

**MID-KANSAS ENGINEERING  
CONSULTANTS P.A.**

3500 NORTH ROCK ROAD, BLDG #800  
WICHITA, KANSAS 67226 1-316-682-6561

**CALCULATIONS & SKETCHES**

Proj. No.		Date	18 NOV 87
By	JNJ	Date	
Chkd By		Date	
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Location KILLBONEY LAKE  
Reference SOUTH CHANNEL - ALONG PROPOSED 34th STREET (PRELIMINARY)

PROPOSED UPSTREAM LAKE @ 190.0 FT (WICHITA)

CHANNEL FLOWLINE UPSTREAM OF LAKE 190.0 FT

EXIST. 8'x3' RCC @ ROCK ROAD @ 193.0 FT (WICHITA)

CHANNEL FLOWLINE DOWNSTREAM OF ROCK ROAD 193.0 FT

$A = 3.0 \text{ FT}^2$

ESTIMATED CHANNEL LENGTH = 550 FT

$\therefore \text{CHANNEL BOTTOM SLOPE} = \frac{(3 \text{ FT})}{(550 \text{ FT})} = 0.0055 \text{ " OR } 0.55 \%$

FRY 100-YR WSP @ OF ROCK ROAD - LINE 3 = 196.12 FT

$Q_{100} @ \text{SUMP} - \text{STA } 271+39 \text{ (EXIST. 8'x3' RCC)} = 102.85 \text{ CFS}$   
(ROCK RD) PLUS SOUTH LAKE

USE: CHANNEL DESIGN Q = 130 CFS

DESIGN CHANNEL DEPTH = 196.12 - 193.0 = 3.12 OR 3 FT

TRY: BOTTOM WIDTH = 4 FT

SIDE SLOPE = 4:1

DEPTH = 3 FT

$m = 0.045 \text{ (ROCK-LINED)}$   
 $m = 0.030 \text{ (GRASS-LINED)}$   
 $S = 0.0055 \text{ "/}$

X-SEC AREA =  $(4 \times 3) + (3 \times 3) = 18 \text{ FT}^2$

$WP = (12.37 + 12.37 + 4) = 28.74 \text{ FT}$

$R = \frac{(18)}{(28.74)} = 1.67$

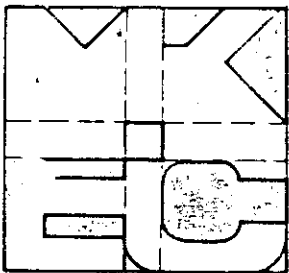
$R^{1/2} = 1.41$

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

$= \frac{(1.486)}{(0.030) \text{ (0.045)}} (18) (1.41) (0.0055)^{1/2}$

$= 249 \text{ CFS (GRASS-LINED)} \quad (V = 3.2 \text{ ft/sec})$

$166 \text{ CFS (ROCK-LINED)} \quad (V = 2.5 \text{ ft/sec})$



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**CALCULATIONS & SKETCHES**

Proj. No. \_\_\_\_\_  
By JNJ Date 18 NOV 97  
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Location KILLARNEY LAKE

Reference \_\_\_\_\_

NORTH CHANNEL - SOUTH OF 36th STREET (PRELIMINARY)

PROPOSED UPSTREAM LAKE @ 190.0 FT (WICHITA)

CHANNEL FLOWLINE UPSTREAM OF LAKE 190.0 FT

A 2 - 8'x3' RCB'S @ ROCK ROAD @ 191.30 FT (WICHITA)

CHANNEL FLOWLINE DOWNSTREAM OF ROCK ROAD 191.3 FT

$A = 1.3 \text{ FT}$

ESTIMATED CHANNEL LENGTH = 340 FT

$\therefore \text{CHANNEL BOTTOM SLOPE} = (1.3 \text{ FT}) / (340 \text{ FT}) = 0.0038 \text{ " ft}^{-1} \text{ or } 0.38 \%$

FRM 100-NE USER <sup>3</sup>/<sub>4</sub>S OF ROCK ROAD - LINE A = 195.3 FT

$Q_{100}$  @ STA 34+29 ROCK RD (2 - 8'x3' RCB'S) = 342 CFS

USE: CHANNEL DESIGN  $Q = 350 \text{ CFS}$

DESIGN CHANNEL DEPTH = 195.3 - 191.3 = 4.0 FT

GRASS LINED  $m = 0.030$

BOTTOM WIDTH = 4 FT

SIDE SLOPE = 4:1

DEPTH = 4 FT

ROCK LINED  $m = 0.045$

BOTTOM WIDTH = 10 FT

SIDE SLOPE = 4:1

DEPTH = 4 FT

X-SEC AREA =  $(4 \times 4) + (4 \times 16) = 80 \text{ FT}^2$

$W^2 = (16.5 + 16.5 + 4) = 37 \text{ FT}$

$R = 2.16$

$R^{2/3} = 1.67$

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

$= \frac{(1.486)}{(0.030)} (80) (1.67) (0.0038)^{1/2}$

$= 408 \text{ CFS} \quad (5.1 \text{ ft}^3/\text{sec})$

X-SEC AREA =  $(10 \times 10) + (4 \times 16) = 104 \text{ FT}^2$

$W^2 = (16.5 + 16.5 + 10) = 43 \text{ FT}$

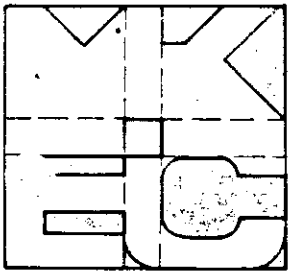
$R = 2.42$

$R^{2/3} = 1.80$

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

$= \frac{(1.486)}{(0.045)} (104) (1.80) (0.0038)^{1/2}$

$= 391 \text{ CFS} \quad (3.7 \text{ ft}^3/\text{sec})$



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**CALCULATIONS & SKETCHES**

Proj. No.		Date	18 NOV 67
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Location KILLBURN LANE

Reference ADDITIONAL DRAINAGE AREA DOWNSTREAM OF ROCK ROAD

UPSTREAM LAKE

5621	10223	5829		
0510	5621	0723		
5111	5122	5116	max 51,077	15.1 acres

4254	8050	11815		
04813	4254	8050		
3776	3791	3265	max 37,772	8.95 acres

ELEV MAX = 202 FT  
ELEV MIN = 190 FT

A = 12 FT

$$S = \frac{(12)^2}{(950)} = 0.0126 \text{ " TO } 1.26\%$$

LENGTH = 950 FT

ZONED BC SUBJECT TO PLATTING (OFFICE DISTRICT)  
LC SUBJECT TO PLATTING (LIGHT COMMERCIAL)

$$T_c = \frac{1.48(1.1 - C) L^{0.76}}{S^{0.48}}$$

$$= \frac{(1.48)(1.1 - 0.5)(950)^{0.76}}{(1.26)^{0.48}}$$

$$= \frac{(1.48)(0.5)(30.82)}{(1.08)}$$

BUSINESS - NEIGHBORHOOD AREAS

C<sub>s</sub> = 0.69  
C<sub>100</sub> = 0.90

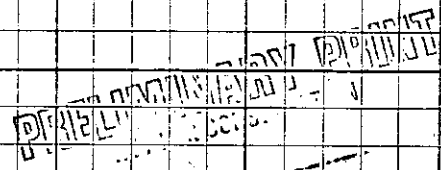
= 15.4 minutes

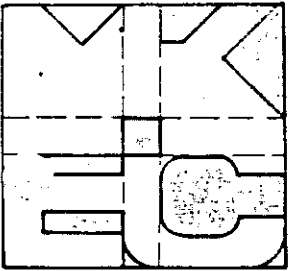
$$I_{100} = 2.29 \text{ in/hr}$$

$$Q = C I A$$

$$= (0.80)(2.29)(21.05)$$

$$Q_{100} = 123 \text{ CFS}$$





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**CALCULATIONS & SKETCHES**

Proj. No.		Date	19 NOV 97
By	JNT	Date	
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Location KILLARNEY LAKE

Reference \_\_\_\_\_

ADDITIONAL DRAINAGE AREA DOWNSTREAM OF ROCK ROAD

DOWNSTREAM LAKE

3125	5792	8477		
0475	3107	5792		
3678	2699	2695	use 36.340	6.26 acres

ELEV MAX = 200 FT

ELEV MIN = 187 FT

$\Delta = 13$  FT

$S = \frac{(13)^2}{(600)} = 0.0217$  " or 2.17 %

LENGTH = 600 FT

ZONED BR SUBJECT TO PLATTING (OFFICE DISTRICT)

$T_c = \frac{1.48 (1.49 - C) V L}{S^{4.33}}$

BUSINESS - NEIGHBORHOOD AREAS

$= \frac{(1.48)(1.49 - 0.3)(600)^{1/2}}{(2.17)^{4.33}}$

$C_5 = 0.69$

$C_{100} = 0.80$

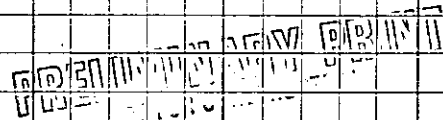
$= \frac{(1.48)(0.3)(24.495)}{(1.295)}$

$= 10.2$  minutes (use 15 minutes)

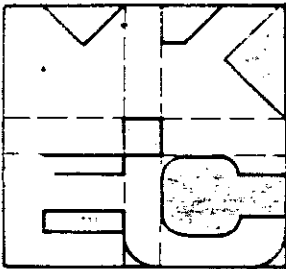
$I_{100} = 7.37$  in/hr

$Q = C I A$   
 $= (0.80)(7.37)(6.36)$

$Q_{100} = 37$  cfs



DATE:



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**CALCULATIONS & SKETCHES**

Proj. No.		Date	13 NOV 37
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Location KILLARNEY LAKE

Reference UPSTREAM LAKE WEIR

DISCHARGE SUMMARY

SOUTH CHANNEL	130	CFS	
NORTH CHANNEL	50	CFS	
D.R. BELOW ROCK ROAD (LIGHT COMMERCIAL OFFICE DISTRICT)	133	CFS	
<b>TOTAL</b>	<b>603</b>	<b>CFS</b>	<u>USED 610 CFS</u>

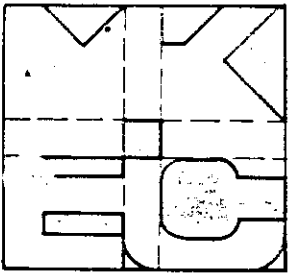
weir equation  $Q = C L H^{3/2}$        $Q_{DESIGN} = 610 \text{ CFS}$

BROAD CRESTED WEIR ( $b = 1.5 \text{ FT}$ )

H	$H^{3/2}$	C	Q	L	COMMENTS
0.5	.3536	2.64	610	653	
1.0	1.000	2.75	610	222	
1.5	1.837	3.00	610	111	
2.0	2.828	3.02	610	71	
2.5	3.953	3.28	610		
3.0	5.196	3.32	610	35	

$L = 25 \text{ FT} \Rightarrow H^{3/2} = 2.684 \quad H = 1.93$

$\therefore \text{DESIGN USE} = 190 + 1.9 = 191.9$



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Location KILLARNEY LAKE

Reference

DOWNSTREAM LAKE WEIR

DISCHARGE SUMMARY

UPSTREAM LAKE	610	CFS		
D.A. BETWEEN LAKES	37	CFS		
TOTAL	647	CFS	MAX	650 CFS

WEIR EQUATION  $Q = C L H^{3/2}$   $Q_{DESIGN} = 650 \text{ CFS}$

BEDROCK CRESTED WEIR (b = 1.5 FT)

H	$H^{3/2}$	C	Q	L	COMMENTS
0.5	.3536	2.64	650	696	
1.0	1.000	3.125	650	236	
1.5	1.837	3.00	650	118	
2.0	2.828	3.00	650	76	
2.5	3.953	3.00	650	50	
3.0	5.196	3.32	650	38	

$L = 60 \text{ FT} \Rightarrow H^{3/2} = 3.400$

DESIGNER: [Signature]

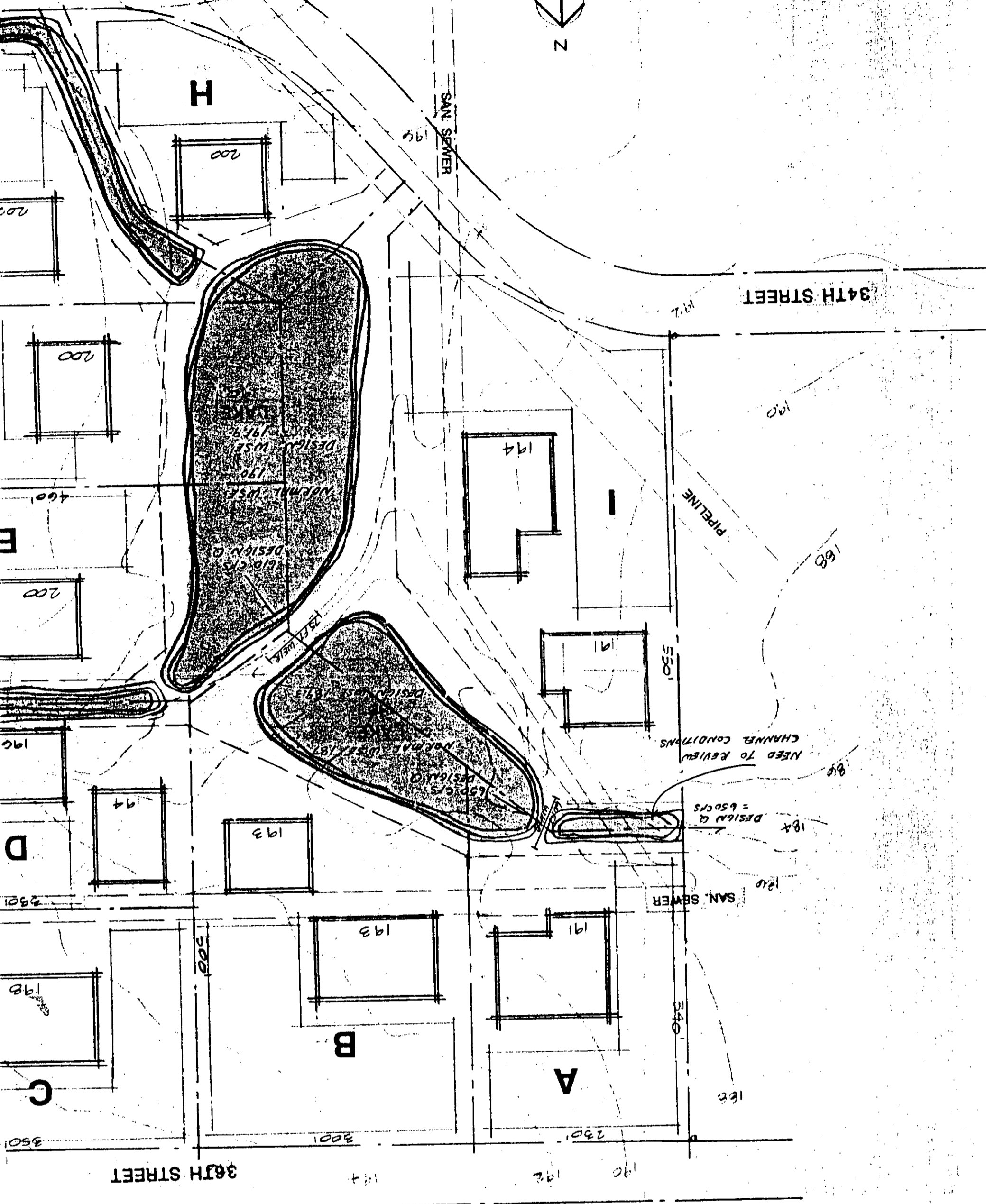
$\therefore \text{DESIGN WEIR} = 187 + 2.3 = 189.3$

# KILLARNEY LAKE

1" = 100'



N



E

T = 100



DESIGN Q = 130 CFS

DESIGN Q = 350 CFS

ROCK ROAD

SANITARY SEWER

36TH STREET

