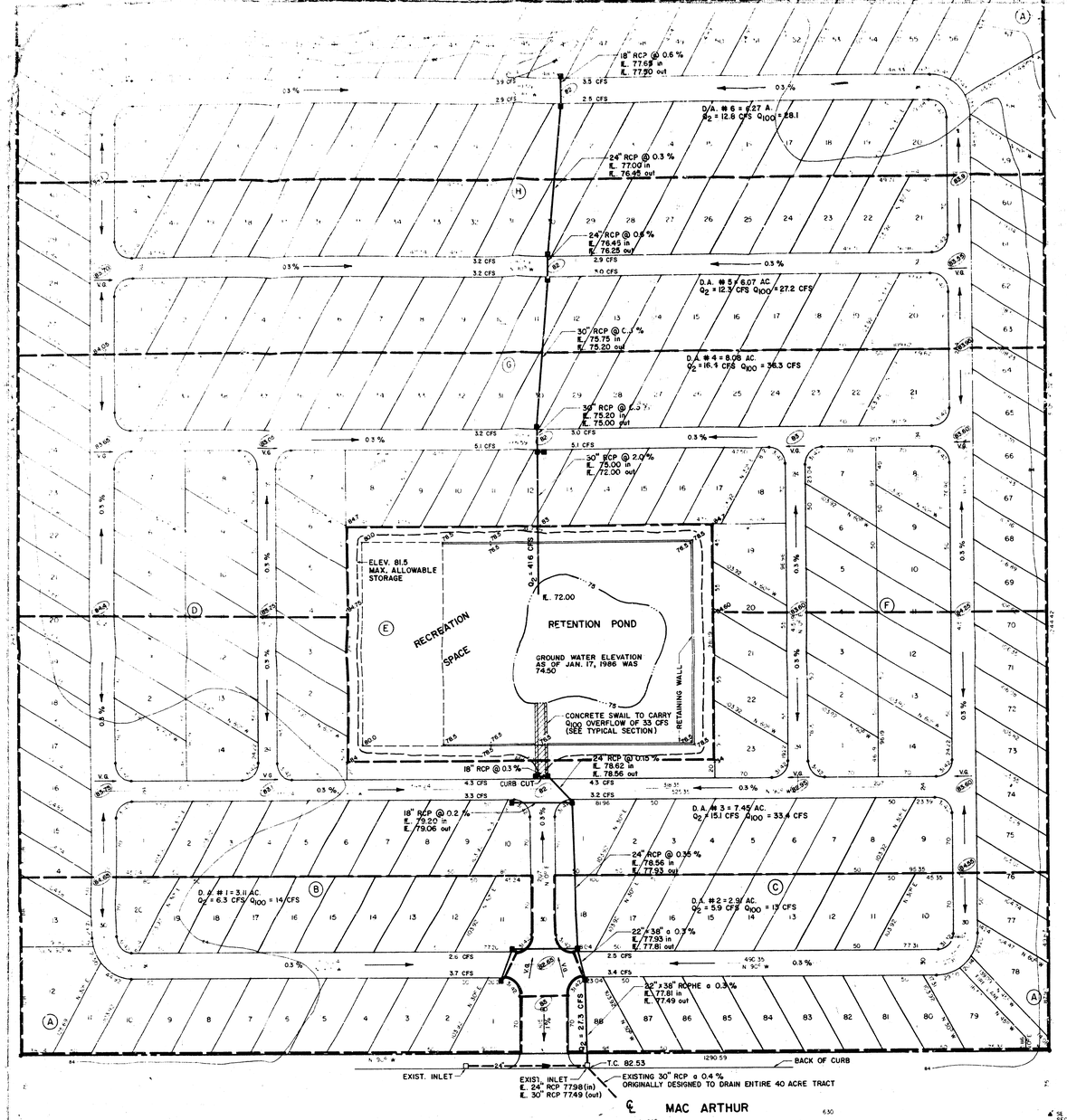
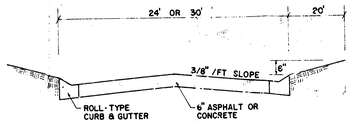


NOTES

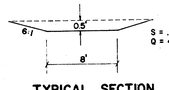
ALL CURBS ARE ROLL-TYPE.

SEE ACCOMPANYING DRAINAGE CALCULATIONS FOR FURTHER DETAIL.

BM : CHISLED "□" NORTHWEST CORNER CONCRETE BASE SIGNAL LIGHT CENTER MEDIAN, CORNER MAC ARTHUR & W. LINE HYDRAULIC.
ELEV. 87.17, CITY DATUM.



TYPICAL STREET X-SECTION
N.T.S.



TYPICAL SECTION
CONCRETE DRAINAGE SWALE
N.T.S.

PRELIMINARY DRAINAGE CONCEPT PLAN

LAMPLIGHTER MOBILE HOME PARK

WICHITA, SEDGWICK COUNTY, KANSAS

SCALE : 1" = 60'

REISS & GOODNESS ENGINEERS
2160 WEST 21ST STREET
WICHITA, KANSAS 67204
(316) 832 0283

Lt. SIDE FROM West ORIGINAL DESIGN CALCULATIONS

Inlet or Pipe No.	Location	Area (Acres)	Runoff Ratio	Equivalent Area (Ac.)	Accumulated Area	Time of concentration	T	I	Q	Sewer Size	Length	HW Rise	Hydraulic Grade Rise	Slope	Velocity	Time	F.L. Elev. Up	Dn
FROM KL	1435+00	.86	.37	.32	.32	7.5	5.3	2.1	.5	84'								
STUB PIPE	1435+47	3.2	.2	.64	.96	17.0				18"								
INLET	1435+47	.3	.95	.27	1.23	22.0	3.5	5.5		18"	184		0.26%	3.3 / 1.17	5.8	.93		
STUB PIPE	1437+35	3.2	.2	.64	1.87	22.7				8"								
INLET	1437+35	.2	.95	.19	2.06	22.7	3.4	8.8		18"	38'		0.40%	5.0 / 2.00	3.8	.13		
INLET	1440+58	.3	.95	.27	2.3	8.4	5.1	11.9		15"			1.0%					
STUB PIPE	1443+10	19.5	.15	2.92	2.92	24	2.3	20.8		30"	520'		.20%	11.5 / 2.70	2.2	4.9		
INLET	1443+80	.3	.95	.27	3.19	25	2.2	20.7		30"	40'		.20%	11.4 / 2.60	2.2	.17		
						26.1												
INLET	1447+70	.4	.95	.38	3.57	9.0	5.0	2.4		15"			1.0%	2.4 / 2.6	1.9			
600 Howe Park		20	.20	4.0	4.0	66	2.5	13										
INLET	1450+00	.23	.25	.22	4.22	66	2.5	13.2		24"	193'		.30%	8.3 / 2.8	3.4	.60		
Mobile Home Park		20	.20	4.0	8.22	66.6	2.5											
STREET FLOW	Post.	.71	.37	.26	8.48													
					8.48	66.6	2.5	26.5		30"			.10% / 1.17%	5.7	28.1			
INLET	1451+62																	

PLOTTING COEFFICIENTS FOR HYDROGRAPH

Ordinate Plotting Value = 1 Unit of Flow X	Unit of Flow Coefficient	Unit of Time Coefficient	X 1 Unit of Time =	Abcissa Plotting Value
0	0	0	0	0
.04	0.03	0.15	0.15	.15
.09	0.07	0.35		.35
.16	0.12	0.60		.60
.25	0.19	0.95		.95
.36	0.27	1.35		1.35
.49	0.37	1.85		1.85
.64	0.48	2.40		2.40
.81	0.61	3.05		3.05
1.00	0.75	3.75		3.75
1.21	0.91	4.55		4.55
1.44	1.08	5.40		5.40
1.69	1.27	6.35		6.35
1.96	1.47	7.35		7.35
2.25	1.69	8.45		8.45
2.56	1.92	9.60		9.60
2.89	2.17	10.85		10.85
3.24	2.43	12.15		12.15
3.61	2.71	13.55		13.55
4.00	3.00	15.00		15.00
4.41	3.31	16.55		16.55
4.84	3.63	18.15		18.15
5.29	3.97	19.85		19.85
5.76	4.32	21.60		21.60
6.25	4.69	23.45		23.45
6.76	5.07	25.35		25.35
7.29	5.47	27.35		27.35
7.84	5.88	29.40		29.40
8.41	6.31	31.55		31.55
9.00	6.75	33.75		33.75
9.61	7.21	36.05		36.05
10.24	7.68	38.40		38.40
10.89	8.17	40.85		40.85
11.56	8.67	43.35		43.35
12.25	9.19	45.95		45.95
12.96	9.72	48.60		48.60
13.69	10.27	51.35		51.35
14.44	10.83	54.15		54.15
15.21	11.41	57.05		57.05
16.00	12.00	60.00		60.00
16.81	12.61	63.05		63.05
17.64	13.23	66.15		66.15
18.49	13.87	69.35		69.35
19.36	14.52	72.60		72.60
20.25	15.19	75.95		75.95
21.16	15.87	79.35		79.35
22.09	16.57	82.85		82.85
23.04	17.28	86.40		86.40
24.01	18.01	90.05		90.05
25.00	18.75	93.75		93.75
26.01	19.51	97.55		97.55
27.04	20.28	101.40		101.40
28.09	21.07	105.35		105.35
29.16	21.87	109.35		109.35
30.25	22.69	113.45		113.45
31.36	23.52	117.60		117.60
32.49	24.37	121.85		121.85
33.64	25.23	126.15		126.15
34.81	26.11	130.55		130.55
36.00	27.00	135.00		135.00
37.21	27.91	139.55		139.55
38.44	28.83	144.15		144.15
39.69	29.77	148.85		148.85
40.96	30.72	153.60		153.60
42.25	31.69	158.45		158.45
43.56	32.67	163.35		163.35
44.89	33.67	168.35		168.35
46.24	34.68	173.40		173.40
47.61	35.71	178.55		178.55
49.00	36.75	183.75		183.75
50.41	37.81	189.05		189.05
51.84	38.88	194.40		194.40
53.29	39.97	199.85		199.85
54.76	41.07	205.35		205.35
56.25	42.19	210.95		210.95
57.76	43.32	216.60		216.60
59.29	44.47	222.35		222.35
60.84	45.63	228.15		228.15
62.41	46.81	234.05		234.05
64.00	48.00	240.00		240.00
65.61	49.21	246.05		246.05
67.24	50.43	252.15		252.15
68.89	51.67	258.35		258.35
70.56	52.92	264.60		264.60
72.25	54.19	270.95		270.95
73.96	55.47	277.35		277.35
75.69	56.77	283.85		283.85
77.44	58.08	290.40		290.40
79.21	59.41	297.05		297.05
81.00	60.75	303.75		303.75
82.81	62.11	310.55		310.55
84.64	63.48	317.40		317.40
86.49	64.87	324.35		324.35
88.36	66.27	331.35		331.35
90.25	67.69	338.45		338.45
92.16	69.12	345.60		345.60
94.09	70.57	352.85		352.85
96.04	72.03	360.15		360.15
98.01	73.51	367.55		367.55
100.00	75.00	375.00		375.00
102.01	76.51	382.55		382.55
104.04	78.03	390.15		390.15
106.09	79.57	397.85		397.85
108.16	81.12	405.60		405.60
110.25	82.69	413.45		413.45
112.36	84.27	421.35		421.35
114.49	85.87	429.35		429.35
116.64	87.48	437.40		437.40
118.81	89.11	445.55		445.55
121.00	90.75	453.75		453.75
123.21	92.41	462.05		462.05
125.44	94.08	470.40		470.40
127.69	95.77	478.85		478.85
129.96	97.47	487.35		487.35
132.25	99.19	495.95		495.95
134.56	100.92	504.60		504.60
136.89	102.67	513.35		513.35
139.24	104.43	522.15		522.15
141.61	106.21	531.05		531.05
144.00	108.00	540.00		540.00
146.41	109.81	549.05		549.05
148.84	111.63	558.15		558.15
151.29	113.47	567.35		567.35
153.76	115.32	576.60		576.60
156.25	117.19	585.95		585.95
158.76	119.07	595.35		595.35
161.29	120.97	604.85		604.85
163.84	122.88	614.40		614.40
166.41	124.81	624.05		624.05
169.00	126.75	633.75		633.75
171.61	128.71	643.55		643.55
174.24	130.68	653.40		653.40
176.89	132.67	663.35		663.35
179.56	134.67	673.35		673.35
182.25	136.69	683.45		683.45
184.96	138.72	693.60		693.60
187.69	140.77	703.85		703.85
190.44	142.83	714.15		714.15
193.21	144.91	724.55		724.55
196.00	147.00	735.00		735.00

Step 1 - Determine Peak Discharge "Qp" in cfs.
Step 2 - Determine Volume of Runoff "Q" in acre-feet.
Step 3 - Divide "Q" by 1,1965 (Number of units under hydrograph) to determine value of 1 "square unit".
Step 4 - Divide "Qp" by 60 to determine value of 1 unit of flow
Step 5 - Multiply value of 1 "square unit" by 12 and divide by value [illegible]

DRAINAGE CALCULATIONS

LAMPLIGHTER MOBILE HOME PARK

The proposed Lamplighter Mobile Home Park is situated on a forty (40) acre tract, one-half (1/2) mile east of Hydraulic on the north side of MacArthur. The original drainage concept for the site was designed by Delameter, Freund & Scherer in the mid 70's as part of a MacArthur Road improvement project. The design called for the entire tract to be drained by a single thirty inch (30") R.C.P., layed at 0.4%. The inlets that pick up the drainage are located in a sump condition near the center of the lot frontage. Currently the lot is basicly flat and sheet drains slowly to MacArthur or stands until it percolates into the soil. The new design concept, as proposed for the mobile home park development, diverts street drainage from going into MacArthur Road. It is picked up by storm sewer. Only the south half of the property can be directed into the storm sewer without exceeding capacity. Original design calculations place the design flow at 26.5 cfs, with a capacity of 28.1 cfs. The new design aims to keep this range of flow during a two (2) year storm. Once capacity is reached, the remainder of the storm flow will get to a holding pond through an overflow swale. The holding pond is to be excavated to expose the water table. The north half of the property is drained totally to the holding pond.

Drainage and storage calculations follow. It should be noted that the calculations do not take into account the natural infiltration of incoming storm waters into the holding pond, thus the calculations are relatively conservative.

Drainage Area: 36.98 Acres
Soil: Ca = Canadian Fine Sandy Loam, Soil Type B
Runoff Curve Number (CN): 85 (Based on S.C.S. Technical Release No. 55, pp. 2 - 5)

Design Storm: 100 Year (6"/6 Hr)
Runoff: 4.31 inches (Pp. 2 - 3)

Total Runoff: $\frac{4.31}{12}$ x 36.98 Ac. = 12,460 cf/Ac. = 578,563 cf.

From the hydrograph provided, determine how much storage is required from that south portion of the property drained by the storm sewer.

Drainage Area: 13.57 Acre
Runoff: 212,306 cf.
Storage Required: 58,531 cf.
Runoff Discharged: 153,775 cf.

Total Storage Required: 578,563 cf
-153,775 cf
424,788 cf

Available Storage to Elevation 81.50 = 501,300 cf.

REISS & GOODNESS ENGINEERS
2160 WEST 21ST STREET WICHITA, KANSAS 67204 (316) 832 0283

January 23, 1986

Carl Gibson
Dept. of Engineering
City Hall - 7th Floor
455 N. Main
Wichita, Kansas 67202

RE: Lamplighter Mobile Home Park

Dear Carl:

Please find enclosed the required drainage plan and accompanying drainage calculations for Lamplighter Mobile Home Park.

If you have any questions, please feel free to call.

Respectfully submitted,

REISS & GOODNESS ENGINEERS

Bob Previtera

Bob Previtera, L.A.

BP/cr
enc.

Table 2-2.--Runoff curve numbers for selected agricultural, suburban, and urban land use. (Antecedent moisture condition II, and $I_a = 0.2S$)

LAND USE DESCRIPTION		HYDROLOGIC SOIL GROUP A	B	C	D
Cultivated land[1/]: without conservation treatment		72	81	88	91
: with conservation treatment		62	71	78	81
Pasture or range land: poor condition		68	79	86	89
: good condition		39	61	74	80
Meadow: good condition		30	58	71	78
Woods or Forest land: thin stand, poor cover, no mulch		45	66	77	83
: good cover[2/]		25	55	70	77
Open Spaces, lawns, parks, golf courses, cemeteries, etc. good condition: grass cover on 75% or more of the area		39	61	74	80
fair condition: grass cover on 50% to 75% of the area		49	69	79	84
Commercial and business areas (85% impervious)		89	92	94	95
Industrial districts (72% impervious).		81	88	91	93
Residential:[3/]	Average % impervious[3/]				
Average lot size					
1/8 acre or less	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
Paved parking lots, roofs, driveways, etc.[3/]		98	98	98	98
Streets and roads:					
paved with curbs and storm sewers[3/]		98	98	98	98
gravel		76	85	89	91
dirt		72	82	87	89

1/ For a more detailed description of agricultural land use curve numbers refer to National Engineering Handbook, Section 4, Hydrology, Chapter 9, Aug. 1972.

2/ Good cover is protected from grazing and litter and brush cover soil.

3/ Curve numbers are computed assuming the runoff from the house and driveway is directed towards the street with a minimal of rod water directed to lawns where additional infiltration could occur.

Thus

$$P_e = P - I_a, \quad P - 0.2S \qquad \text{(Eq. 2-4)}$$

where P is the total storm rainfall in inches. Substituting equation 2-4 in equation 2-2,

$$Q = \frac{(P - 0.2S)^2}{P + 0.8S} \qquad \text{(Eq. 2-5)}$$

Potential abstraction S is related to the soil and cover conditions of a watershed. The runoff curve number, which is also related to soil and cover conditions, is related to potential abstraction S by

$$CN = \frac{1000}{S + 10} \qquad \text{(Eq. 2-6)}$$

from which

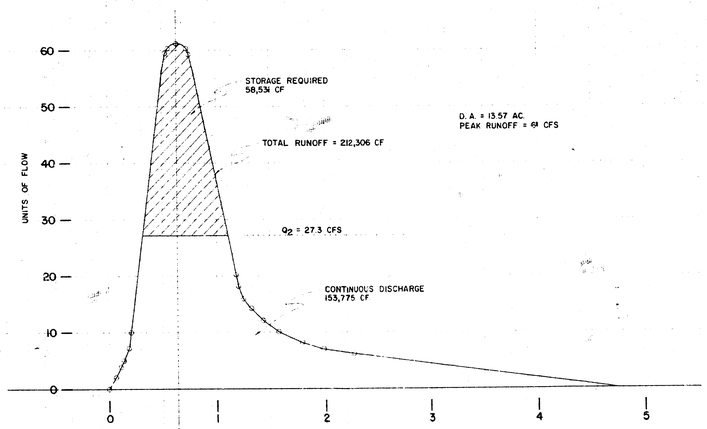
$$S = \frac{1000}{CN} - 10 \qquad \text{(Eq. 2-7)}$$

The solution to equation 2-5 is shown in table 2-1 for a range of CN's and total rainfall amounts.

Table 2-1.--Runoff depth in inches for selected CN's and rainfall amounts

Rainfall (inches)	Curve Number (CN)[1/] 60	65	70	75	80	85	90	95	98
1.0	0	0	0	0.03	0.08	0.17	0.32	.56	.79
1.2	0	0	0.03	0.07	0.15	0.28	0.46	.74	.99
1.4	0	0.02	0.06	0.13	0.24	0.39	0.61	.92	1.18
1.6	0.01	0.05	0.11	0.20	0.34	0.52	0.76	1.11	1.38
1.8	0.03	0.09	0.17	0.29	0.44	0.65	0.93	1.29	1.58
2.0	0.06	0.14	0.24	0.38	0.56	0.80	1.09	1.48	1.77
2.5	0.17	0.30	0.46	0.65	0.89	1.18	1.53	1.96	2.27
3.0	0.33	0.51	0.72	0.96	1.25	1.59	1.98	2.45	2.78
4.0	0.76	1.03	1.33	1.67	2.04	2.46	2.92	3.43	3.77
5.0	1.30	1.65	2.04	2.45	2.89	3.37	3.88	4.42	4.76
6.0	1.92	2.35	2.80	3.28	3.78	4.31	4.85	5.41	5.76
7.0	2.60	3.10	3.62	4.15	4.69	5.25	5.82	6.41	6.76
8.0	3.33	3.90	4.47	5.04	5.62	6.21	6.81	7.40	7.76
9.0	4.10	4.72	5.34	5.95	6.57	7.19	7.79	8.40	8.76
10.0	4.90	5.57	6.23	6.88	7.52	8.16	8.78	9.40	9.76
11.0	5.72	6.44	7.13	7.82	8.48	9.14	9.77	10.39	10.76
12.0	6.56	7.32	8.05	8.76	9.45	10.12	10.76	11.39	11.76

1/ For choice runoff depths for CN's and other rainfall amounts not



UNIT HYDROGRAPH - BASED ON THE COMMON'S MEDTHOD
(FOR THE SOUTH HALF OF PROPERTY)

REISS & GOODNESS ENGINEERS
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