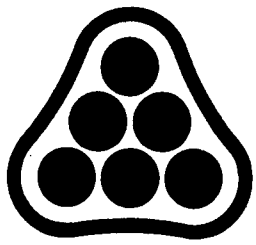

PROFESSIONAL
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SUPPLEMENT TO "DRAINAGE PLAN & SUPPORTING CALCULATIONS"

FOR
AMARADO ESTATES THIRD ADDITION
TO WICHITA, SEDGWICK COUNTY, KANSAS

PREPARED BY
PROFESSIONAL ENGINEERING CONSULTANTS, P.A.
ENGINEERS
WICHITA, KANSAS

FEBRUARY 25, 1987

1440 EAST ENGLISH
WICHITA, KANSAS 67211
(316) 262-2691

PROFESSIONAL
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PROFESSIONAL ASSOCIATION

February 25, 1987

Michael E. Lindebak, P.E., City Engineer
7th Floor - City Hall
455 North Main
Wichita, Kansas 67202

Attention: Mr. Carl Gipson, P.E.

Reference: Amarado Estates 3rd Addition
Drainage Plan
PEC File No: 36-87053-1047

Dear Mr. Gipson:

As requested, we are transmitting herewith two (2) copies of the Supplement to the Drainage Plan and Supporting Calculations for Amarado Estates 3rd Addition.

The plan has been revised to divert the 100-year runoff from the southwesterly portion of the plat (Nodes 211-214) to 18th Street. Also, the outfall pipe of System 100 was increased from 48" to 54" to handle 100% of the 100-year storm runoff.

Please review and advise our office of your comments.

Very truly yours,

PROFESSIONAL ENGINEERING CONSULTANTS, P.A.

Charles S. Brown

Charles S. Brown, P.E.
Project Engineer

enclosures

CSB/mkm

xc: Randy Voth

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Project Amarado 3rd

Item Revised Drainage Plan

100 Year flow from 17th street Area only into system 200 (Nodes 200-210)

All remaining areas to System 100 (Nodes 100-116 plus 211-214)

SYSTEM 200	Node	Q_{100}	
	210	3.1	cfs
	209	16.0	
	208	6.3	
	207	3.4	
	206	2.9	
	205	7.9	
	204	3.5	
	203	3.6	
	202	18.2	
	201	0.6	
	200	-	
	TOTAL	65.5	cfs

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Project Amarado 3rd.

Item Revised Drainage Plan

SYSTEM 100

Node	Q_{100}
116	16.1
115	23.7
114	19.5
113	8.3
112	1.0
111	13.4
110	3.4
109	3.8
108	8.4
107	4.6
106	4.0
105	21.7
104	13.8
103	2.5
102	6.4
101	3.9
100	—
214	44.4
213	2.2
212	10.4
211	9.5
	171.0 cfs

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Project Amarado 3rd

Item Revised Drainage Plan.

CHECK STREET FLOW 17th STREET (SYSTEM 200)

$Q_{street} = Q_{100} - Q_{2(pipes)}$

$Q_{street} = 65.5 - (Q_2 \text{ nodes } 200\text{-}210)$

$= 65.5 - (23.8)$

$= 41.7 \text{ cfs}$

From Page 4, $Q_{max} = 1,262.0\ s^{1/2}$

$= 1,262.0 \times 0.0031^{1/2}$

$= 70.3 \text{ cfs}$

$Q_{street} < Q_{max}$ Street Flow OK

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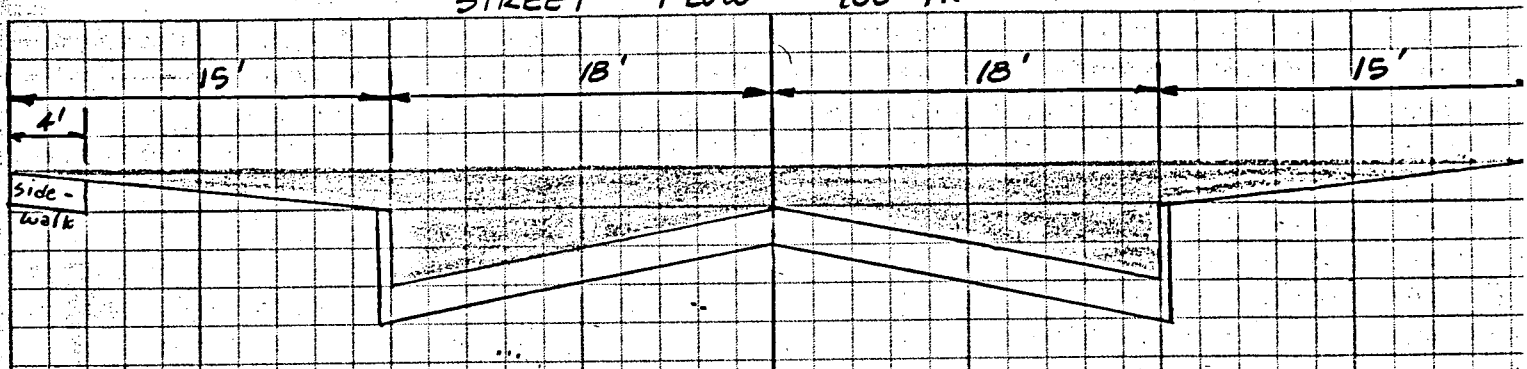
Project Amarado 3rd Addition

Item Drainage Plan - System 200

STREET FLOW - 100-YR



Use Manning's Eq'n

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

$n = \dfrac{(4' \times 0.014) + (10.5 \times 0.03) + 2(1.05 \times 0.013) + (36 \times 0.016) + (14.5 \times$ (illegible)$)}{67.1}$

$= 0.021$

$A = (2 \times \frac{1}{2} \times 15 \times 0.4) + (36 \times 0.4) + (2 \times \frac{1}{2} \times 18 \times 0.55)$

$= 30.3$

$p = (2 \times 15) + (2 \times 0.55) + (2 \times 18)$

$= 67.1$

$R = A/p = 0.451565$

$R^{2/3} = 0.5886$

$Q = \dfrac{1.486}{0.021} \times 30.3 \times 0.5886 \times S^{1/2}$

$Q = 1262.0 \; S^{1/2}$

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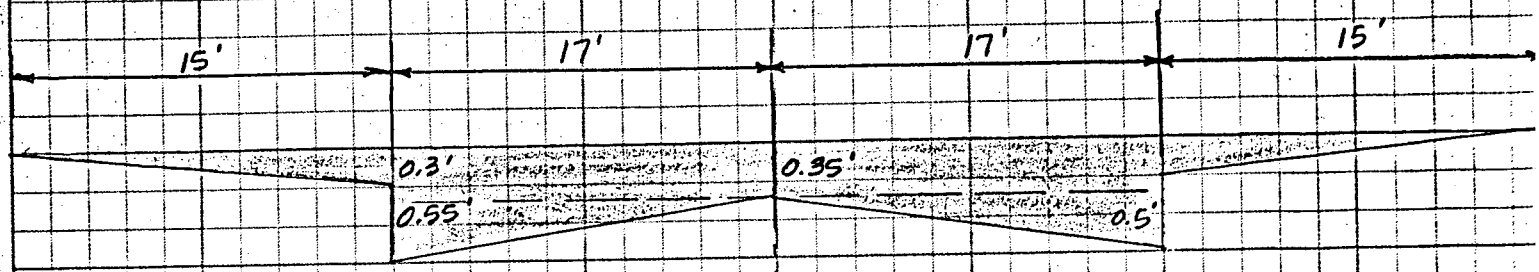
Project Amarado 3rd

Item Drainage Plan - System 100

Check Street Flow 100-yr (Walk Grade +0.3')



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

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

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

$n = 1.4413 / 65.1 = 0.0221$

$A = 2(1/2 \times 15 \times 0.3) + (34 \times 0.35) + 2(1/2 \times 0.5 \times 17)$
$= 24.90$ SF

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

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

$R^{2/3} = 0.527$

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

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

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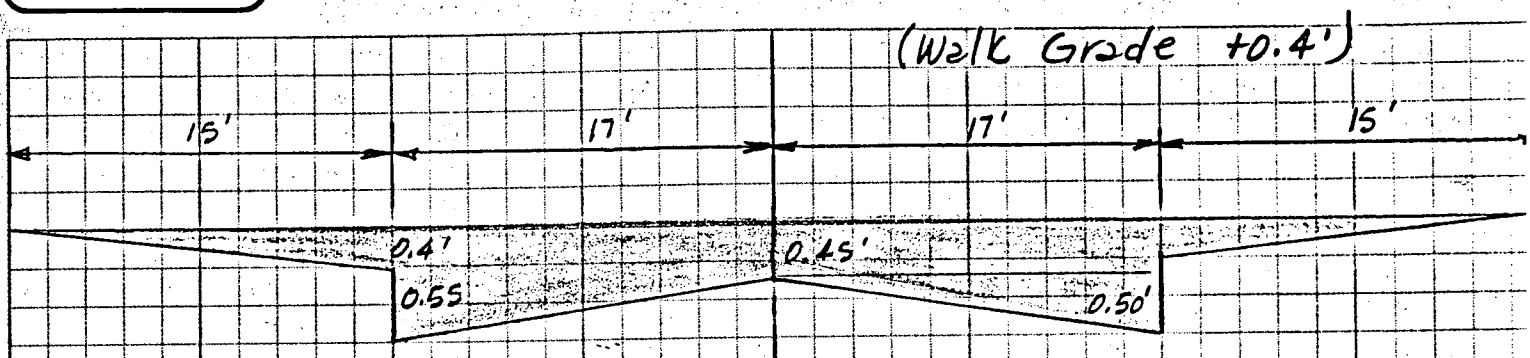
Project Amarado 3rd Addition

Item Drainage Plan - System 100



n: 0.0221 (see previous sheet)

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

$= 29.8$ SF

$P = 65.1'$

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

$R^{2/3} = 0.594$

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

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

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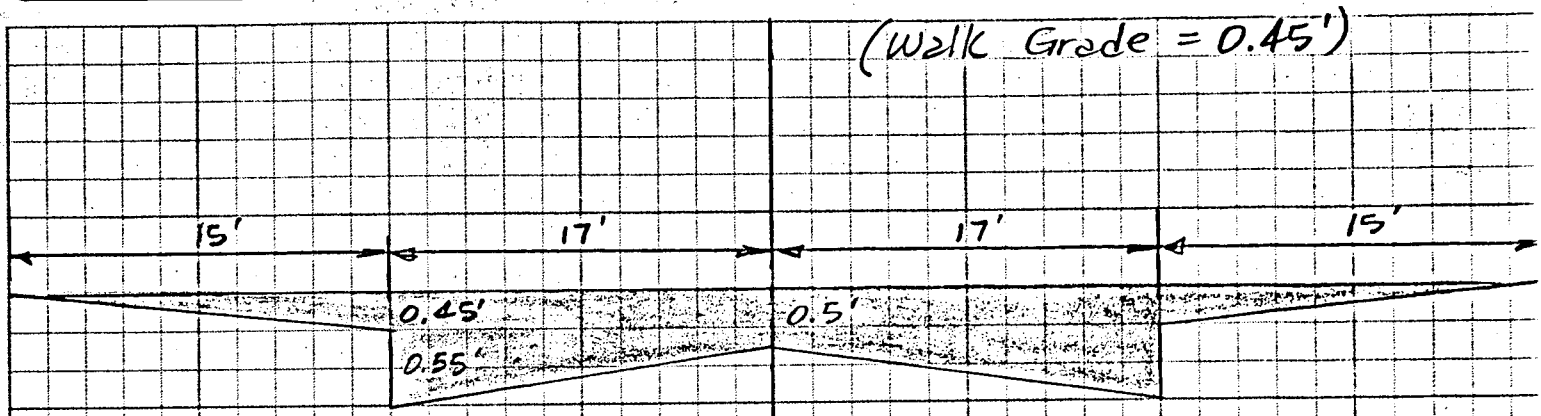
Item Drainage Plan - System 100



n: 0.0221 (see previous sheet)

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

$= 32.25$ SF

$p = 65.1$

$R = A/p = 32.25/65.1 = 0.4954$

$R^{2/3} = 0.626$

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

$= \frac{1.486}{0.0221} \times 32.25 \times 0.626 \times S^{1/2}$

$Q = 1357.5\ S^{1/2}$

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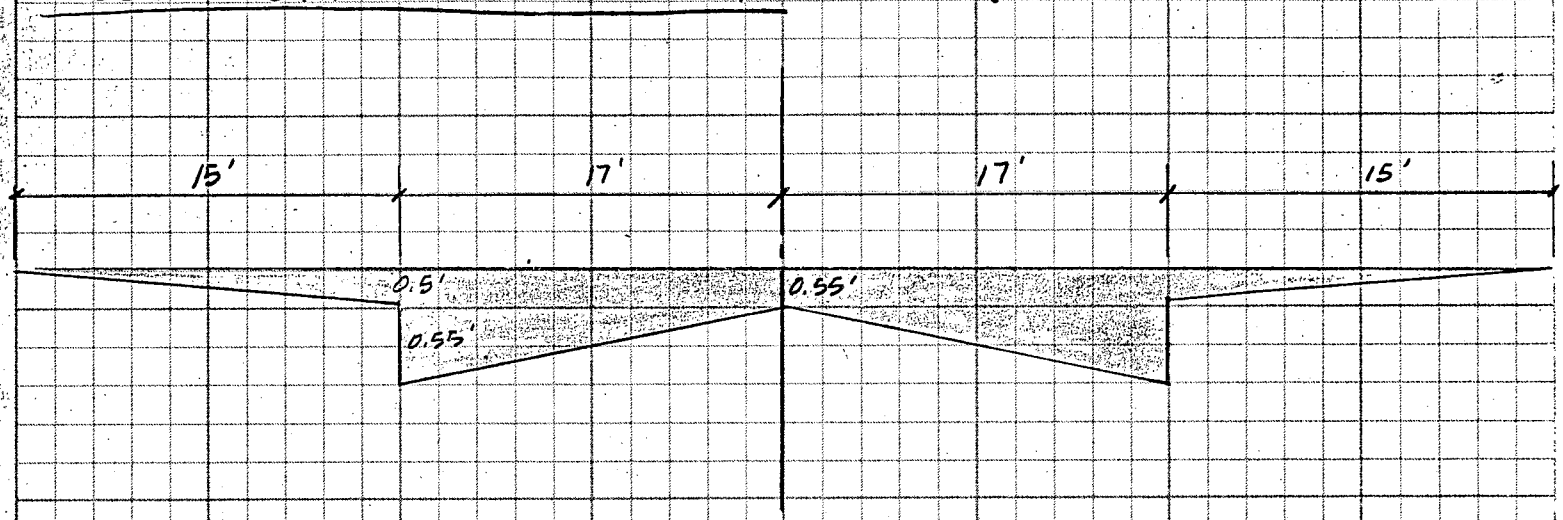
Project Amarado 3rd

Item Revised Drainage Plan

CHECK STREET FLOW 100-YR (WALK GRADE = 0.5')



$n = 0.0221$ (see previous sheet)

$A = 2(1/2 \times 15 \times 0.5) + (34 \times 0.55) + 2(1/2 \times 17 \times 0.5)$

$= 34.7$ SF

$P = 65.1$

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

$R^{2/3} = 0.6574$

$Q_{max} = \frac{1.486}{0.022} \times 34.7 \times 0.6574 \times S^{1/2}$

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

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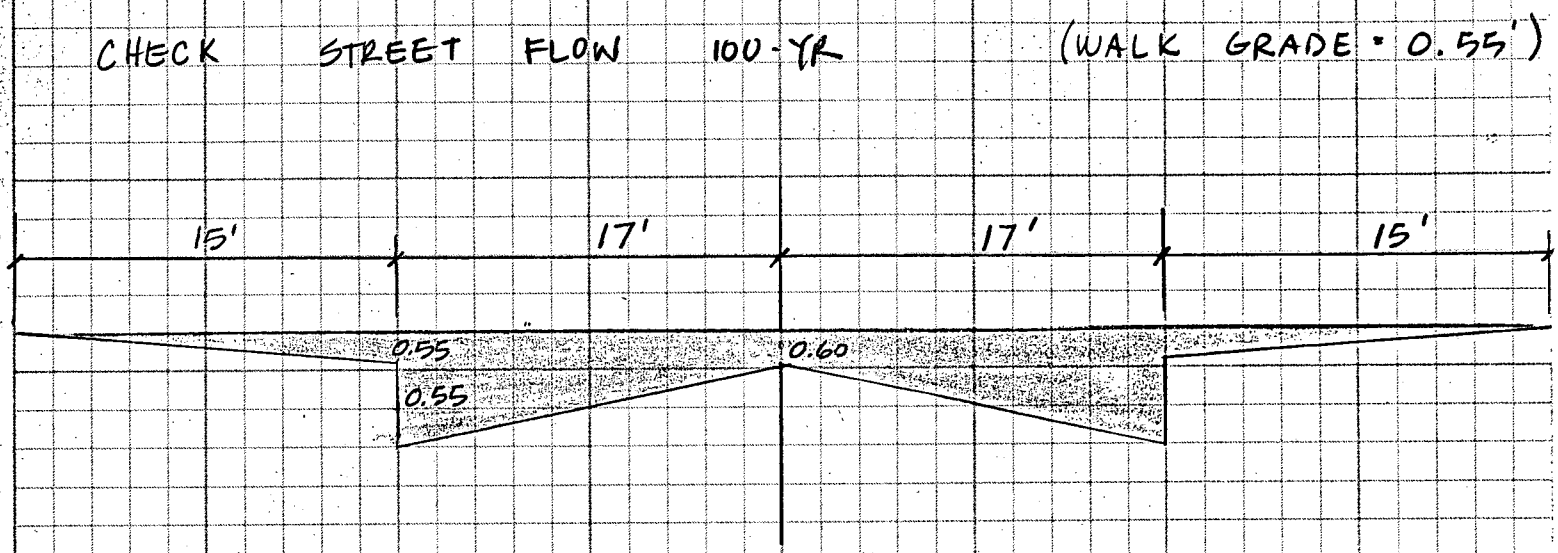
Project Amarado 3rd

Item Revised Drainage Plan

CHECK STREET FLOW 100-YR (WALK GRADE = 0.55')



n = 0.0221 (see previous sheet)

A = $2(\frac{1}{2} \times 15' \times 0.55') + (34 \times 0.60') + 2(\frac{1}{2} \times 17 \times 0.5)$

= 37.15 SF

P = 65.1

$R = A/P = 37.15/65.1 = 0.570661$

$R^{2/3} = 0.687995$

$Q_{max} = \frac{1.486}{0.0221} \times 37.15 \times 0.687995 \times S^{1/2}$

$Q_{max} = 1,718.6\ S^{1/2}$

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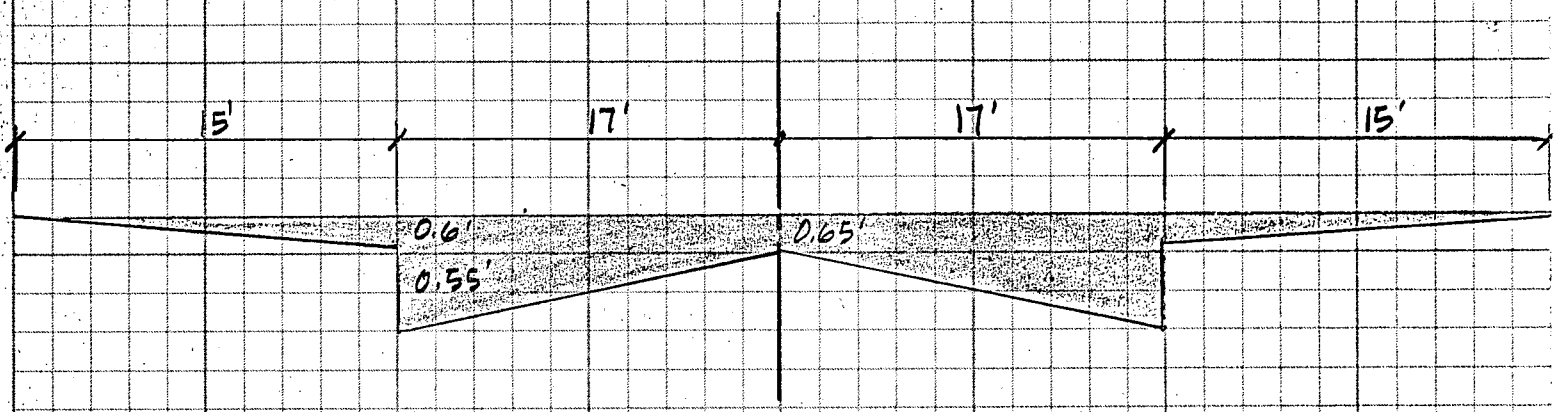
Project Amarado 3rd

Item Revised Drainage Plan

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



$n = 0.0221$ (see previous sheet)

$A = 2(1/2 \times 15 \times 0.6) + (34 \times 0.65) + 2(1/2 \times 17 \times 0.5)$

$= 39.6$ SF

$p = 65.1'$

$R = A/p = 39.6/65.1 = 0.6083$

$R^{2/3} = 0.71792$

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

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

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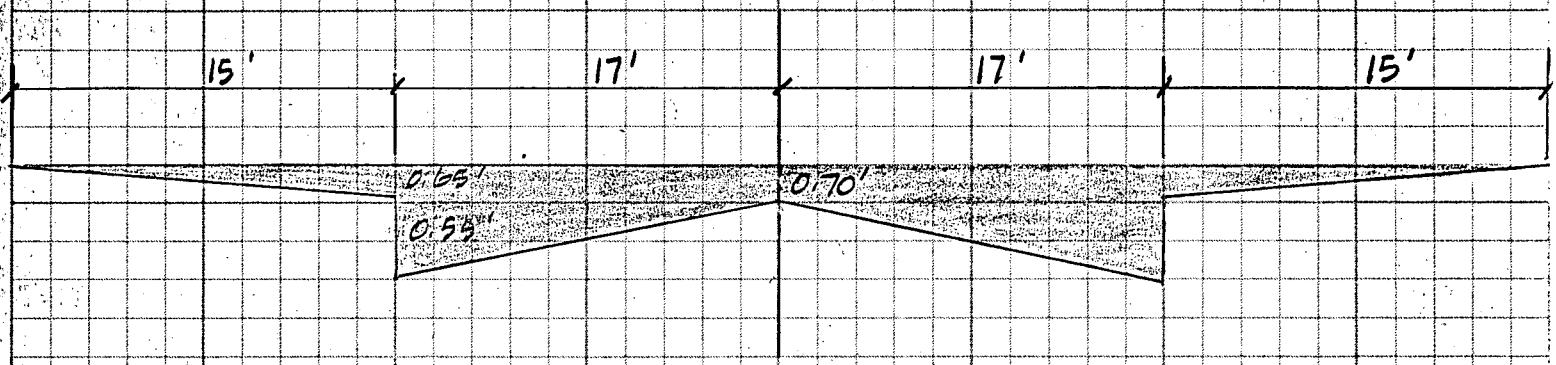
Project Amarado 3rd

Item Revised Drainage Plan

CHECK STREET FLOW 100-YR (WALK GRADE = 0.65')



n = 0.0221 (see previous sheet)

$A = 2(1/2 \times 15 \times 0.65) + (34 \times 0.70') + 2(1/2 \times 17 \times 0.5)$

$= 42.05$ SF

$p = 65.1$

$R = A/p = 42.05/65.1 = 0.6459$

$R^{2/3} = 0.747234$

$Q_{max} = \frac{1.486}{0.0221} \times 42.05 \times 0.747234 \times s^{1/2}$

$Q_{max} = 2,112.8\ s^{1/2}$

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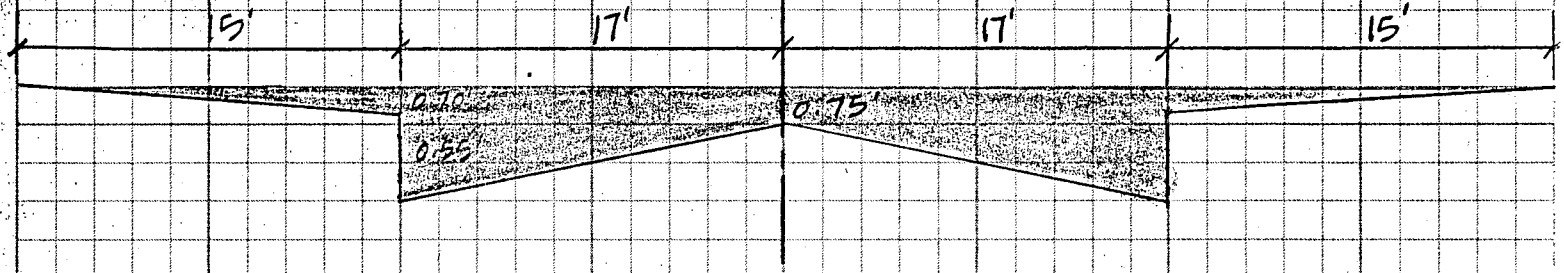
Project Amarado 3rd

Item Revised Drainage Plan.

CHECK STREET FLOW 100 YR (WALK GRADE = 0.70')



$n = 0.0221$ (see previous sheet)

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

$= 44.5$ SF

$P = 65.1$

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

$R^{2/3} = 0.775984$

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

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

131.3

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Project Amarado 3rd

Item Drainage Plan - System 100

1. Check Street Flow Approaching Nodes 115 - 116

Q_{100} = Node 116 = 16.1 cfs

115 = 23.7

39.8

Q_2 (pipe) = 0

$Q_{street} = Q_{100} - Q_2 = 39.8 - 0 = 39.8$

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

= 49.9 cfs

Street Flow OK

(Use 0.3 Walk Gr.)

2. Check Street Flow Approaching Nodes 114 113

Q_{100} : Node 116 16.1 cfs

115 23.7

114 30% × 19.5 = 5.9

113 8.3

54 cfs

$Q_{2\ (pipe)\ 113-113}$ = 14.9

$Q_{street} = Q_{100} - Q_{2\ pipe} = 54.0 - 14.9 = 39.1$ cfs

Q_{max} = 49.9

Street Flow OK

(Use 0.3 Walk Gr.)

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Project Amarado 3rd.

Item Revised Drainage Plan

3. Check street Flow Approaching Nodes 109-111

Q_{100} = Nodes

116	16.1
115	23.7
114	19.5
113	8.3
112	1.0
111	13.4
109	3.4
214	44.4
213	2.2
212	10.4
211	9.5
	151.9

$Q_2 = Q_{pipe\ 112-109} + Q_{pipe\ 211-210}$

$= 25.3 + 24.8 = 50.1$

$Q_{street} = 151.9 - 50.1 = 101.8$ cfs

$Q_{max} = 108.1$

Street Flow OK

(Use 0.6' Walk Gr)

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Project Amarado 3rd

Item Revised Drainage Plan

4. Check Street Flow Approaching Nodes 106-107

Q_{100} Nodes	
116	16.1
115	23.7
114	19.5
113	8.3
112	1.0
111	13.4
110	3.4
109	3.8
108	8.4
107	4.6
106	4.0
214	44.4
213	2.2
212	10.4
211	9.5
	172.7

$Q_2 = Q_{pipe\ 211-210} + Q_{pipe\ 109-106} + Q_{pipe\ 108-107}$

$= 24.8 + 32.5 + 2.9$

$= 60.2$

$Q_{street} = Q_{100} - Q_{pipe}$

$= 172.7 - 60.2$

$= 112.5$ cfs

$Q_{max} = 119.5$ cfs

Street Flow OK

(Use 0.65 Walk Gr)

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Project Amarado 3rd

Item Revised Drainage Plan.

5. Check Street Flow Approaching Nodes 102 - 101 (W)

Q_{100}	Node 116	16.1	cfs
	115	23.7	
	114	19.5	
	113	8.3	
	112	1.0	
	111	13.4	
	110	3.4	
	109	3.8	
	108	8.4	
	107	4.6	
	106	4.0	
	103	2.5	
	102	3.2	(50%)
	101	2.0	(50%)
	214	44.4	
	213	2.2	
	212	10.4	
	211	9.5	
		180.4	cfs

$Q_2 = Q_{pipe\ 211-210} + Q_{pipe\ 103-101}$

$= 24.8 + 38.5$

$= 63.3$

$Q_{street} = 180.4 - 63.3$

$= 117.1$ cfs

$Q_{max} = 119.5$ cfs

Street Flow OK

(Use 0.65 walk Grd.)

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Project Amarado 3rd

Item Drainage Plan System 100

6. Check Street Flow Approaching Nodes 105-104

Q_{100}: Node 105 21.7 cfs

104 13.8

35.5 cfs

$Q_2 = 0$

$Q_{street} = Q_{100} - Q_2 = 35.5 - 0 = 35.5$ cfs

$Q_{max} = 49.9$ cfs

Street Flow OK
(Use 0.3' WalkG

7. Check Street Flow Approaching Nodes 102-101 (N)

Q_{100}: Nodes 105 21.7 cfs

104 13.8

102 50% x 6.4 = 3.2

101 70% x 3.9 = 2.7

41.4 cfs

$Q_{2\,(pipe)}$ = 12.6
104-101

$Q_{street} = Q_{100} - Q_2 = 41.4 - 12.6 = 28.8$ cfs

$Q_{max} = 49.9$

Street Flow OK
(Use 0.3' WlkGr
(Except Where 0.65 WkGr (W) Controls)

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Project Amarado 3rd.

Item Revised Drainage Plan

Size Outlet Pipe For Q_{100}

Q_{100} Σ Nodes 116-100 = 154.5

$Q_{overflow}$ Nodes 214-211 = 44.4
2.2
10.4
9.5
66.5 − 24.8 = 41.7
($Q_{2\ pipe}$ 211-210)

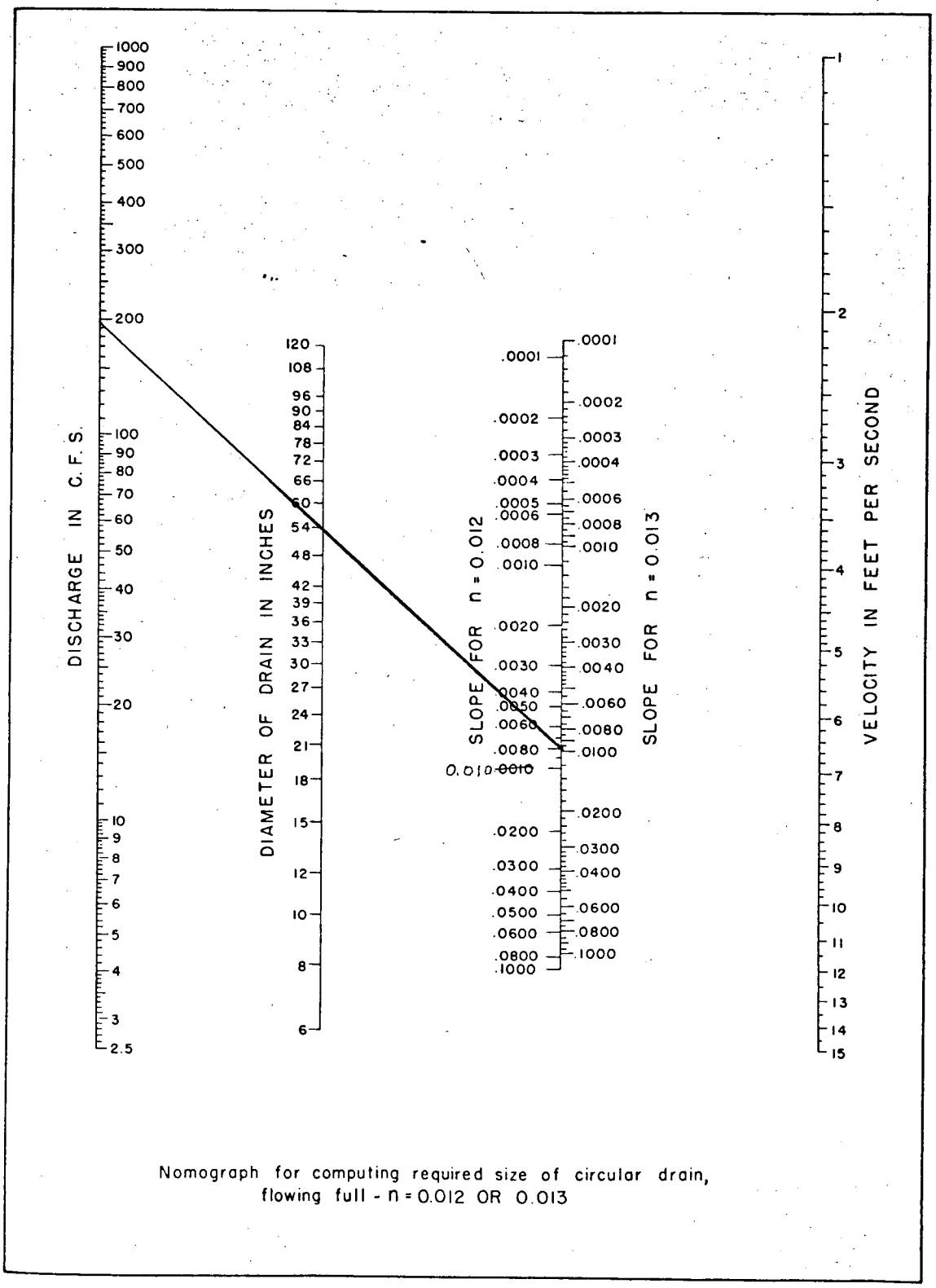
$Q_{100\ total}$ Approaching Nodes 101 & 102 = 154.5
+ 41.7
196.2 cfs

HGL @ Node 101 = 153.9 TC
0.65 Walk Grd
154.55

HGL @ Channel = 152.9

Hyd. Slope = $\frac{154.55 - 152.9}{170'}$ = 0.97 %

From Page 19, USE 54" RCP



Nomograph for computing required size of circular drain, flowing full - n = 0.012 OR 0.013

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Project Amarado 3rd

Item Revised Drainage Plan

CALC. LENGTH OF INLET NEEDED

Q_{100} approaching Nodes 101-102 = 196.2 cfs

Q_2 already in pipe = $Q_{pipe\ 103-101} + Q_{pipe\ 104-101} + Q_{pipe\ 102-101}$

= 38.5 + 12.6 + 2.2

= 53.3 cfs

$Q_{100\ street}$ = 196.2 - 53.3 = 142.9 cfs (N + W)

From Page 21, Q/L = 3.1 cfs/ft (capacity of inlet)

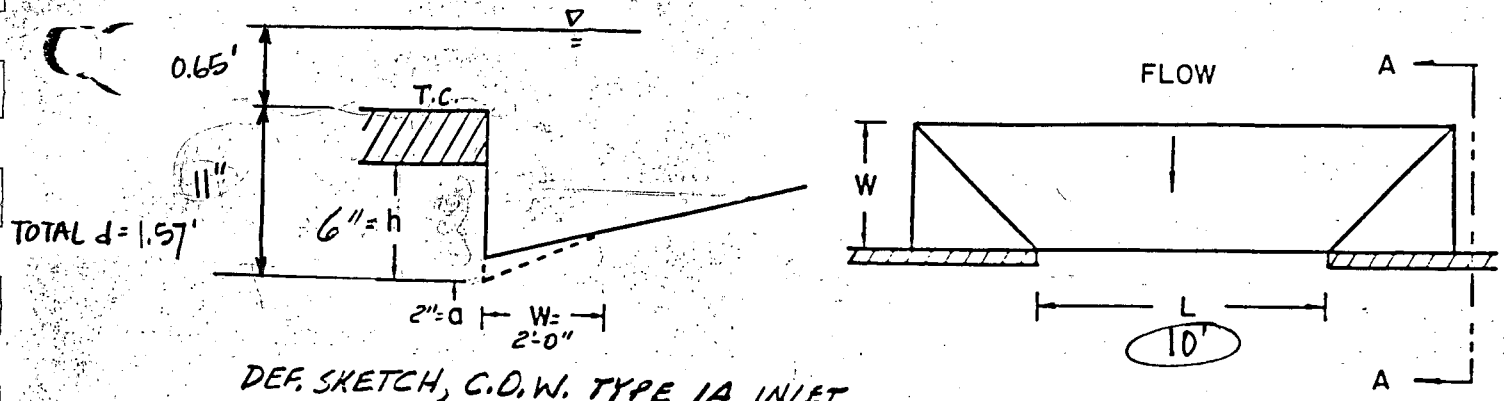
L = 142.9 cfs / 3.1 cfs/ft = 46.1' Inlet.

NOTE TO DESIGNER:

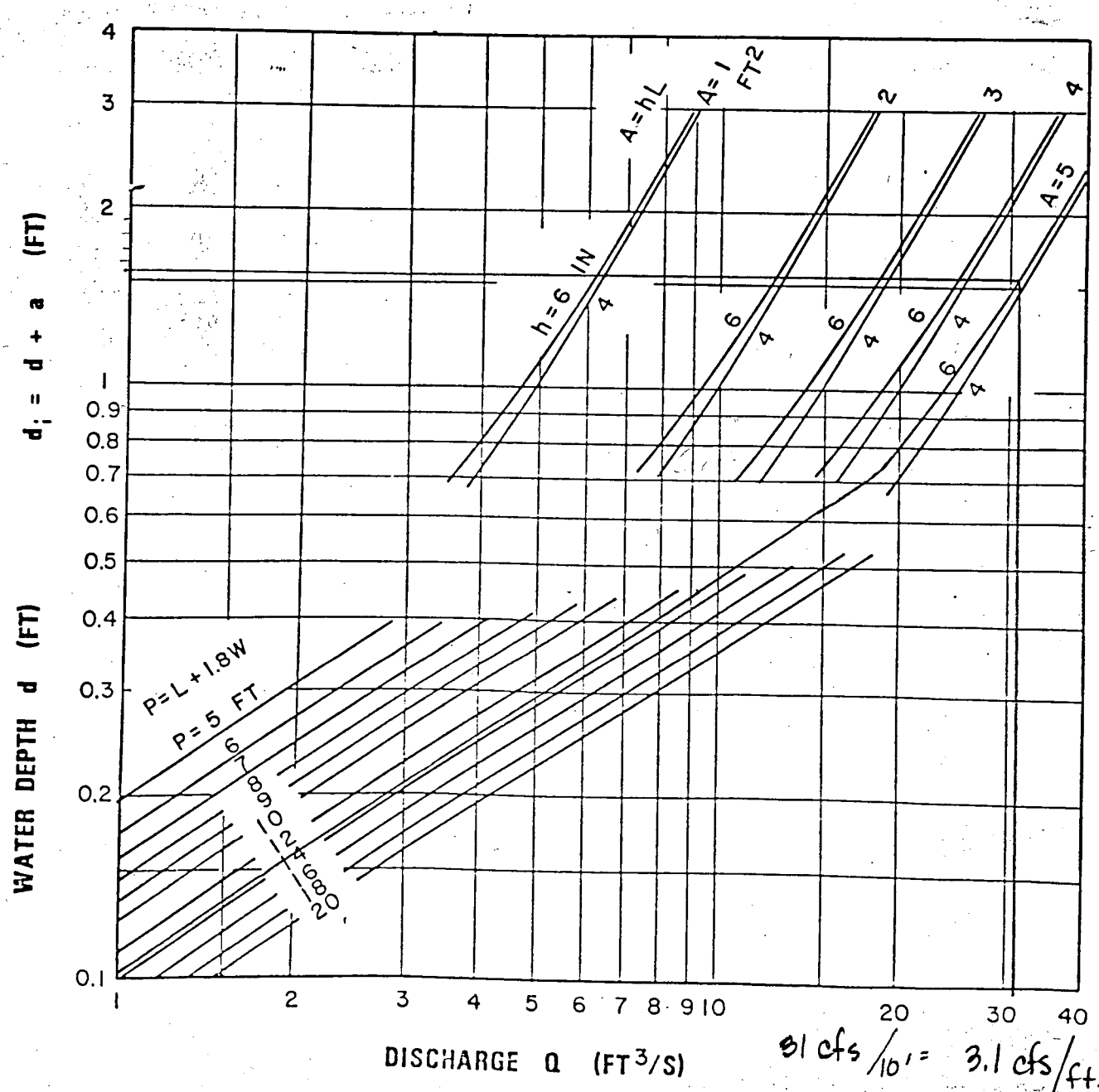
OPTION 1 46.1' inlet on SE side street w/ 54" outlet

OPTION 2 23'± inlet on each side street w/ 54" outlet pipe

± Approx 42" connecting Pipe



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



31 cfs / 10' = 3.1 cfs/ft.

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

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

```
100 j,  150.0400  100    3   18   17
110 t,stonegate estates
120 t,revised drainage calcs
130 t,storm water sewer system 100 analysis
140 i,  116     0.44     3.58     0.00     0.00     6.00    15.00   156.84
150 i,  115     0.44     5.28     0.00     0.00     8.90    15.00   156.84
160 i,  114     0.44     4.34     0.00     0.00     7.30    15.00   155.37
170 i,  113     0.44     1.84     0.00     0.00     3.10    15.00   155.37
180 i,  117     0.44     1.00     0.00     0.00     1.70    15.00   155.37
190 i,  112     0.44     0.23     0.00     0.00     0.30    15.00   155.37
200 i,  111     0.44     1.98     0.00     0.00     3.30    15.00   154.93
210 i,  110     0.44     0.76     0.00     0.00     1.30    15.00   155.08
220 i,  109     0.44     0.85     0.00     0.00     1.50    15.00   154.90
230 i,  108     0.48     1.57     0.00     0.00     2.90    15.00   154.47
240 i,  107     0.50     0.83     0.00     0.00     1.60    15.00   154.38
250 i,  106     0.44     0.83     0.00     0.00     1.40    15.00   154.32
260 i,  105     0.47     4.26     0.00     0.00     7.70    15.00   153.91
270 i,  104     0.47     2.71     0.00     0.00     4.90    15.00   153.91
280 i,  103     0.50     0.45     0.00     0.00     0.60    15.00   154.40
290 i,  102     0.50     1.15     0.00     0.00     2.20    15.00   153.90
300 i,  101     0.50     0.69     0.00     0.00     1.60    15.00   153.90
310 m,  100   150.04
320 p,  116  115    41.00   15 0.013 120.00   0.00
330 p,  115  113   280.60   27 0.013  20.00   0.00
340 p,  114  113    41.60   18 0.013  90.00   0.00
350 p,  117  112    42.30   15 0.013 100.00   0.00
360 p,  113  112   104.00   30 0.013  20.00   0.00
370 p,  112  109   303.90   36 0.013  10.00   0.00
380 p,  110  111    76.00   15 0.013 100.00   0.00
390 p,  111  109    44.60   18 0.013  80.00   0.00
400 p,  109  106   358.00   36 0.013   0.00   0.00
410 p,  108  107    76.00   15 0.013 110.00   0.00
420 p,  107  106    48.70   15 0.013 110.00   0.00
430 p,  106  103   214.80   36 0.013  45.00   0.00
440 p,  103  101   136.60   36 0.013  60.00   0.00
450 p,  102  101    44.30   42 0.013   0.00   0.00
460 p,  105  104    41.80   18 0.013  90.00   0.00
470 p,  104  101   309.80   24 0.013  70.00   0.00
480 p,  101  100   171.00   54 0.013   0.00   0.00
490 e
```

Date: 03-02-1988
Time: 15:42:48

Input File: rado100

stonegate estates
revised drainage calcs
storm water sewer system 100 analysis

Storm Frequency = 2-Year

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

Tributary Area									Hydrology Summation				Conduit Data				
Node	to Node	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)
116	115	0.44	3.58	0.00	0.0	15.00	4.06	6.00	15.00	4.06	6.00	6.00	15"	4.89	41.80	0.14	15.14
115	113	0.44	5.20	0.00	0.0	15.00	4.06	8.90	15.14	4.04	8.87	14.87	27"	3.74	280.60	1.25	16.39
114	113	0.44	4.34	0.00	0.0	15.00	4.06	7.30	15.00	4.06	7.30	7.30	18"	4.13	41.80	0.17	15.17
117	112	0.44	1.00	0.00	0.0	15.00	4.06	1.70	15.00	4.06	1.70	1.70	15"	1.39	42.30	0.51	15.51
113	112	0.44	1.84	0.00	0.0	15.00	4.06	3.10	16.39	3.92	2.99	24.94	30"	5.08	104.00	0.34	16.73
112	109	0.44	0.23	0.00	0.0	15.00	4.06	0.30	16.73	3.89	0.29	26.88	36"	3.80	303.90	1.33	18.07
110	111	0.44	0.76	0.00	0.0	15.00	4.06	1.30	15.00	4.06	1.30	1.30	15"	1.06	76.00	1.20	16.20
111	109	0.44	1.98	0.00	0.0	15.00	4.06	3.30	15.00	4.06	3.30	4.50	18"	2.55	44.60	0.29	15.29
109	106	0.44	0.85	0.00	0.0	15.00	4.06	1.50	18.07	3.77	1.40	32.50	36"	4.60	358.00	1.30	19.36
108	107	0.48	1.57	0.00	0.0	15.00	4.06	2.90	15.00	4.06	2.90	2.90	15"	2.36	76.00	0.54	15.54
107	106	0.50	0.83	0.00	0.0	15.00	4.06	1.60	15.54	4.00	1.58	4.48	15"	3.65	48.70	0.22	15.76
106	103	0.44	0.83	0.00	0.0	15.00	4.06	1.40	19.36	3.67	1.27	37.90	36"	5.36	214.80	0.67	20.03
103	101	0.50	0.45	0.00	0.0	15.00	4.06	0.60	20.03	3.63	0.54	38.43	36"	5.44	136.60	0.42	20.45
102	101	0.50	1.15	0.00	0.0	15.00	4.06	2.20	15.00	4.06	2.20	2.20	42"	0.23	44.30	3.23	18.23
105	104	0.47	4.26	0.00	0.0	15.00	4.06	7.70	15.00	4.06	7.70	7.70	18"	4.36	41.80	0.16	15.16
104	101	0.47	2.71	0.00	0.0	15.00	4.06	4.90	15.16	4.04	4.88	12.58	24"	4.00	309.80	1.29	16.45
101	100	0.50	0.69	0.00	0.0	15.00	4.06	1.60	20.45	3.60	1.42	53.51	54"	3.36	171.00	0.85	21.30

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stonegate estates
revised drainage calcs
storm water sewer system 100 analysis

Storm Frequency = 2-Year

* * * HYDRAULICS * * *

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)
116	0.00863	0.3606	0.0000	0.0000	0.0000	0.0000	0.0000	0.3606	155.9254	156.8400	0.91
115	0.00230	0.6466	0.0000	0.0308	0.0000	0.2621	0.3414	1.2809	155.5648	156.8400	1.28
114	0.00483	0.2019	0.0000	0.0000	0.0000	0.0000	0.0000	0.2019	154.4858	155.3700	0.88
113	0.00370	0.3846	0.0000	0.0184	0.0000	0.0179	0.5134	0.9343	154.2839	155.3700	1.09
117	0.00069	0.0293	0.0000	0.0000	0.0000	0.0000	0.0000	0.0293	153.3789	155.3700	1.99
112	0.00162	0.4936	0.0000	0.0353	0.0000	0.0330	-0.1119	0.4500	153.3496	155.3700	2.02
111	0.00184	0.0820	0.0000	0.0083	0.0000	0.0099	0.2156	0.3158	153.2155	154.9300	1.71
110	0.00040	0.0308	0.0000	0.0000	0.0000	0.0000	0.0000	0.0308	153.2462	155.0800	1.83
109	0.00237	0.8499	0.0000	0.0104	0.0000	0.0080	0.2089	1.0771	152.8997	154.9000	2.00
108	0.00202	0.1532	0.0000	0.0000	0.0000	0.0000	0.0000	0.1532	152.5346	154.4700	1.94
107	0.00481	0.2340	0.0000	0.0120	0.0000	0.0552	0.2576	0.5589	152.3814	154.3800	2.00
106	0.00323	0.6934	0.0000	0.0118	0.0000	0.0000	0.2753	0.9806	151.8226	154.3200	2.50
105	0.00537	0.2246	0.0000	0.0000	0.0000	0.0000	0.0000	0.2246	151.8217	153.9100	2.09
104	0.00309	0.9580	0.0000	0.0092	0.0000	0.1474	0.2344	1.3490	151.5971	153.9100	2.31
103	0.00332	0.4536	0.0000	0.0013	0.0000	0.0971	0.0419	0.5938	150.8420	154.4000	3.56
102	0.00000	0.0002	0.0000	0.0000	0.0000	0.0000	0.0000	0.0002	150.2484	153.9000	3.65
101	0.00074	0.1266	0.0000	0.0567	0.0000	0.1411	-0.1162	0.2081	150.2481*	153.9000	3.65
100	0.00000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	150.0400*	150.0400	0.00

* Starting HGL set @ 150.04 so that resulting HGL @ Node 101 = soffit of pipe = ± 147.42
2.83 (34" pipe)
150.25