fc	B	Farnum loam, sandy substratum, 0 to 1 percent slopes
Ga	D	Goessel silty clay, 0 to 1 percent slopes
Gb	D	Goessel silty clay, 1 to 2 percent slopes
Ia	D	Irwin silty clay loam, 1 to 3 percent slopes
Ib	D	Irwin silty clay loam, 3 to 6 percent slopes
Ic	D	Irwin silty clay loam, 2 to 6 percent slopes, eroded
La	C	Lesho loam
Lb	A	Lincoln soils
Ma	B	Milan loam, 1 to 3 percent slopes
Mb	B	Milan form, 3 to 6 percent slopes
Mc	B	Milan clay loam, 2 to 6 percent slopes, eroded
Na	B	Naron fine sandy loam
Oc	D	Owens clay loam, 1 to 3 percent slopes
Od	D	Owens-Rock outcrop complex, 3 to 10 percent slopes
Pa		Pits
Pb	D	Plevna fine sandy loam
Pc	A	Pratt loamy fine sand, undulating
Pd	A	Pratt-Tivoli complex, rolling
Ra	D	Renfrow silty clay loam, 1 to 3 percent slopes
Rb	D	Renfrow silty clay loam, 3 to 6 percent slopes
Rc	D	Renfrow-Owens clay loams, 1 to 4 percent slopes
Rd	D	Rosehill silty clay, 1 to 3 percent slopes
Sa	B	Shellabarger sandy loam, 1 to 3 percent slopes
Sb	B	Shellabarger sandy loam, 3 to 6 percent slopes
Sc	B	Shellabarger sandy loam, 3 to 6 percent slopes, eroded
Ta	D	Tabler silty clay loam
Tb	D	Tabler-Drummond complex
Ua	B	Urban land-Canadian complex
Ub	B	Urban land-Elandco complex
Uc	B	Urban land-Farnum complex, 0 to 3 percent slopes
Ud	D	Urban land-Irwin complex, 1 to 3 percent slopes
Ue	D	Urban land-Tabler complex
Va	B	Vanoss silt loam, 0 to 1 percent slopes
Vb	B	Vanoss silt loam, 1 to 3 percent slopes
Vc	B	Vanoss silt loam, 3 to 6 percent slopes
Vd	B	Vanoss silt loam, 3 to 6 percent slopes, eroded
Ve	D	Vernon sandy loam, 1 to 3 percent slopes
Vf	D	Vernon sandy loam, 3 to 6 percent slopes
Wa	C	Waldeck sandy loam

ATTACHMENT A  
DRAINAGE CRITERIA MANUAL

## CITY OF WICHITA, KANSAS

## RAINFALL INTENSITY TABLE FOR SEDGWICK COUNTY, KANSAS

The following tabulation contains rainfall intensity in inches per hour as derived from ESSA Weather Bureau Technical Paper 40 Modified to NWS Hydro-35, 1977 During First Hour

DURATION IN MINUTES	RETURN PERIODS OF						
	1-YR	2-YR	5-YR	10-YR	25-YR	50-YR	100-YR
5	4.18	5.57	6.53	7.41	8.52	9.48	10.32
6	3.99	5.32	6.25	7.09	8.16	9.09	9.89
7	3.81	5.09	5.99	6.81	7.84	8.74	9.50
8	3.66	4.89	5.75	6.55	7.55	8.42	9.15
9	3.52	4.70	5.54	6.31	7.28	8.13	8.83
10	3.39	4.52	5.34	6.09	7.04	7.86	8.54
11	3.27	4.36	5.16	5.89	6.81	7.61	8.27
12	3.18	4.21	4.99	5.71	6.60	7.38	8.02
13	3.05	4.08	4.84	5.53	6.41	7.17	7.79
14	2.96	3.95	4.69	5.37	6.23	6.97	7.57
15	2.87	3.83	4.56	5.22	6.06	6.78	7.37
16	2.78	3.72	4.43	5.08	5.90	6.60	7.18
17	2.71	3.61	4.31	4.95	5.75	6.44	7.00
18	2.63	3.51	4.20	4.83	5.61	6.29	6.84
19	2.56	3.42	4.10	4.71	5.47	6.14	6.68
20	2.50	3.33	4.00	4.60	5.35	6.00	6.53
21	2.44	3.25	3.90	4.50	5.23	5.87	6.39
22	2.38	3.17	3.81	4.40	5.12	5.75	6.26
23	2.32	3.10	3.73	4.31	5.01	5.63	6.13
24	2.27	3.03	3.65	4.22	4.91	5.52	6.01
25	2.22	2.96	3.57	4.13	4.81	5.41	5.90
26	2.20	2.90	3.50	4.05	4.72	5.31	5.79
27	2.16	2.84	3.43	3.98	4.63	5.21	5.69
28	2.14	2.78	3.37	3.90	4.55	5.12	5.59
29	2.11	2.72	3.30	3.83	4.47	5.03	5.49
30	2.08	2.67	3.24	3.76	4.39	4.94	5.40
31	2.05	2.62	3.19	3.70	4.32	4.86	5.32
32	2.02	2.57	3.10	3.63	4.25	4.79	5.22
33	1.99	2.52	3.05	3.57	4.18	4.71	5.14
34	1.96	2.48	3.01	3.51	4.11	4.63	5.07
35	1.93	2.44	2.98	3.46	4.05	4.56	5.00
36	1.91	2.39	2.93	3.41	3.99	4.50	4.93
37	1.89	2.35	2.88	3.36	3.93	4.43	4.86
38	1.87	2.32	2.84	3.31	3.87	4.37	4.79
39	1.85	2.28	2.80	3.26	3.82	4.31	4.73
40	1.83	2.24	2.76	3.22	3.76	4.25	4.66
41	1.81	2.21	2.72	3.17	3.71	4.19	4.60
42	1.79	2.18	2.68	3.13	3.66	4.13	4.54
43	1.77	2.14	2.64	3.09	3.61	4.08	4.49
44	1.75	2.11	2.61	3.05	3.57	4.03	4.43
45	1.73	2.08	2.57	3.01	3.52	3.98	4.38

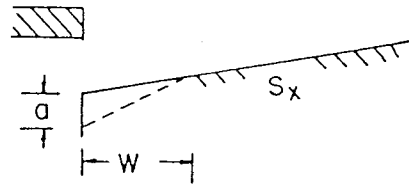
ATTACHMENT D

DRAINAGE CRITERIA

CITY OF WICHITA, KANSAS

RECOMMENDED RUNOFF COEFFICIENTS FOR RATIONAL METHOD  
AND PERCENT IMPERVIOUS FOR UNIT HYDROGRAPH METHOD

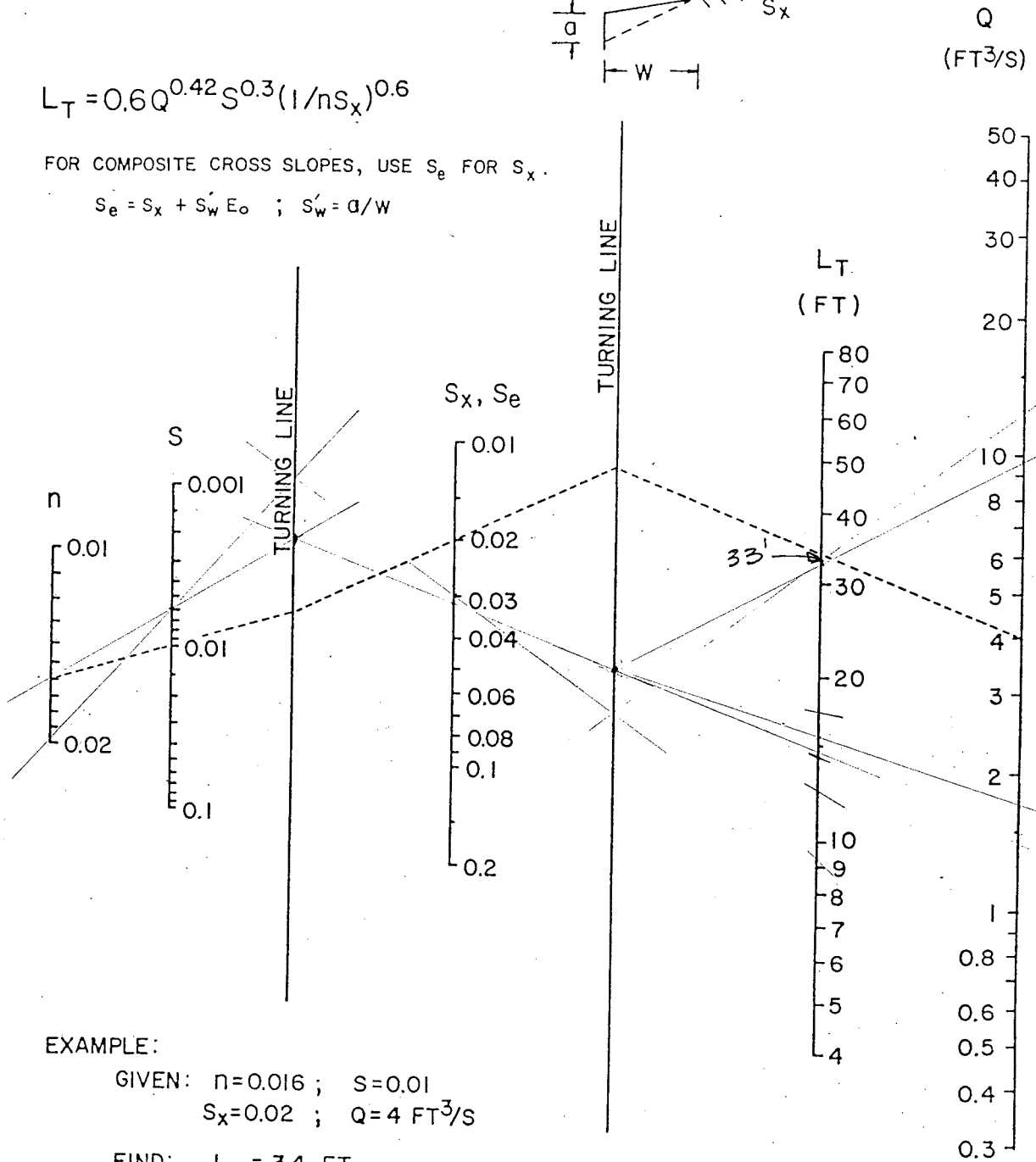
Land Use or Surface Characteristics	Percent Impervious	Frequency			
		<u>2</u>	<u>5</u>	<u>10</u>	<u>100</u>
1. Business:					
Downtown Areas	95	0.84	0.85	0.87	0.91
Neighborhood Areas	70	0.68	0.69	0.73	0.80
2. Residential:					
<u>Single Family (Soil Group D)</u>					
1/8 Acre	50	0.57	0.61	0.66	0.79
1/4 Acre	38	0.50	0.54	0.62	0.76
1/3 Acre	30	0.46	0.50	0.59	0.73
1/2 Acre	25	0.42	0.48	0.56	0.72
3/4 Acre	22	0.42	0.46	0.55	0.71
1 Acre	20	0.41	0.45	0.54	0.71
<u>Multi-Family (Soil Group D)</u>					
Multi-Unit (detached)	60	0.62	0.66	0.72	0.82
Multi-Unit (attached)	65	0.64	0.68	0.73	0.83
Apartments	75	0.70	0.73	0.79	0.86
<u>Single Family (Soil Group C)</u>					
1/8 Acre	50	0.55	0.58	0.64	0.73
1/4 Acre	38	0.48	0.51	0.57	0.68
1/3 Acre	30	0.43	0.46	0.53	0.65
1/2 Acre	25	0.40	0.43	0.50	0.63
3/4 Acre	22	0.39	0.42	0.49	0.62
1 Acre	20	0.37	0.40	0.48	0.61
<u>Multi-Family (Soil Group C)</u>					
Multi-Unit (detached)	60	0.60	0.63	0.69	0.77
Multi-Unit (attached)	65	0.63	0.66	0.71	0.79
Apartments	75	0.68	0.72	0.77	0.83
<u>Single-Family (Soil Group B)</u>					
1/8 Acre	50	0.52	0.54	0.59	0.67
1/4 Acre	38	0.44	0.46	0.52	0.61
1/3 Acre	30	0.39	0.41	0.47	0.57
1/2 Acre	25	0.36	0.38	0.44	0.54
3/4 Acre	22	0.34	0.36	0.42	0.52
1 Acre	20	0.33	0.35	0.40	0.51
<u>Multi-Family (Soil Group B)</u>					
Multi-Unit (detached)	60	0.58	0.60	0.65	0.72
Multi-Unit (attached)	65	0.61	0.64	0.68	0.75
Apartments	75	0.67	0.70	0.74	0.80



$$L_T = 0.6Q^{0.42} S^{0.3} (1/nS_x)^{0.6}$$

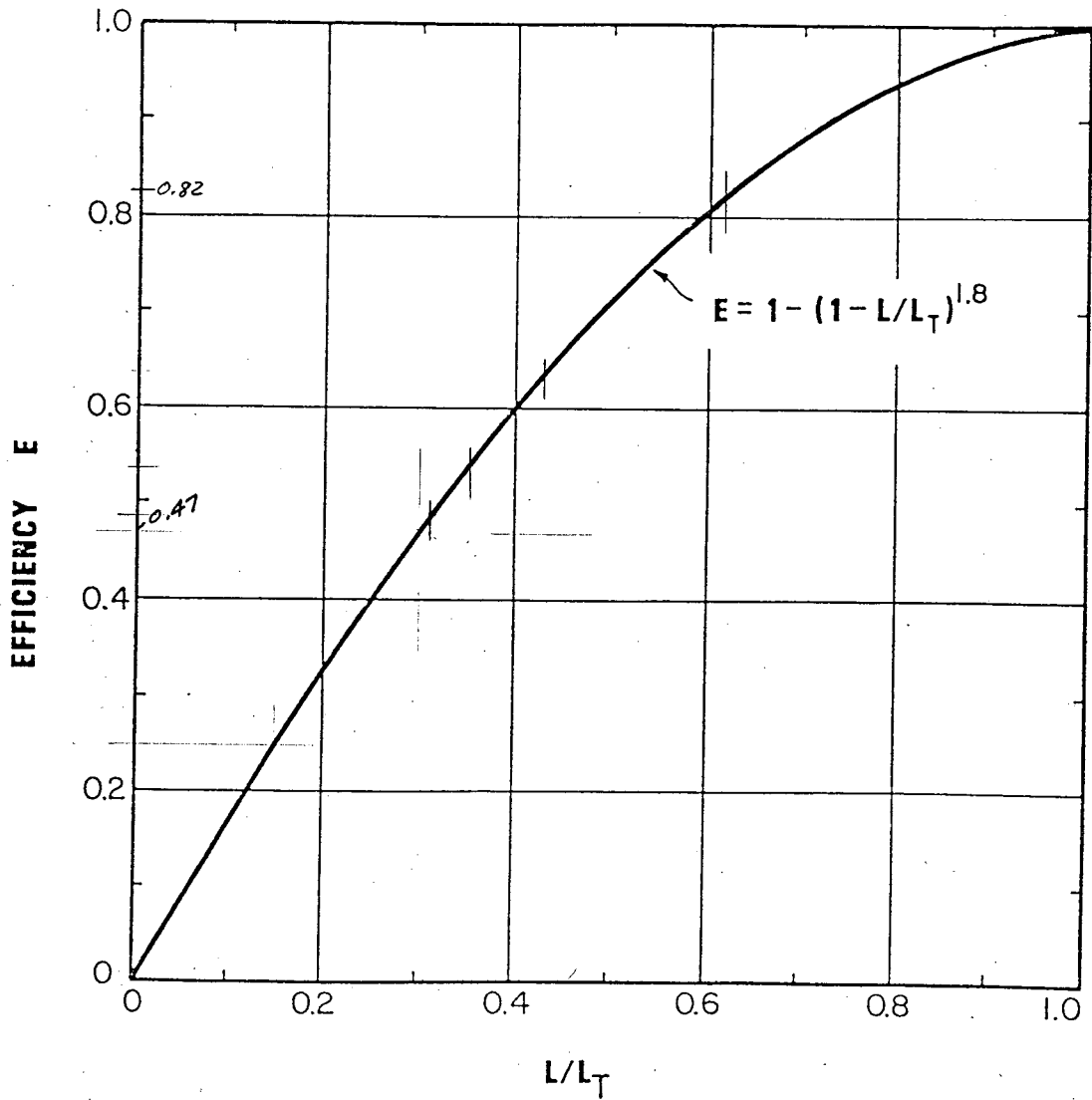
FOR COMPOSITE CROSS SLOPES, USE  $S_e$  FOR  $S_x$ .

$$S_e = S_x + S_w E_o \quad ; \quad S_w = a/W$$



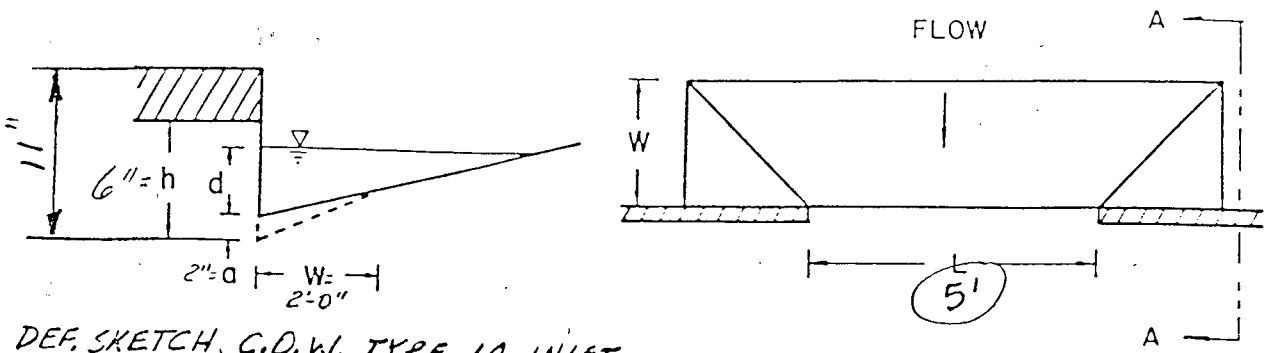
**CHART 9. Curb-opening and slotted drain inlet length for total interception.**

FROM: HEC-12, DRAINAGE OF HIGHWAY PAVEMENTS, F.H.W.A., MAR. 1984.



**CHART 10. Curb-opening and slotted drain inlet interception efficiency.**

FROM: HEC-12, DRAINAGE OF HIGHWAY PAVEMENTS, FHWA, MAR. 1954



DEF. SKETCH, C.D.W. TYPE 1A INLET

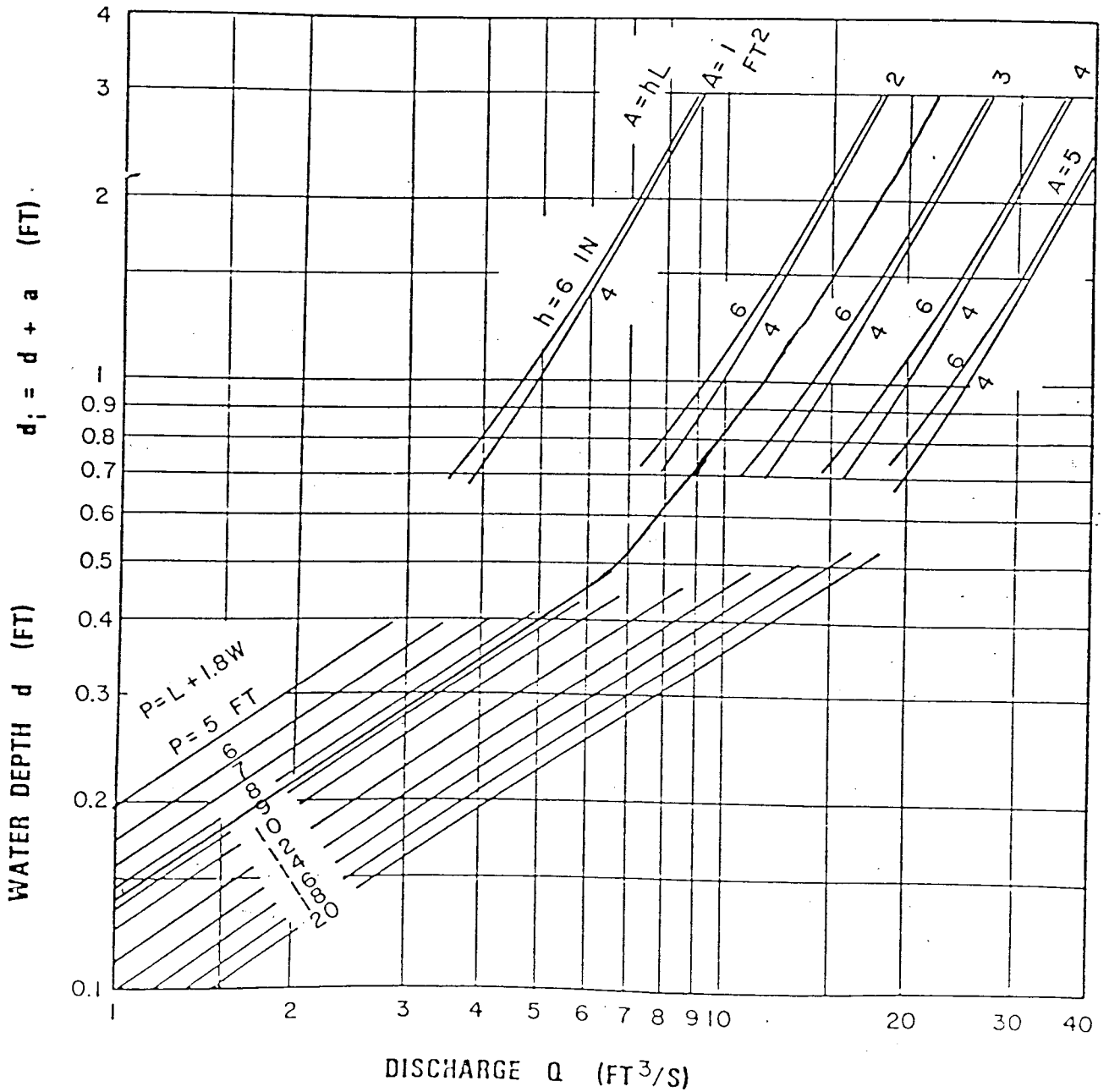


CHART 12. Depressed curb-opening inlet capacity in sump locations.

FROM: HEC-12, DRAINAGE OF HIGHWAY PAVEMENTS, FHWA, MAR, 1973

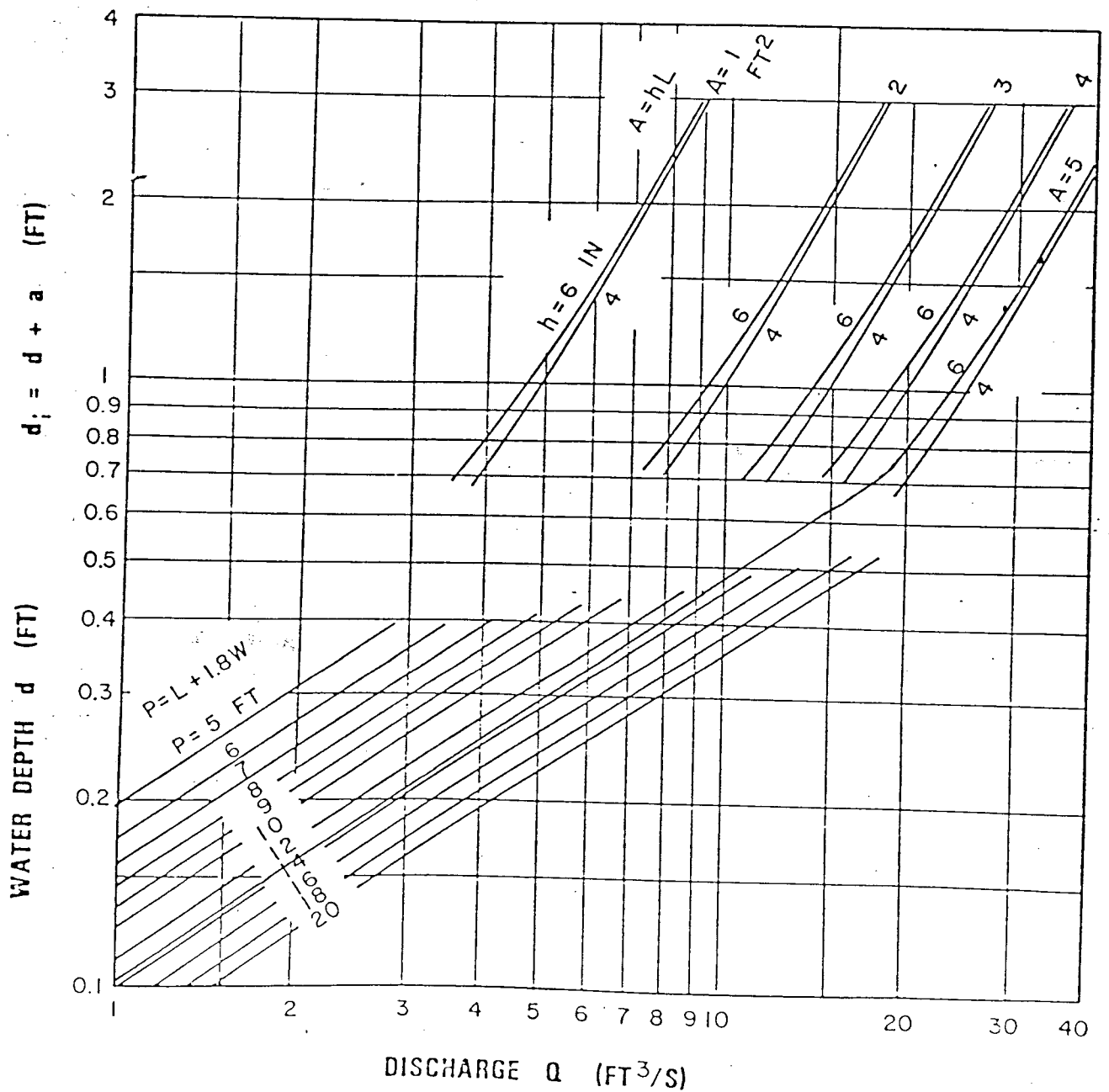
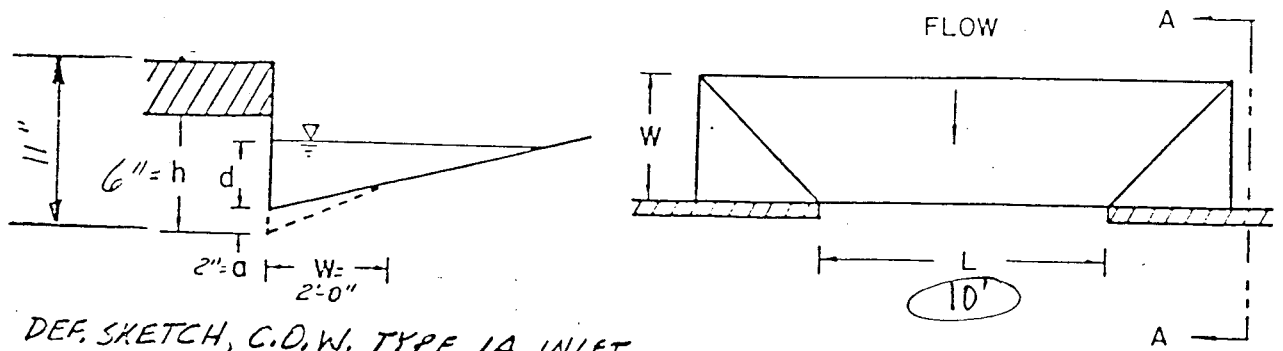
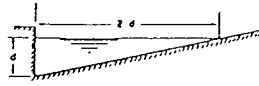


CHART 12. Depressed curb-opening inlet capacity in sump locations.

FROM: HEC-12, DRAINAGE OF HIGHWAY PAVEMENTS, FHWA, MAR, 1974

Chart 1



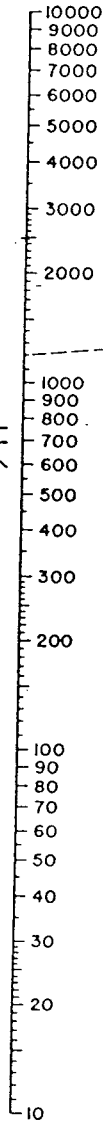
EQUATION:  $Q = 0.56 \left(\frac{z}{n}\right)^{2/3} d^{5/3}$   
 $n$  IS ROUGHNESS COEFFICIENT IN MANNING'S  
 FORMULA APPROPRIATE TO MATERIAL IN  
 BOTTOM OF CHANNEL  
 $z$  IS RECIPROCAL OF CROSS SLOPE  
 REFERENCE: H. R. B. PROCEEDINGS 1948,  
 PAGE 150, EQUATION (14)

EXAMPLE (SEE INSTRUCTION 1)

GIVEN:  $z = 0.03$   
 $z = 24$   
 $n = .02$  }  $z/n = 1200$   
 $Q = 20 \text{ CFS}$

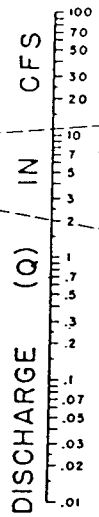
FIND:  $d = 0.22$  BY FOLLOWING  
 DASHED LINES

RATIO  $z/n$

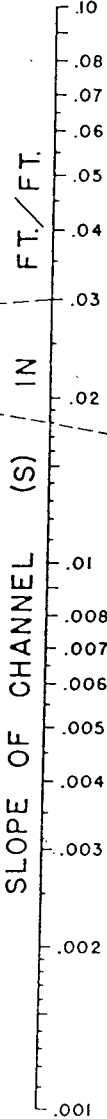


TURNING LINE

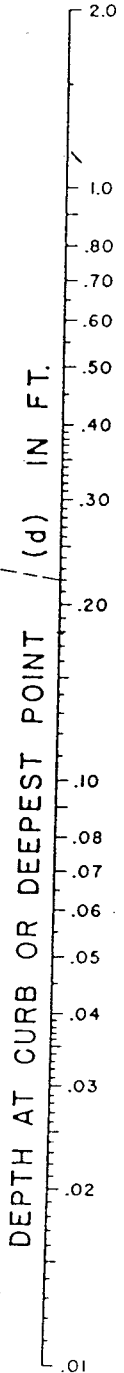
DISCHARGE (Q) IN CFS



SLOPE OF CHANNEL (S) IN FT./FT.



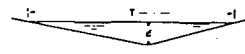
DEPTH AT CURB OR DEEPEST POINT (d) IN FT.



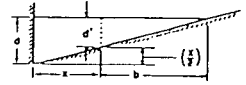
INSTRUCTIONS

1. CONNECT  $z/n$  RATIO WITH SLOPE (S) AND CONNECT DISCHARGE (Q) WITH POINT WHERE LINE, CROSSES TURNING LINE READ DEPTH AT CURB (d) Q CAN BE FOUND FROM d BY CONNECTING d WITH CROSSING OF TURNING LINE.

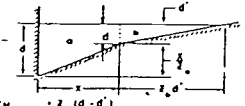
2. FOR SHALLOW V-SHAPED CHANNEL AS SHOWN USE NOMOGRAPH AS EXPLAINED IN INSTRUCTION 1 BUT WITH  $z = \frac{T}{d}$ .



3. TO DETERMINE DISCHARGE  $Q_0$  IN PORTION OF CHANNEL HAVING WIDTH  $x$ : DETERMINE DEPTH  $d$  FOR TOTAL DISCHARGE IN ENTIRE SECTION AS EXPLAINED IN 1. THEN USE NOMOGRAPH TO DETERMINE  $Q_0$  IN SECTION OF WIDTH  $b$  FOR DEPTH  $d' = d - (\frac{x}{z})$  THEN  $Q_0 = Q - Q_b$ .



4. TO DETERMINE DISCHARGE ( $Q_0$ ) IN COMPOSITE SECTION: FOLLOW INSTRUCTION 3. TO OBTAIN DISCHARGE ( $Q_b$ ) IN SECTION  $b$  AT ASSUMED DEPTH  $d'$  BASED ON AN EXTENSION OF SLOPE RATIO  $z_b$  TO INTERSECT WATER SURFACE; OBTAIN  $Q_0$  FOR SLOPE RATIO  $z_b$  AND DEPTH  $d'$ ;  $d' = d - \frac{x}{z_b}$  THEN  $Q_0 = Q_b + Q_0$ .





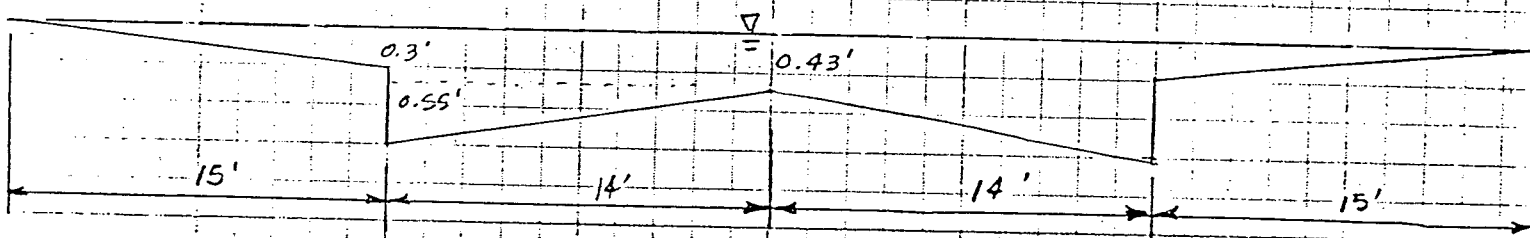
Date \_\_\_\_\_ Page \_\_\_\_\_ of \_\_\_\_\_

Project \_\_\_\_\_

Item Drainage Plan

Determine Capacities of Standard Curb Streets w/  
Various Walk Grades for 100-year storm analysis  
(58' R-O-W)

0.3' WALK GRADE



$$p = \frac{(2 \times 14.5 \times 0.03) + (2 \times 3.05 \times 0.013) + (2 \times 12 \times 0.016)}{59.1}$$

$$= \frac{(0.87) + (0.0793) + (0.384)}{59.1} = \frac{1.3333}{59.1} = 0.0226$$

$$A = (2 \times \frac{1}{2} \times 15 \times 0.3) + (28 \times 0.43) + (2 \times \frac{1}{2} \times 14 \times 0.42)$$

$$= (4.5) + (12.04) + (5.88)$$

$$= 22.42$$

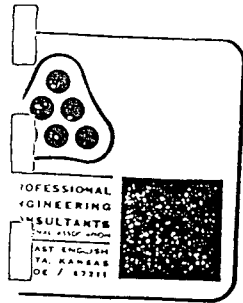
$$p = 0.0226$$

$$R = A/p = 22.42/0.0226 = 992.0354 \quad R^{2/3} = 1000.0000$$

$$Q = \frac{1.486}{n} A R^{2/3} S^{1/2}$$

$$Q = \frac{1.486}{0.0226} \times 22.42 \times 1000 \times S^{1/2}$$

$$Q = 772.5 \sqrt{S}$$



Date \_\_\_\_\_ Page \_\_\_\_\_ of \_\_\_\_\_

Project \_\_\_\_\_

Item Drainage Plan

0.4' WALK GRADE

50' R-o-W  
Std. Curb

$$n = 0.0226$$

$$A = (2 \times \frac{1}{2} \times 15 \times 0.4) + (20 \times 0.53) + (2 \times \frac{1}{2} \times 14 \times 0.42)$$

$$= (6.00) + (10.60) + (5.88)$$

$$= 22.48$$

$$p = 59.1$$

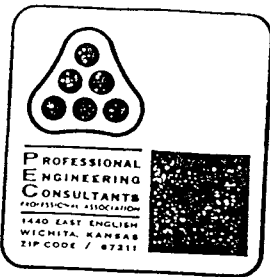
$$R = A/p = 22.48/59.1 = 0.380372$$

$$R^{2/3} = 0.511069$$

$$Q = \frac{1.486}{n} A R^{2/3} S^{1/2}$$

$$Q = \frac{1.486}{0.0226} \times 22.48 \times 0.511069 \times S^{1/2}$$

$$Q = 1,034.93 \sqrt{S}$$



Date \_\_\_\_\_ Page \_\_\_\_\_ of \_\_\_\_\_

Project \_\_\_\_\_

Item Drainage Plan

0.5' WALK GRADE

58' R-o-w  
Std Curb

$$n = 0.0226$$

$$A = (2 \times \frac{1}{2} \times 15 \times 0.5) + (28 \times 0.63) + (2 \times \frac{1}{2} \times 14 \times 0.42)$$

$$= (7.5) + (17.64) + (5.88)$$

$$= 31.02 \text{ SF}$$

$$p = 59.1$$

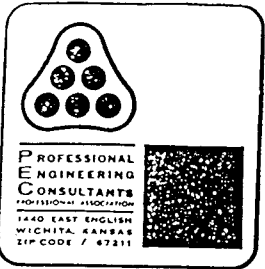
$$R = A/p = 31.02/59.1 = 0.524873$$

$$R^{2/3} = 0.650683$$

$$Q = \frac{1.486}{n} A R^{2/3} S^{1/2}$$

$$Q = \frac{1.486}{0.0226} \times 31.02 \times 0.650683 \times S^{1/2}$$

$$Q = 1,327.15 \sqrt{S}$$



Date \_\_\_\_\_ Page \_\_\_\_\_ of \_\_\_\_\_

Project \_\_\_\_\_

Item Drainage Plan

0.6' WALK GRADE

50' R-o-w  
Std. Curb

$$n = 0.0226$$

$$A = (2 \times \frac{1}{2} \times 15 \times 0.6) + (28 \times 0.73) + (2 \times \frac{1}{2} \times 14 \times 0.42)$$
$$= (9.0) + (20.44) + (5.88)$$
$$= 35.32$$

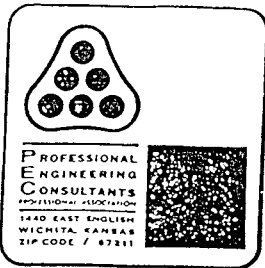
$$p = 59.1$$

$$R = A/p = 35.32/59.1 = 0.597631 \quad R^{2/3} = 0.709505$$

$$Q = \frac{1.486}{n} A R^{2/3} S^{1/2}$$

$$Q = \frac{1.486}{0.0226} \times 35.32 \times 0.709505 \times S^{1/2}$$

$$Q = 1,647.73 \sqrt{S}$$



Date \_\_\_\_\_ Page \_\_\_\_\_ of \_\_\_\_\_

Project \_\_\_\_\_

Item Drainage Plan

58' R-o-W  
Std Curb

0.7' WALK GRADE

$$n = 0.0226$$

$$A = (2 \times \frac{1}{2} \times 15 \times 0.7) + (28 \times 0.83) + (2 \times \frac{1}{2} \times 14 \times 0.42)$$
$$= (10.5) + (23.24) + (5.88)$$
$$= 39.62$$

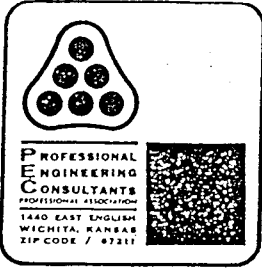
$$p = 59.1$$

$$R = A/p = 39.62/59.1 = 0.670389 \quad R^{2/3} = 0.765981$$

$$Q = \frac{1.486}{n} A R^{2/3} S^{1/2}$$

$$Q = \frac{1.486}{0.0226} \times 39.62 \times 0.765981 \times S^{1/2}$$

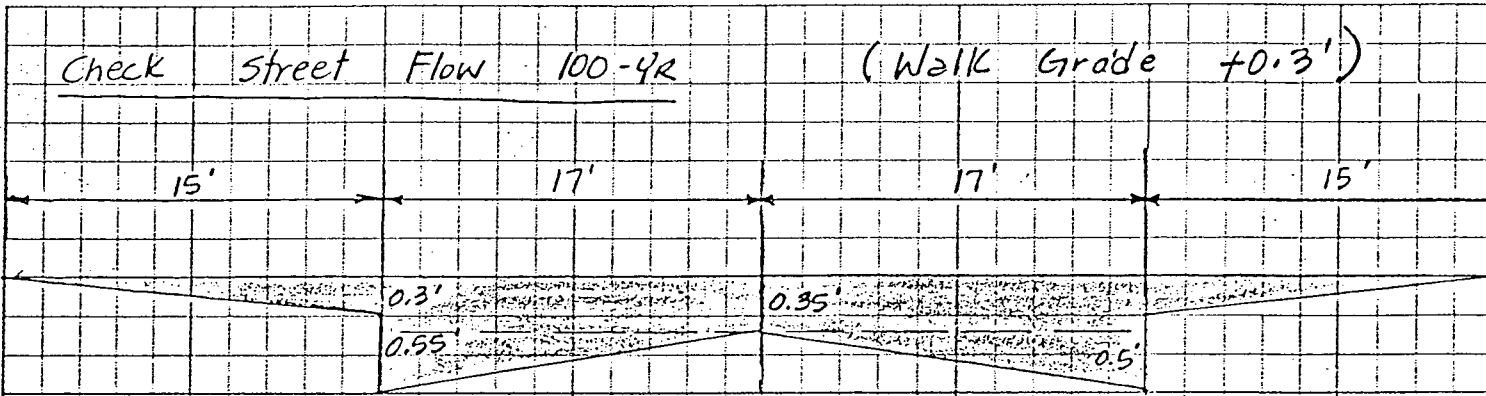
$$Q = 1,995.46 \sqrt{S}$$



Date \_\_\_\_\_ Page \_\_\_\_\_ of \_\_\_\_\_

Project \_\_\_\_\_

Item Drainage Plan



Determine  $Q_{max}$  in Street R-O-W

Use Mannings Eq'n  $Q = \frac{1.486}{n} A R^{2/3} S^{1/2}$

$$n = \frac{2(14.5 \times 0.030) + 2(1.05' \times 0.013) + 2(17 \times 0.016)}{65.1}$$

$$n = \frac{1.4413}{65.1} = 0.0221$$

$$A = 2\left(\frac{1}{2} \times 15 \times 0.3\right) + (34 \times 0.35) + 2\left(\frac{1}{2} \times 0.5 \times 17\right) = 24.90 \text{ SF}$$

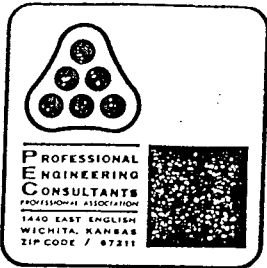
$$p = (2 \times 15) + (2 \times 17) + (2 \times 0.55) = 65.1'$$

$$R = A/p = 24.9/65.1 = 0.38249$$

$$R^{2/3} = 0.527$$

$$Q = \frac{1.486}{0.0221} \times 24.90 \times 0.527 \times S^{1/2}$$

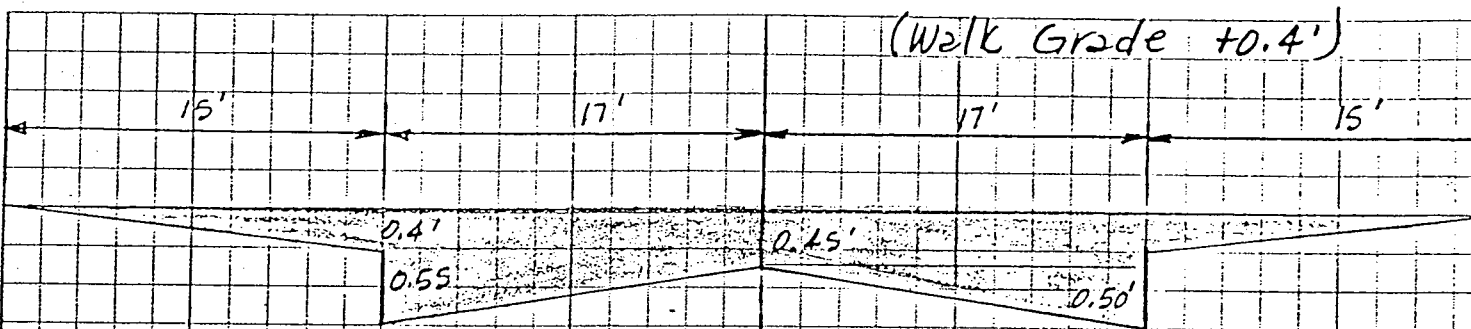
$$Q = 882.3 \times S^{1/2}$$



Date \_\_\_\_\_ Page \_\_\_\_\_ of \_\_\_\_\_

Project \_\_\_\_\_

Item Drainage Plan



$n = 0.0221$  (see previous sheet)

$$A = 2\left(\frac{1}{2} \times 15' \times 0.4'\right) + (34 \times 0.45') + 2\left(\frac{1}{2} \times 17' \times 0.5'\right)$$

$$= 29.8 \text{ SF}$$

$$P = 65.1'$$

$$R = A/P = 29.8/65.1 = 0.4577$$

$$R^{2/3} = 0.594$$

$$Q = \frac{1.486}{0.0221} \times 29.8 \times 0.594 \times 5^{1/2}$$

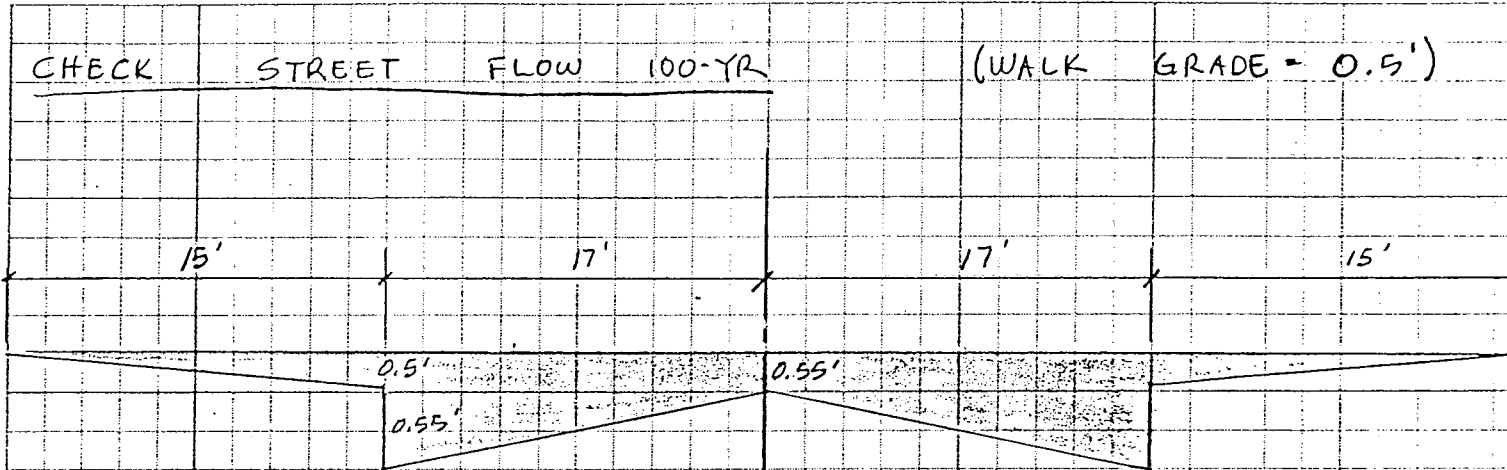
$$Q = 1,190.2 \text{ s}^{1/2}$$



Date \_\_\_\_\_ Page \_\_\_\_\_ of \_\_\_\_\_

Project \_\_\_\_\_

Item \_\_\_\_\_



$$n = 0.0221 \quad (\text{see previous sheet})$$

$$A = 2 \left( \frac{1}{2} \times 15 \times 0.5 \right) + (34 \times 0.55) + 2 \left( \frac{1}{2} \times 17 \times 0.5 \right)$$

$$= 34.7 \text{ SF}$$

$$p = 65.1$$

$$R = A/p = 34.7/65.1 = 0.5330$$

$$R^{2/3} = 0.6574$$

$$Q_{\max} = \frac{1.486}{0.0221} \times 34.7 \times 0.6574 \times 5^{1/2}$$

$$Q_{\max} = 1,533.9 \text{ s}^{1/2}$$

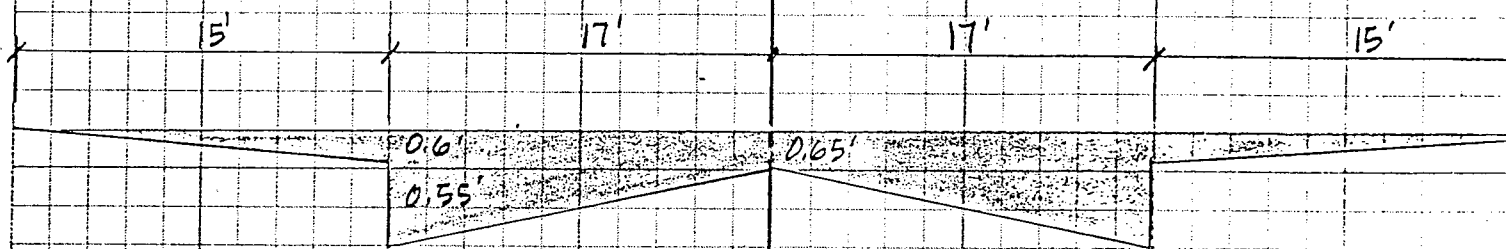


Date \_\_\_\_\_ Page \_\_\_\_\_ of \_\_\_\_\_

Project \_\_\_\_\_

Item Drainage Plan

CHECK STREET FLOW 100-YEAR (WALK GRADE = 0.6')



$n = 0.0221$  (see previous sheet)

$A = 2(\frac{1}{2} \times 15 \times 0.6) + (34 \times 0.65) + 2(\frac{1}{2} \times 17 \times 0.5)$   
 $= 39.6 \text{ SF}$

$p = 65.1'$

$R = A/p = \frac{39.6}{65.1} = 0.6083$

$R^{2/3} = 0.71792$

$Q_{max} = \frac{1.486}{0.0221} \times 39.6 \times 0.71792 \times 5^{1/2}$

$Q_{max} = 1,911.6 \text{ s}^{1/2}$



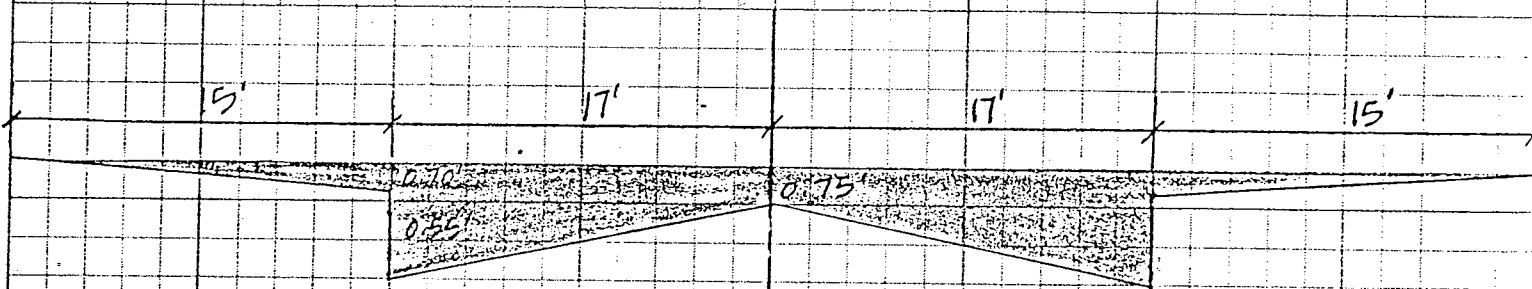
Date \_\_\_\_\_ Page \_\_\_\_\_ of \_\_\_\_\_

Project \_\_\_\_\_

Item Drainage Plan.

CHECK STREET FLOW 100 YR

(WALK GRADE = 0.70')



$$n = 0.0221 \text{ (see previous sheet)}$$

$$A = 2\left(\frac{1}{2} \times 15 \times 0.7\right) + (34 \times 0.75) + 2\left(\frac{1}{2} \times 17 \times 0.5\right)$$

$$= 44.5 \text{ SF}$$

$$p = 65.1$$

$$R = A/p = 44.5/65.1 = 0.683564$$

$$R^{2/3} = 0.775984$$

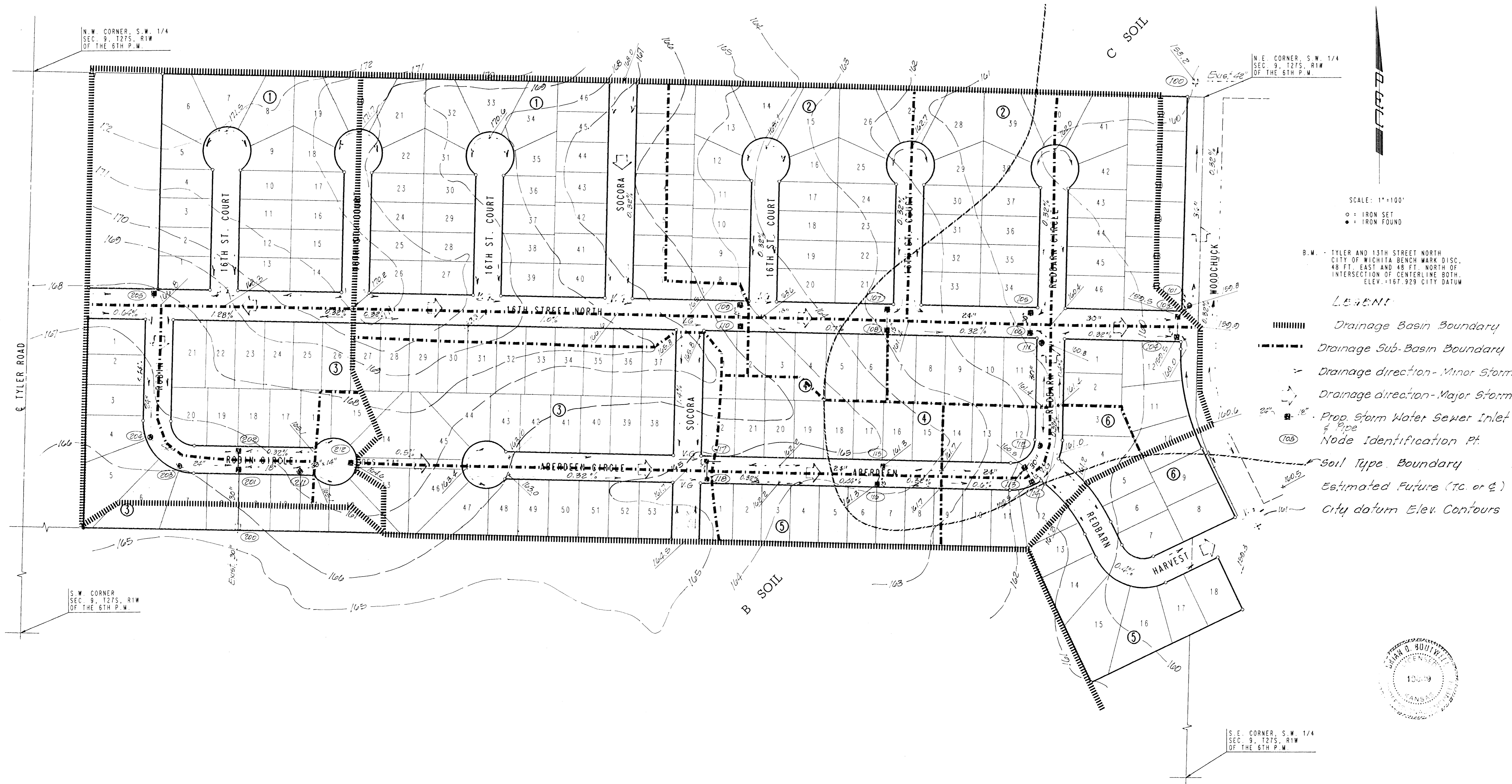
$$Q_{max} = \frac{1.486}{0.0221} \times 44.5 \times 0.775984 \times s^{1/2}$$

$$Q_{max} = 2,321.9 \text{ s}^{1/2}$$

# DRAINAGE PLAN

## SOCORA VILLAGE

### AN ADDITION TO WICHITA, SEDGWICK COUNTY, KANSAS

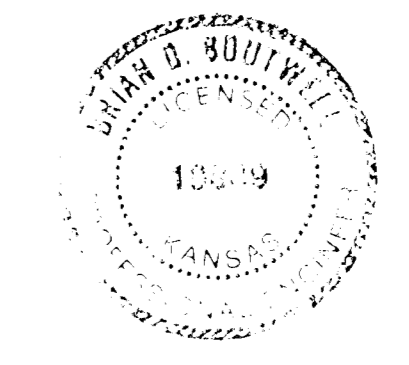


SCALE: 1"=100'  
 ○ = IRON SET  
 ● = IRON FOUND

B.M. - TYLER AND 13TH STREET NORTH  
 CITY OF WICHITA BENCH MARK DISC.  
 48 FT. EAST AND 48 FT. NORTH OF  
 INTERSECTION OF CENTERLINE BOTH.  
 ELEV. +167.929 CITY DATUM

#### LEGEND

- ▬▬▬▬▬▬ Drainage Basin Boundary
- - - - - Drainage Sub-Basin Boundary
- Drainage direction - Minor Storm
- ↘ Drainage direction - Major Storm
- 18" Prop. Storm Water Sewer Inlet
- Node Identification Pt.
- Soil Type Boundary
- - - - - Estimated Future (TC or E)
- City datum Elev. Contours



S. E. CORNER, S. W. 1/4  
 SEC. 9, T27S, R1W  
 OF THE 6TH P.M.