3-25-91

COTTAGE GARDENS

DRAINAGE ON S. SIDE OF PAULINE

LOTS 24, 25 BLK 3 D.A. = 6.9 AC

OVERLAND FLOW S = 0.7% 150' @ .23 fps = 10.9 MIN

DITCH FLOW 910' @ 2 fps AVERAGE = 7.6 MIN

TC = 18.5 MIN.

4.4 AC	LC	C = .80	3.52
2.5 AC	RESID.	C = .73	1.83
			5.35

COMPOSITE C = 0.77

Q_5 = 6.9 x 0.77 x 4.15 = 22.0 cfs

Q_{100} = 6.9 x 0.77 x 6.76 = 35.9 cfs

STREET GRADE FROM WEBSTER TO LAUREL = 2%

41' B.B = 0.47' DEEP @ 22 cfs SPREAD 15' O.K.

41' B.B. = 0.7' DEEP @ 41 cfs O.K.

ADD 3.8 AC AT LAUREL

DA = 10.7 AC 160' DITCH FLOW @ 2 fps = 1.3 MIN.

1.3 + 18.5 = 19.8 USE 20 MIN TC

3.9 Ac Resid. Lots C = .73 = 2.85

5.35

8.20 ÷ 10.7

C = 0.77

Q_5 = 10.7 x 0.77 x 4.00 = 32.9 cfs

Q_{100} = 10.7 x 0.77 x 6.53 = 53.8 cfs

Street Grade 2% 41' BB

5 yr Capacity 0.5' deep @ 26 cfs spread 16'
100 yr Capacity 0.78' deep* @ 54 cfs O.K.
* Depth from F.L. Gutter

Need Storm Sewer for 7.9 cfs

Add 2.9 Ac and 2.3 Ac @ Cooper

DA = 15.9 Ac 380' Ditch Flow @ 2fps = 2.6 min

19.6 + 2.6 = 22.2 use 22.5 min Tc

5.2 Ac Resi. Lots C = 0.73 3.80

8.20

$Q_5 = 15.9 \times 0.75 \times 3.77 = 45.0$ cfs

$Q_{100} = 15.9 \times 0.75 \times 6.20 = 73.9$ cfs ON PAWNEE

STREET GRADE 2% 41' BB

5 YR CAPACITY 25 cfs NEED 20 cfs CAPACITY IN STORM SEWER

100 YR STREET FLOW 0.9' DEEP FROM GUTTER F.L. O
ON PAWNEE

DA = 6.7 AC FROM BLOCK 1-4-7-8

$Q_5 = 6.7 \times 0.60 \times 4.56 = 18.3$ cfs

$Q_{100} = 6.7 \times 0.73 \times 7.37 = 36.0$ cfs

36.0 - 18.3 IN STORM SEWER = 17.7 cfs IN STREET

Q_{100} @ 1.3% GT. GRADE = 0.45' DEEP @ GUTTER F.L. O.K
8.9 cfs/SIDE

DA = 5.4 AC FROM BLOCK 5

$Q_5 = 5.4 \times 0.6 \times 4.56 = 14.8$ cfs

$Q_{100} = 5.4 \times 0.73 \times 7.37 = 29.1$ cfs

29.1 - 14.8 IN STORM SEWER = 14.3 cfs IN STREET

Q_{100} = 7.2 cfs / SIDE IN STREET @ 1.3% = 0.4' DEEP
O.K.

DA = 5.4 Ac. + 2.3 Ac + 3.4 Ac TO COOPER

Δ DA = 11.1 AC

95' OVERLAND FLOW @ 0.2 fps = 7.9 MIN

1800' STREET FLOW @ 2 fps = 15 MIN

22.9 MIN USE TC = 23 MIN.

Q_{100} = 11.1 x 0.73 x 6.13 = 49.7 cfs

49.7 - 23.8 IN STORM SEWER = 25.9 cfs IN COOPER FROM CYPRESS TO PALMETTO

STREET CAPACITY 0.58' DEPTH @ FL O.K.

DA = 3.4 AC ON BEECH

Q_{100} = 3.4 x 0.73 x 7.37 = 18.3 cfs

ASSUME 4 cfs ON CARSON

14.3 cfs IN BEECH @ 0.4% = 0.47' DEEP *

* FROM E.L.

DA 3.8 Ac TO LAUREL

$Q_{100} = 3.8 \times 0.73 \times 7.37 = 20.4$ cfs

0.57' DEEP @ 10.2 cfs / SIDE *
STREET GRADE @ 0.32%

GRADE @ R/W MUST BE 0.3' ABOVE T.C.

2-4-91

RATIONAL METHOD

D.A. = 64.3 Ac

OVERLAND FLOW 80' @ 1% @ 0.28 fps = 4.8 MIN

STREET FLOW 1770' @ 2 fps AVERAGE = 14.8 MIN

19.55 MIN

USE T_C = 20 MIN.

SOIL GROUP		C	%	
C-D	LIGHT COMM	.80	5.3	4.24
C	RESIDENTIAL LOTS	.73	35.2	25.70
D	"	.79	20.6	16.27
C	OPEN SPACE	.53	1.8	0.95
D	"	.65	1.4	0.91
			64.3	48.07

$$C = \frac{48.07}{64.3} = 0.75$$

$i_{100} = 6.53$

$Q_{100} = 64.3 \times 0.75 \times 6.53 = 315$ cfs

URBAN HYDROLOGY FOR SMALL WATERSHEDS (TR-55)
PEAK DISCHARGE WORKSHEET
FOR CHAPTER 4 (APPENDICES D & E)

Project COTTAGE GARDENS By K. HILL Date 2-4-91

Checked _____ Date _____

Steps Peak Discharge Computations for up to 3 Storms: Type II, Duration ~~24~~ 6 hours.

1. Data: Watershed Condition = _____ (present or future).

Drainage Area (DA) = 64.3 acres. Ave. Watershed Slope (S) = 1.5 %.

2. Runoff Curve Number (CN)

Hydrologic Soil Group (Appendix B)	Land Use Description Include Treatment, Practice & Condition (Table 2-2)	CN (Table 2-2) (3)	% or Area (acres) (4)	Product (3)x(4) (5)
C	LIGHT COMMERCIAL	94	3.2	300
D	" "	95	2.1	200
C	RESIDENTIAL 1/4 & 1/8 ACRE LOTS	83-90	35.2	3045
D	" "	92-87	20.6	1844
C	OPEN SPACE	74	1.8	133
D	"	40	1.4	112
		Totals =	64.3	5634

CN (weighted) = $\frac{\text{total col. (5)}}{\text{total col. (4)}}$ $\left[\frac{5634}{64.3}\right]$ = 87.6 ; use CN = 88

3. Rainfall Frequency (F)

Rainfall Depth (P)

1st Storm	2nd Storm	3rd Storm	
2 YR	25 YR	100 YR	yrs.
2.5	4.6	5.9	inches

4. Runoff Depth (Q)
Use P, CN, and Table 2-1.

1.39	3.30	4.54	inches

5. Basic Peak Discharge (q)
Use S, DA, CN, and Figure D-2.
For graph labeled: (check one)
☑ Flat (S = less than 3%)
☐ Moderate (S = 3% to 7.9%)
☐ Steep (S = 8% & greater)

x 36.0 cfs/inch of Q

*6. Watershed Slope Factor
Use S, DA, and Table E-1.

x 1.15

7. Peak Discharge (q_p)
where q_p = Steps #4 x 5 x 6

58	137	188	cfs

See Steps 8 to 13 for adjustments that may be applicable.

TR-55, CHAPTER 4 (APPENDICES D & E), PEAK DISCHARGE WORKSHEET (CONT.)

Steps Peak Discharge Computations with Adjustments

8. Data: Obtain if Adjustments are Applicable

Ponding and Swampy areas (PND) = 1.6 acres, 2.5 % of DA
Impervious Area (IMP) = _____ acres, 92 % of DA
Total Hydraulic Length (HL) = 1800 feet
Hydraulic Length Modified (HLM) = 1320 feet, 72 % of HL

	1st Storm	2nd Storm	3rd Storm	
Rainfall Frequency (F) from Step 3	2	25	100	yrs.
Peak Discharge (q_p) from Step 7	58	137	188	cfs
	X	X	X	
*9. Ponding and Swampy Area Peak Factor	.69	.75	.82	
	X	X	X	
*10. Watershed Shape Peak Factor	1.21	1.21	1.21	
	X	X	X	
*11. Impervious Area Peak Factor	1.19	1.19	1.19	
	X	X	X	
*12. Hydraulic Length Modified Peak Factor	1.30	1.30	1.30	
	=	=	=	
13. Adjusted Peak Discharge (q_p)	75	192	289	cfs

*9. Ponding and Swampy Area Peak Factor
Use % PND, F, and Tables E-2, 3 or 4.
Location in Watershed: (check one)
☑ at Design Point (E-2)
☐ Center or Spreadout (E-3)
☐ Upper Reaches (E-4)

*10. Watershed Shape Peak Factor
Use HL with Figure E-1 and read;
Equiv. Drainage Area (EDA) = 37 acres.

Use Figure D-2 graph from Step 5, CN, and EDA for;
Equiv. Peak/Inch Runoff (q_e) = 25 cfs/in.

$$\text{Factor} = \left[\frac{q_e}{q \text{ from Step 5}}\right] \times \left[\frac{DA}{EDA}\right]$$

$$\text{Factor} = \left[\frac{25}{36}\right] \times \left[\frac{64.3}{37}\right] =$$

*11. Impervious Area Peak Factor
Use % IMP, CN and Figure 4-1.

*12. Hydraulic Length Modified Peak Factor
Use % HLM, CN and Figure 4-2.

13. Adjusted Peak Discharge (q_p)
$q_p = q_p$ (from Step 7) x Steps #9 x 10 x 11 x 12

* If the adjustment is not applicable, enter a Factor of 1.0

URBAN HYDROLOGY FOR SMALL WATERSHEDS (TR-55)
PEAK DISCHARGE WORKSHEET
FOR CHAPTER 4 (APPENDICES D & E)

Project COTTAGE GARDENS By K. HILL Date 2-4-91

Checked _____ Date _____

Steps Peak Discharge Computations for up to 3 Storms: Type II, Duration 24 hours.

1. Data: Watershed Condition = _____ (present or future).

Drainage Area (DA) = 64.3 acres. Ave. Watershed Slope (S) = 1.5 %.

2. Runoff Curve Number (CN)

Hydrologic Soil Group (Appendix B)	Land Use Description Include Treatment, Practice & Condition (Table 2-2)	CN (Table 2-2) (3)	% or Area (acres) (4)	Product (3)x(4) (5)
C	LIGHT COMMERCIAL	94	3.2	300
D	"	95	2.1	200
C	RESIDENTIAL LOTS 1/3 & 1/4 AC	90-83	35.2	3045
D	" "	92-87	20.6	1844
C	OPEN SPACE	74	1.8	150
D	"	80	1.4	110
		Totals =	64.3	5649

La
Ta
La-Ce
Pd-Ta

CN (weighted) = $\frac{\text{total col. (5)}}{\text{total col. (4)}} \left[\frac{5649}{64.3}\right]$ = 87.8 ; use CN = 88

3. Rainfall Frequency (F)

Rainfall Depth (P)

1st Storm	2nd Storm	3rd Storm	
10	25	100	yrs.
5.4	6.3	8.0	inches

4. Runoff Depth (Q)
Use P, CN, and Table 2-1.

4.06	4.92	6.57	inches

5. Basic Peak Discharge (q)
Use S, DA, CN, and Figure D-2.
For graph labeled: (check one)
☑ Flat (S = less than 3%)
☐ Moderate (S = 3% to 7.9%)
☐ Steep (S = 8% & greater)

	x		
36.0			cfs/inch of Q

*6. Watershed Slope Factor
Use S, DA, and Table E-1.

	x		
1.15			

7. Peak Discharge (q_p)
where q_p = Steps #4 x 5 x 6

	=		
168	204	272	cfs

See Steps 8 to 13 for adjustments that may be applicable.

TR-55, CHAPTER 4 (APPENDICES D & E), PEAK DISCHARGE WORKSHEET (CONT.)

Steps Peak Discharge Computations with Adjustments

8. Data: Obtain if Adjustments are Applicable

Ponding and Swampy areas (PND) = 1.6 acres, 2.5 % of DA
Impervious Area (IMP) = _____ acres, 52 % of DA
Total Hydraulic Length (HL) = 1800 feet
Hydraulic Length Modified (HLM) = 1300 feet, 72 % of HL

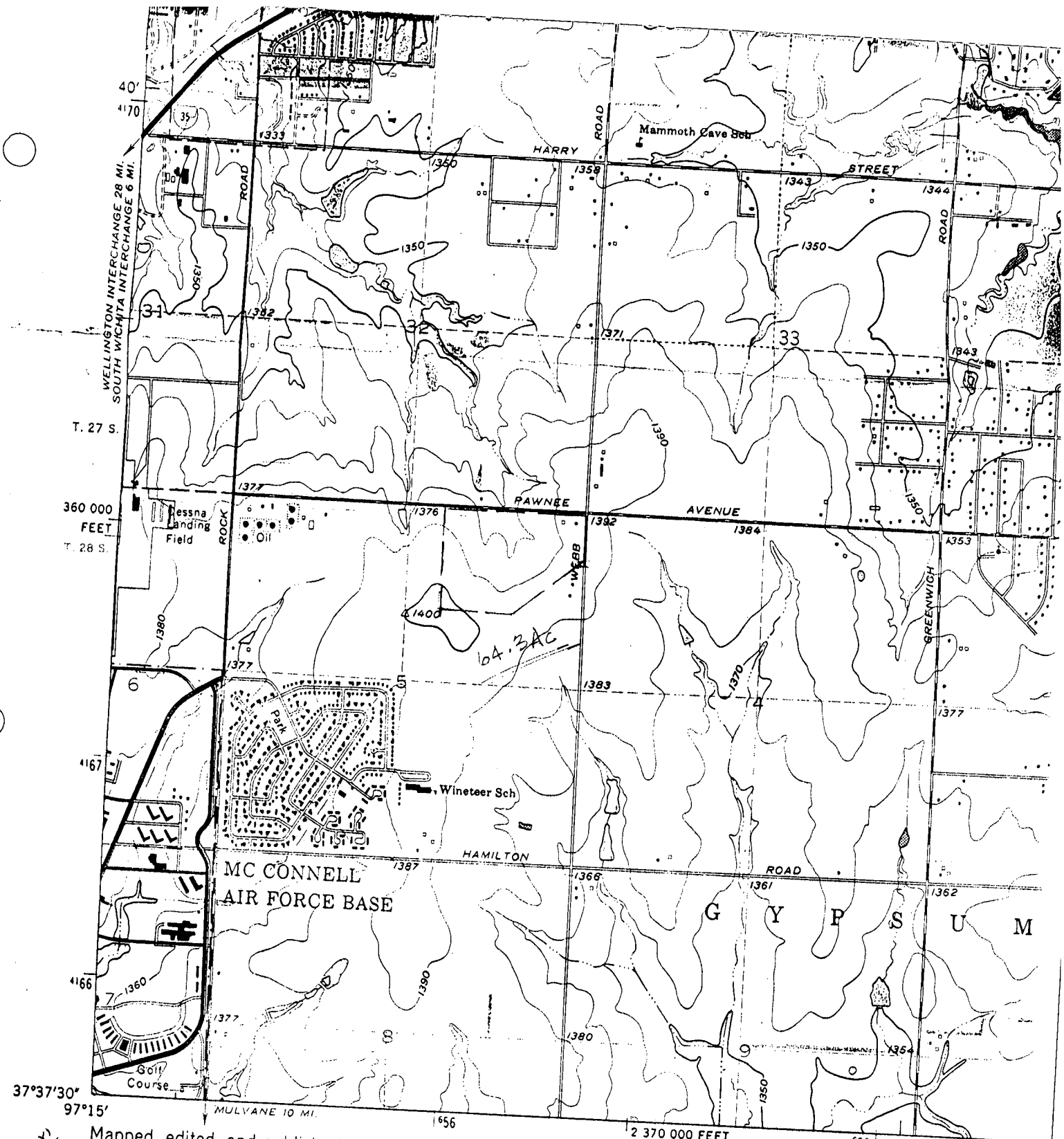
	1st Storm	2nd Storm	3rd Storm	
Rainfall Frequency (F) from Step 3	10	25	100	yrs.
Peak Discharge (q_p) from Step 7	168	204	272	cfs
	X	X	X	
*9. Ponding and Swampy Area Peak Factor (Use % PND, F, and Tables E-2, 3 or 4. Location in Watershed: ☑ at Design Point (E-2); ☐ Center or Spreadout (E-3); ☐ Upper Reaches (E-4))	.72	.75	.82	
	X	X	X	
*10. Watershed Shape Peak Factor (Use HL with Figure E-1 and read; Equiv. Drainage Area (EDA) = 37 acres.)	1.21	1.21	1.21	
	X	X	X	
*11. Impervious Area Peak Factor (Use % IMP, CN and Figure 4-1.)	1.19	1.19	1.19	
	X	X	X	
*12. Hydraulic Length Modified Peak Factor (Use % HLM, CN and Figure 4-2.)	1.30	1.30	1.30	
	=	=	=	
13. Adjusted Peak Discharge (q_p) q_p = q_p (from Step 7) x Steps #9 x 10 x 11 x 12	226	286	417	cfs

Use Figure D-2 graph from Step 5, CN, and EDA for;
Equiv. Peak/Inch Runoff (q_e) = 25 cfs/in.

$$\text{Factor} = \left[\frac{q_e}{q \text{ from Step 5}}\right] \times \left[\frac{DA}{EDA}\right]$$

$$\text{Factor} = \left[\frac{25}{36}\right] \times \left[\frac{64.3}{37}\right] =$$

* If the adjustment is not applicable, enter a Factor of 1.0



Mapped, edited, and published by the Geological Survey
in cooperation with State of Kansas agencies

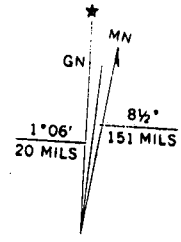
Control by USGS and USC&GS

Culture and drainage in part compiled from aerial photographs taken 1954-1955. Topography by planetable surveys 1941-1942
Revised 1961

Polyconic projection. 1927 North American datum
10,000-foot grid based on Kansas coordinate system, south zone
1000-meter Universal Transverse Mercator grid ticks, zone 14, shown in blue

Red tint indicates area in which only landmark buildings are shown

Fine red dashed lines indicate selected fence and field lines where generally visible on aerial photographs. This information is unchecked



UTM GRID AND 1970 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

FOR SALE BY
A FOR

PROJECT: COTTAGE GARDENS

DESIGNER K. HILL

DATE 2-5-91

HYDROLOGIC AND CHANNEL INFORMATION

Q_1 = ____

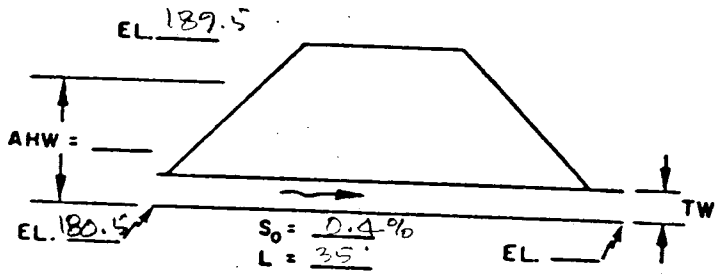
Q_2 = ____

TW_1 = ____

TW_2 = ____

SKETCH

STATION: ____



ALLOWABLE OUTLET VELOCITY = ____

CULVERT TYPE	Q	SIZE	HEADWATER COMPUTATION									CONTROLLING H.W.	OUTLET VELOCITY	COST	COMMENTS
			INLET CONT.		OUTLET CONTROL										
			HW/D	HW	K_e	d_c	$\frac{d_c+D}{2}$	h_o	H	LS_o	HW				
6'x5' RCBC	200		1.12	5.6	0.2	3.3	4.15	3.0	1.15	–	4.15	5.6			W.S. ELEV. 186.1
"	300		1.58	7.9	0.2	4.2	4.60	3.5	2.6	–	6.1	7.9			" 188.4
"	400		2.11	10.55	0.2	5.0	5.0	4.0	4.5	–	8.5	10.6			" 191.1

SUMMARY & RECOMMENDATIONS:

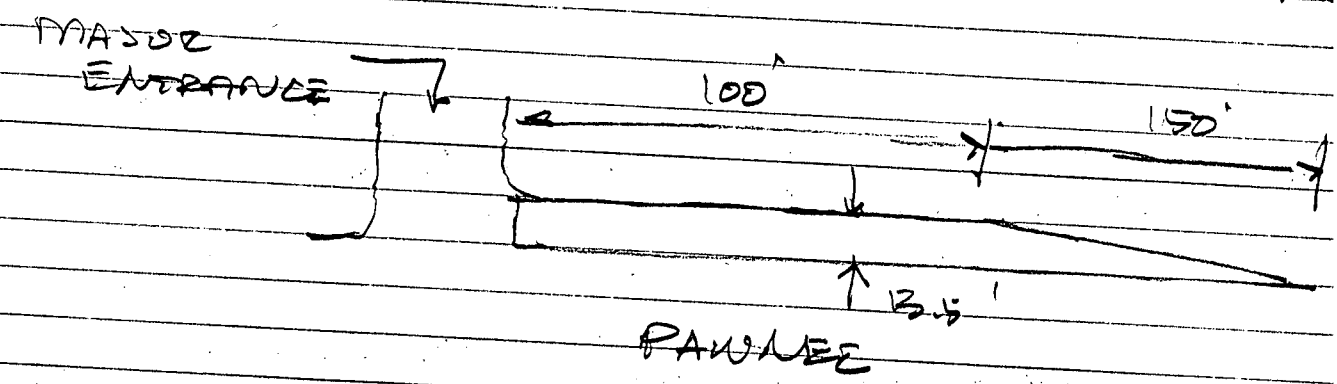
Figure 5

3-26-91

(e

COTTAGE GARDENS

2ND PETITION FOR DECEL LANE AT MAJOR ENTRAN



100 X 13.5 = 1350

150 X 13.5 ÷ 2 = 1012.5

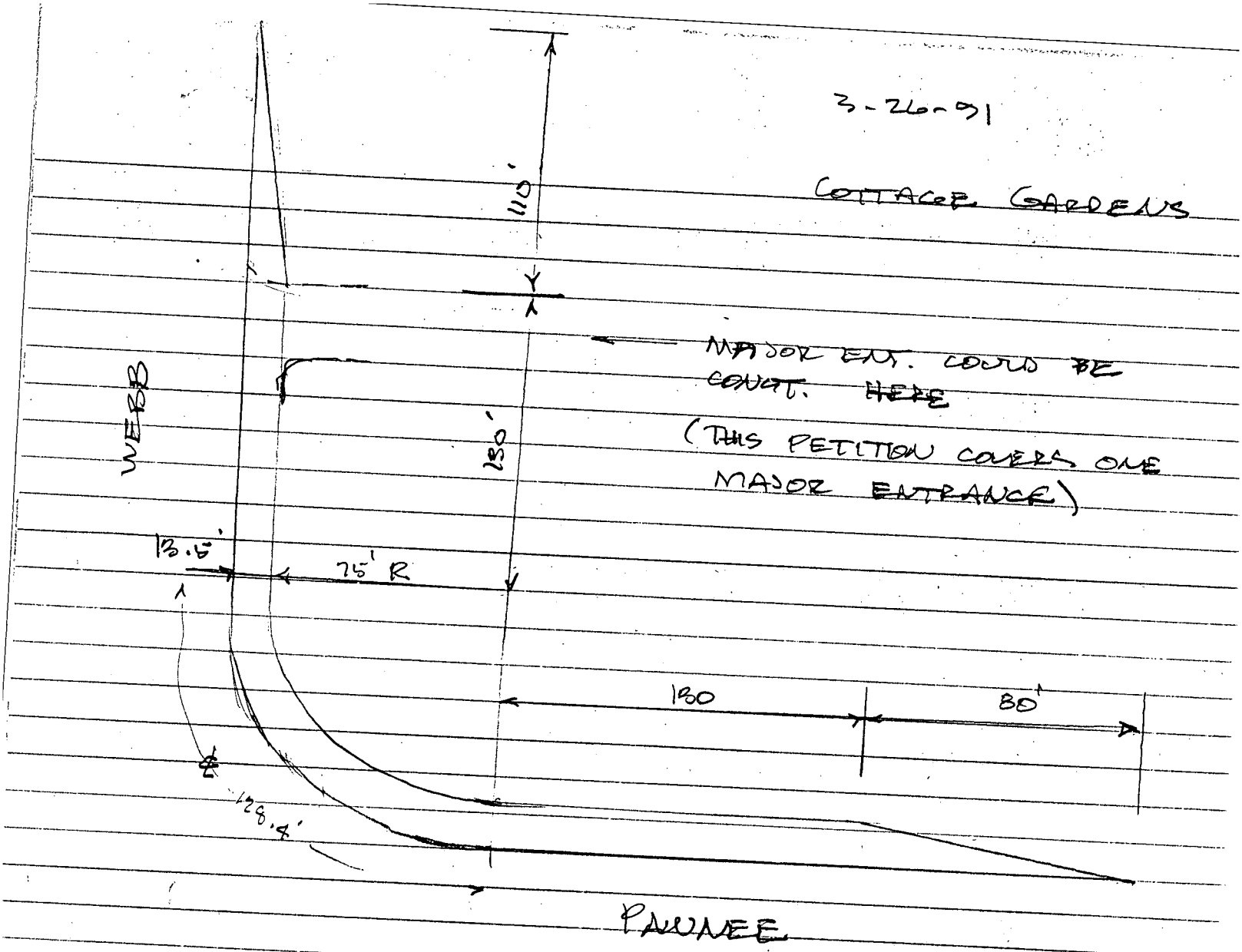
2362.5 ÷ 9 X 27 = 7087.50

USE 8000.00

TAKE COPIES TO VICKI

3-26-91

COTTAGE GARDENS



110 x 13.5 ÷ 2 = 742.5

128.4 x 13.5 = 1733.4

260 x 13.5 = 3510

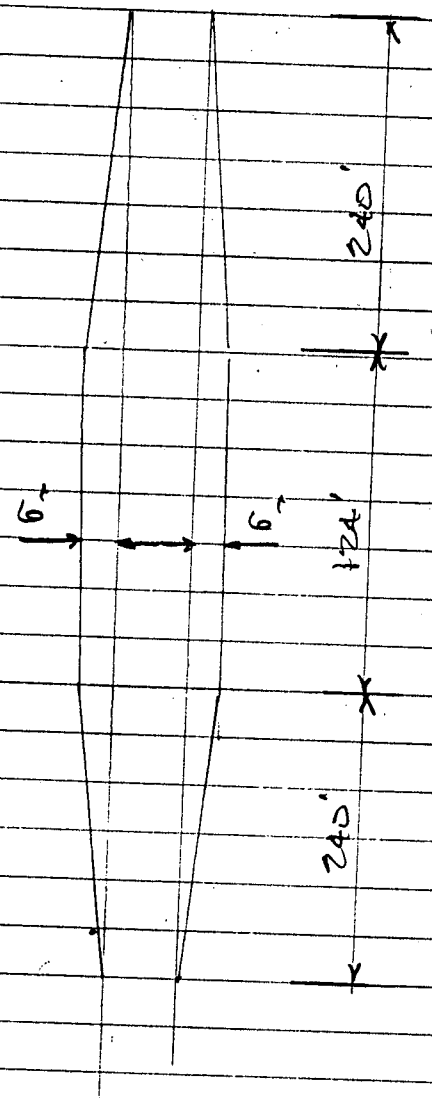
80 x 13.5 ÷ 2 = 540

6525.9 ÷ 9 x 27 = $ 19577.70

USE $ 20 000

3-26-91

MOORINGS 6TH ADDN
NORTH SIDE CHURCH OF CHRIST
2105 JACKSON



DIMENSIONS FROM BILL McKINLEY

LEFT TURN LANE AT MAJOR CHURCH ENTRANCE

6 x 124 x 2 = 1488

240 x 6 ÷ 2 x 4 = 2880

4368 ÷ 9 x 27 = 13104

USE $15000

GENE ~~RAIN~~ ASK FOR TWO PETITIONS ONE TEMPORARY AND ONE PERMANT (SAME COST)