

PROFESSIONAL
ENGINEERING
CONSULTANTS
PROFESSIONAL ASSOCIATION

SUPPLEMENTAL DRAINAGE STUDY

FOREST LAKES; REFLECTION RIDGE 6TH, 7TH AND 8TH ADDITIONS; UNPLATTED LAND IN NORTHWEST QUARTER SECTION 4 AND SOUTHWEST QUARTER SECTION 33

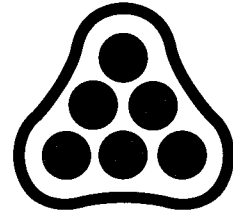
PREPARED BY

**PROFESSIONAL ENGINEERING CONSULTANTS, P.A.
WICHITA, KANSAS**

FEBRUARY 10, 1993

**303 S. TOPEKA
WICHITA, KANSAS 67202
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February 10, 1993



PROFESSIONAL
ENGINEERING
CONSULTANTS
PROFESSIONAL ASSOCIATION

Mr. Michael E. Lindebak, P.E.
City Engineer
7th Floor, City Hall
455 N. Main
Wichita, KS 67202

Attention: Ms. Vicky Huang, P.E.

Reference: Forest Lakes Drainage Plan
PEC Project No. 32-92431-2273

Dear Mr. Lindebak:

In accordance with your request in our meeting of December 6, 1992, transmitted herewith are two copies of a Supplemental Drainage Report relative to Forest Lakes Addition. The purpose of the report is to address the interrelationship of developments in the area and the ultimate impact on drainage.

We would be happy to review this report with you upon your request at a mutually convenient time.

Very truly yours,

PROFESSIONAL ENGINEERING CONSULTANTS, P.A.

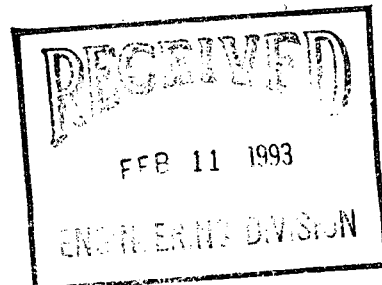
Michael W. Berry

Michael W. Berry, P.E.
Manager
Land Development Division

MWB:st

Encl.

cc: Marvin Schellenberg
Harlan D. Foraker, P.E.



FOREST LAKES

Major Channels/Structures

In the development of the Drainage Plan for this plat, consideration must be given to routing of the major flows through the development. These flows and hydrolgraphs were developed using the SCS methodology in the US Army Corps of Engineers HEC-1 hydrologic computer model. Reference is made to Figure A. This figure shows a schematic of storm routing thorough existing/proposed channels, structures, and ponds.

The Drainage Plan for Reflection Ridge 6th Addition provided a pond at the southeast corner of 29th and Ridge, and a box culvert at Wild Rose. All of these features have been constructed. The channel and culvert were sized to convey the 100-year flow from the area now platted as Reflection Ridge 7th and 8th Additions, estimated to be 568 cfs at hydrograph time 6.1 hr. This flow is depicted as B on Figure A, and the Wild Rose culvert is depicted as Structure No. 4 (existing 3 - 8' X 4' RCBB).

In the 6th Addition Drainage Plan, areas lying north of 29th St. were assumed to be collected north of the roadway and conveyed across 29th St. to Lake #3 in the 6th Addition. This lake and downstream structure were sized to accommodate these flows (Flows B and C on Figure A).

The property currently owned by Mr. Kastens lying in the NW Quarter of Section 4, has not been studied in as much detail. A preliminary plat layout dated 8/3/92, along with a preliminary drainage study dated 9/30/92, are available. (See Exhibit B in map pocket.)

The referenced drainage study proposes a series of ponds lying along the present KG&E transmission line. For purposes of this study, no detention has been assumed and the northerly 70 acres is assumed to flow to the northeast corner of the property. The reader should note that in the Preliminary Drainage Study, a portion of the same 70 acres is assumed to flow south and east through the golf course driving range. However, for this report it was felt that the exact ridge line between basins is not definite based on the design performed to date. Thus, a conservative (large) value of drainage area has been assumed.

In the development of the Forest Lakes Drainage Plan, the area north of 29th St. has been studied in greater detail. The basin is composed of two subareas: the first containing 195 acres flows to a poorly defined channel flowing through the plat. This drainage is intercepted near

the northwest corner of the plat and is conveyed through a series of culverts and ponds to discharge to 29th St. just east of Wild Rose (Flow C).

The west portion of the basin is defined by a ridge line along the 1340 elevation contour. This area is rolling, but has no defined channel. The natural low area discharges to 29th St. at the existing homestead in the SW corner of the SE 1/4 of Section 33 (the area being excepted from the plat). This flow is designated as A and is estimated to be 444 cfs at hydrograph time 6.9 hours.

Both flows A and C must be conveyed to the 6th Addition Pond #3 at 29th and Ridge. Open channels provide the most economical alternative, and are compatible with the developments' water amenities. Rather than providing a second open channel on the north side of 29th, conveyance of flows across 29th St. to the south side is proposed.

The proposed system has the following components:

Structure No. 6. Future box culvert beneath 29th St. to convey flows from the area west of Forest Lakes to the south road ditch. This culvert will be required when the SW 1/4 of Section 33 develops, and would be the responsibility of that developer. This structure was not sized for this report.

An Open Channel from Structure No. 6 to Structure No. 5 (Tee Time South). This channel would be sized to carry flow A and Flow D. This channel is a ten-foot trapezoidal channel on 1% grade. To carry Flow D ($Q_{100} = 290$ cfs), $d = 2.1'$ for Retardance Class E, requiring a 3.0' deep ditch. To carry both A and D ($Q_{100} = 486$ cfs), $d = 2.8'$ for Retardance Class E and a 4.0' deep ditch is required. The ditch will require a minimum 60' half street right-of-way.

Structure No. 5. Future box culvert beneath Tee Time (south) at 29th St. This structure would carry Flow A and D ($Q_{100} = 486$ cfs) and is sized as 3 - 7' X 4' RCB.

An Open Channel from Structure No. 5 to Wild Rose (Structure No. 4) This channel would be sized to convey Flows A, B, and D ($Q_{100} = 608$ cfs). A ten foot trapezoidal channel to be provided on 0.8% slope. For Class E Retardance, $d = 3.2'$ and a 4.25' ditch is required, necessitating a minimum 62' half street right-of-way (75' has been provided).

Structure No. 4. The existing Wild Rose culvert has been analyzed and is shown to be at capacity for Flow B $Q_{100} = 608$ cfs, with a headwater elevation = 1326.9. The road grade (at R/W line) should be set at 1327.0; in addition, the south side of the road ditch should be protected by a berm at elevation 1327 (139.82 City).

Structure No. 3. This structure serves as the outlet for Forest Lakes Pond No. 3. It has been sized as a 2 - 8' X 4' RCB carrying $Q_{100} = 216$ cfs at a headwater elevation of 1324.90, assuming a free discharge.

Open Channel from Structure Nos. 3 and 4 to Lake No. 3 in the 6th Addition. In the course of the investigation, it was determined that the Lake No. 3 in the 6th Addition causes a high tailwater condition for the outlet from Lake No. 3 in Forest Lakes. Therefore, these two lakes have been modeled to function together as one large pond.

Structure Nos. 2 and 1 (Not shown on Figure A). These structures are the outlet control structures for Ponds Nos. 2 and 1 respectively in Forest Lakes, are in discussed in the Forest Lakes Drainage Plan (February 1, 1993).

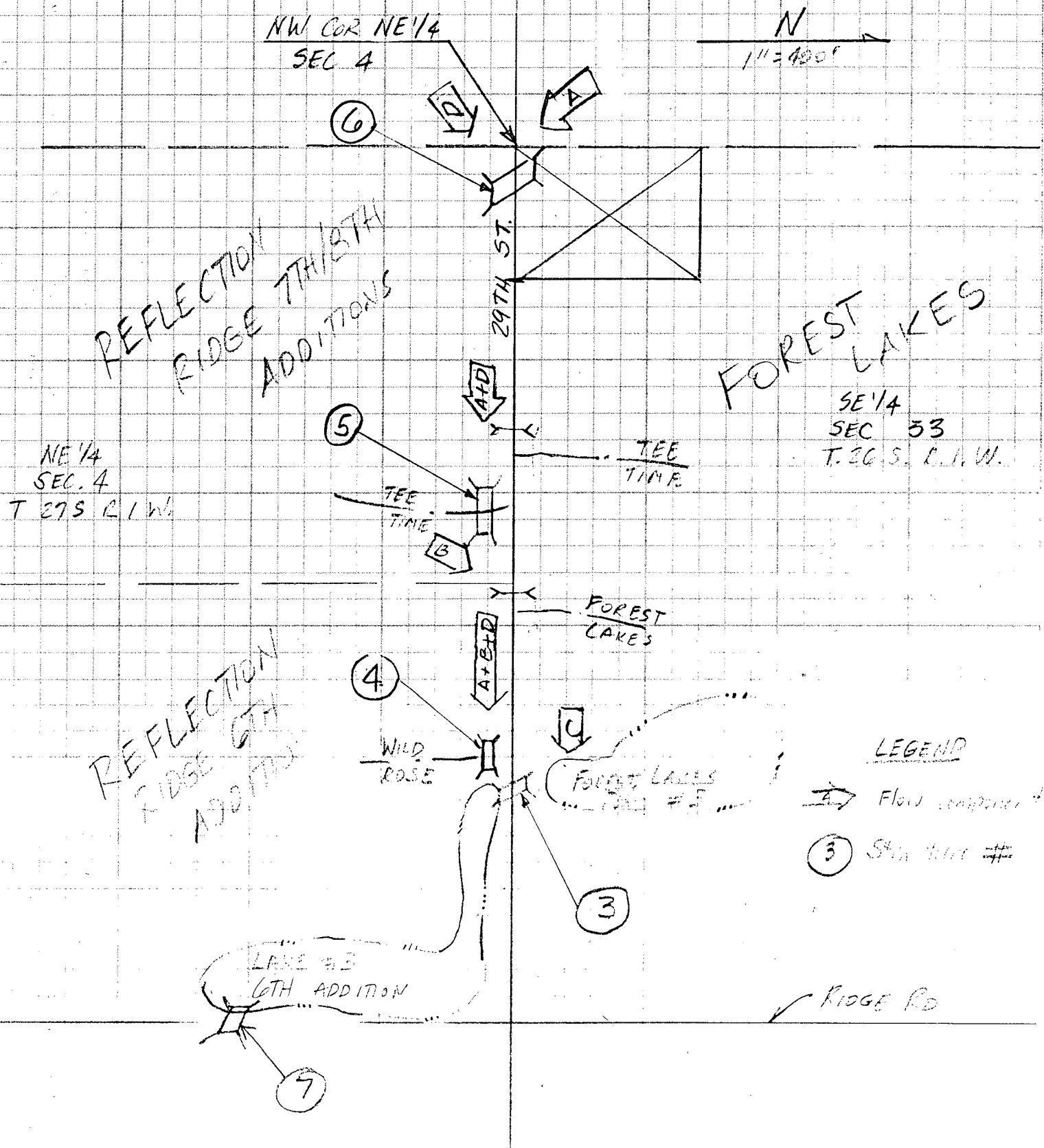
Structure No. 7. In the HEC-1 hydrologic analysis included herein, the outlet across Ridge Road was evaluated. The existing outlet is a single 10' X 3' reinforced concrete box culvert. Under existing outlet conditions and with the ultimate development, the 100-yr. design water surface in Pond No. 3 is 1327.27. This is to be compared to the minimum pad elevation in Reflection Ridge 6th Addition of 1328.00. Thus, approximately 9" of freeboard is provided to homes in the 6th Addition without any additional culvert capacity at Ridge Road.

The ultimate proposed outlet at this location is a 3 - 10' X 3' reinforced concrete box bridge. One barrel must be added at the time of development in the NW 1/4 Sec. 4, and the other at the time of development in the SW 1/4 Sec. 33. If Ridge Road is to be improved to arterial standards, the additional barrels should be added at that time.

Ditch capacity charts and printed results of culvert analysis using the FHWA computer program HY-8 are included. Please note that the computer results do not exactly agree with the results of the HEC-1 analysis; they do agree to within ± 0.1 ft., which is of sufficient accuracy for hydraulic analysis.



REV 2/8/93
Date 10/25/92 MMB Page _____ of _____
Project FOREST LAKES
Item MAJOR CHANNELS FIGURE A





Date 10-24-92 MMB Page _____ of _____

Project FOREST LAKES PLAT

Item OFF SITE DRAINAGE BASIN

WEST OF PLAT & N/O 29TH ST.

SCS PARAMETERS

15% D SOIL

85% B SOIL

CULTIVATED - WHEAT 0% INT 0% HLM

GOOD COND., straight row + residue

$CN = 0.15 \times 83 + 0.85 \times 72 = 73.65$ SAY 74.

CN = 74

DETERMINE LAG

No defined channel. $L = 5800$ ft.

Hydraulically most remote point @ NW cor sec 33 Elev 1343

Outlet @ SW cor SE 1/4 Sec 33 (Farmstead) Elev 1336

$$7/5800 = 0.12\%$$

7 ft.

ESTIMATE 1 FT/SEC OVERLAND FLOW VELOCITY

$$T_c = \frac{5800}{1} = 5800 \text{ SEC} = 97 \text{ MIN} = 1.6 \text{ HR}$$

$$Lag = 0.6 T_c = \frac{6}{10} \times 1.6 = 0.97 \text{ HR}$$

FROM PROPOSED CONDITION HEC-1 MODEL (AREA W FOR LK)

$Q_5 = 182$ CFS

$Q_{10} = 239$ CFS

$Q_{50} = 381$ CFS

$Q_{100} = 444$ CFS

TIME TO PEAK = 6.9 HR

TIME TO PEAK = 6.9 HR

TIME TO PEAK = 6.9 HR

TIME TO PEAK = 6.9 HR

SEE HEC-1 PRINTOUT
FOR PROPOSED CONDITIONS



Date 1/30/93 NRB Page of
Project FOREST LAKES DRAINAGE PLAN
Item EVALUATION OF TW CONDITION

CHECK STRUCTURE NO 3 TAILWATER CONDITION
FROM POND NO 4. (Q100 ONLY)

<u>TIME</u>	<u>Q OUT</u> <u>POND 3</u>	<u>STAGE</u> <u>POND 3</u>	<u>3 BBL</u> <u>STAGE</u> <u>POND 4</u>	<u>4 BBL</u> <u>STAGE</u> <u>POND 4</u>
1224	143	1324.3	1324.9	1323.9
1236	171	1324.6	1325.3	1324.0
1248	191	1324.8	1325.5	1324.0
1300	207	1324.9	1325.4	1323.9
1312	215	1324.9	1325.3	1323.8
1324	215	1324.9	1324.9	1323.3
1336	208	1324.9	1324.4	1323.0

CONCLUSION:

FOREST LAKES POND # 3 & REFLECTION LIDGE 6TH
POND FLOWN TOGETHER.



Date 2/4/93 MWB Page _____ of _____

Project FOREST LAKES

Item COMBINED STORAGE

REFLECTION RIDGE 6TH
POND # 4
STORAGE

FOREST LAKE
POND # 3
STORAGE

Σ

ELEV

1319.6

0

0

1321.6

5.4

5.4

1322

6.6*

0

6.6

1322.2

7.2

1322.9

9.3

1323.6

11.6

8.9

20.5

1324.0

11.2

1324.4

14.3

13.5

27.8

1324.8

15.9

1325.2

18.3

1325.4

18.0

19.5*

37.5

1325.6

20.7

1325.7

19.1

1326.0

20.3*

23.2

43.5

1326.5

22.4

1327.0

24.8

25*

50*

1327.2

25.8

1328

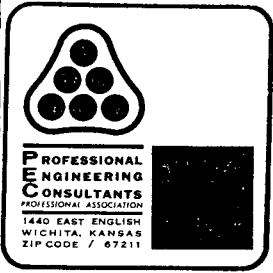
30.4

30*

60*

* Estimated

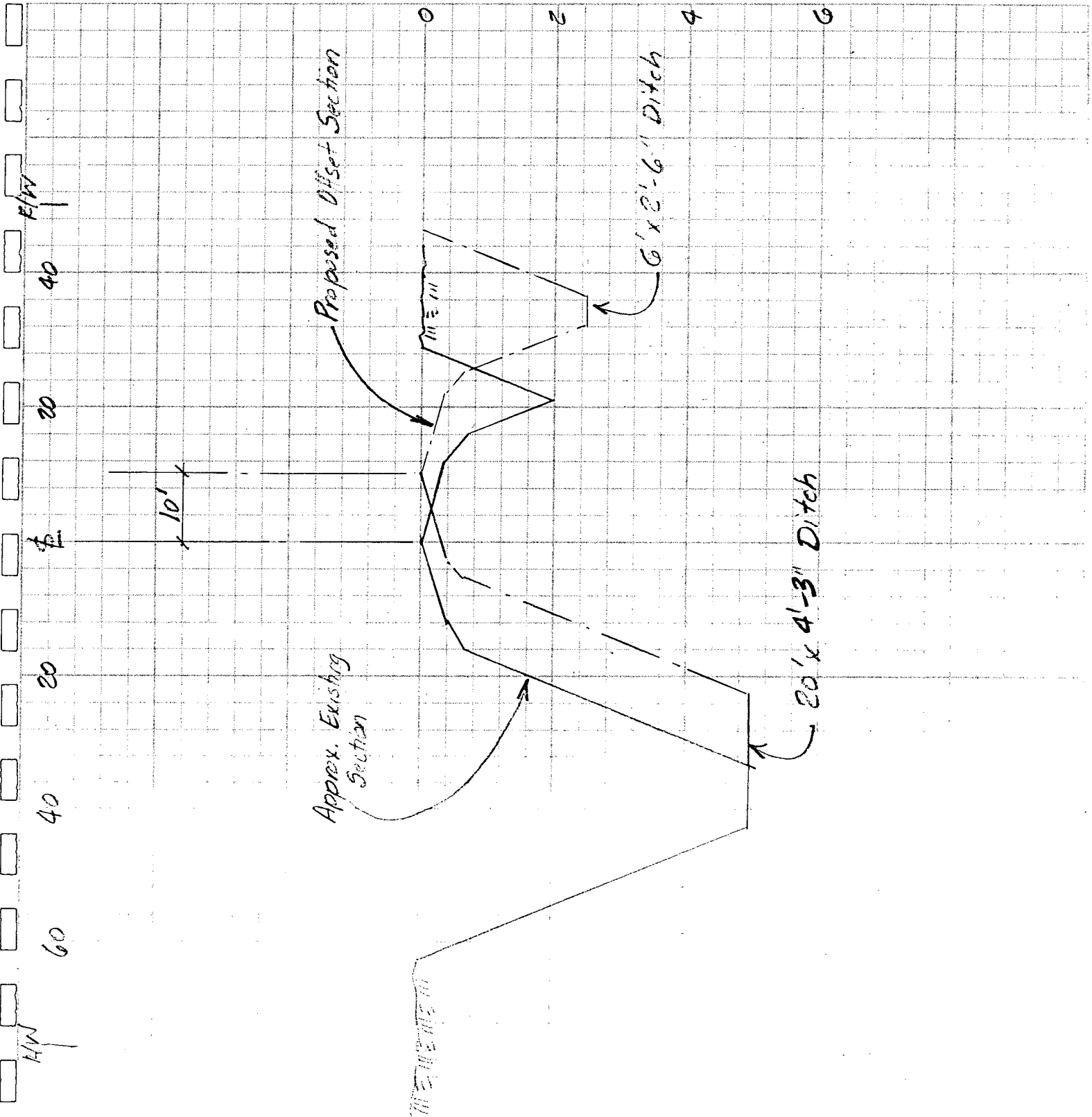
* Interpolated



Date 10/25/92 MMB Page of

Project FOREST LAKES

Item 29TH ST TYP SEC - POSSIBLE OFFSET SECTION



Tee Time (South) RCBB

1

CURRENT DATE: 02-09-1993
CURRENT TIME: 09:52:34

FILE DATE: 02-06-1993
FILE NAME: TEETIMES

***** FHWA CULVERT ANALYSIS *****
***** HY-8, VERSION 3.2 *****

C U L V #	SITE DATA			CULVERT SHAPE, MATERIAL, INLET				
	INLET ELEV. (FT)	OUTLET ELEV. (FT)	CULVERT LENGTH (FT)	BARRELS SHAPE MATERIAL	SPAN (FT)	RISE (FT)	MANNING n	INLET TYPE
1	1324.00	1323.80	80.00	3 RCB	7.00	4.00	.012	CONVENTIONAL
2								
3								
4								
5								
6								

SUMMARY OF CULVERT FLOWS (CFS) FILE: TEETIMES DATE: 02-06-1993

ELEV (FT)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
1324.00	0	0	0	0	0	0	0	0	1
1325.51	100	100	0	0	0	0	0	0	1
1326.35	200	200	0	0	0	0	0	0	1
1327.03	300	300	0	0	0	0	0	0	1
1327.63	400	400	0	0	0	0	0	0	1
1328.11	486	486	0	0	0	0	0	0	1
1328.73	600	600	0	0	0	0	0	0	1
1329.31	700	686	0	0	0	0	0	52	14
1329.55	800	700	0	0	0	0	0	122	16
1329.78	900	700	0	0	0	0	0	209	8
1330.01	1000	700	0	0	0	0	0	309	7
1329.00	600	600	0	0	0	0	0	0	OVERTOPPING

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: TEETIMES DATE: 02-06-1993

HEAD ELEV(FT)	HEAD ERROR(FT)	TOTAL FLOW(CFS)	FLOW ERROR(CFS)	% FLOW ERROR
1324.00	0.00	0	0	0.00
1325.51	0.00	100	0	0.00
1326.35	0.00	200	0	0.00
1327.03	0.00	300	0	0.00
1327.63	0.00	400	0	0.00
1328.11	0.00	486	0	0.00
1328.73	0.00	600	0	0.00
1329.31	0.00	700	-38	-5.38
1329.55	0.00	800	-22	-2.79
1329.78	0.00	900	-9	-0.97
1330.01	0.01	1000	-9	-0.95

<1> TOLERANCE (FT) = 0.010 <2> TOLERANCE (%) = 1.000

Tee Time (South) RCBB

2

CURRENT DATE: 02-09-1993
CURRENT TIME: 09:52:34

FILE DATE: 02-06-1993
FILE NAME: TEETIMES

***** CULVERT # 1 *****

PERFORMANCE CURVE FOR 3 BARREL(S)

Q (cfs)	HWE (ft)	TWE (ft)	ICH (ft)	OCH (ft)	FLOW TYPE	CCE (ft)	FCE (ft)	TCE (ft)	VO (fps)
0	1324.00	1323.80	0.00	-0.20	0-NF	0.00	1324.00	0.00	0.00
100	1325.51	1325.22	1.33	1.51	3-M1	0.00	0.00	0.00	3.36
200	1326.35	1325.82	2.11	2.35	3-M1	0.00	0.00	0.00	4.71
300	1327.03	1326.27	2.82	3.03	3-M1	0.00	0.00	0.00	5.78
400	1327.63	1326.64	3.46	3.63	3-M1	0.00	0.00	0.00	6.71
486	1328.11	1326.92	4.01	4.11	3-M1	0.00	0.00	0.00	7.43
600	1328.73	1327.24	4.73	4.71	3-M1	0.00	0.00	0.00	8.30
686	1329.30	1327.50	5.30	5.14	3-M1	0.00	0.00	0.00	8.83
700	1329.40	1327.73	5.40	5.19	3-M2	0.00	0.00	0.00	8.48
700	1329.51	1327.95	5.40	5.51	4-FF	0.00	0.00	0.00	8.33
700	1329.71	1328.15	5.40	5.71	4-FF	0.00	0.00	0.00	8.33

El. inlet face invert 1324.00 ft El. outlet invert 1323.80 ft
El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

***** SITE DATA ***** CULVERT INVERT *****
INLET STATION (FT) 0.00
INLET ELEVATION (FT) 1324.00
OUTLET STATION (FT) 80.00
OUTLET ELEVATION (FT) 1323.80
NUMBER OF BARRELS 3.00
SLOPE (V-FT/H-FT) 0.0025
CULVERT LENGTH ALONG SLOPE (FT) 80.00

***** CULVERT DATA SUMMARY *****
BARREL SHAPE BOX
BARREL SPAN 7.00 FT
BARREL RISE 4.00 FT
BARREL MATERIAL CONCRETE
BARREL MANNING'S N 0.012
INLET TYPE CONVENTIONAL
INLET EDGE AND WALL 1:1 BEVEL (45 DEG. FLARE)
INLET DEPRESSION NONE

CURRENT DATE: 02-09-1993
CURRENT TIME: 09:52:34

FILE DATE: 02-06-1993
FILE NAME: TEETIMES

***** TAILWATER *****

***** REGULAR CHANNEL CROSS SECTION *****

BOTTOM WIDTH (FT)	10.00
SIDE SLOPE H/V (X:1)	4.0
CHANNEL SLOPE V/H (FT/FT)	0.008
MANNING'S N (.01-0.1)	0.030
CHANNEL INVERT ELEVATION (FT)	1323.80
CULVERT NO.1 OUTLET INVERT ELEVATION	1323.80 FT

***** UNIFORM FLOW RATING CURVE FOR DOWNSTREAM CHANNEL

FLOW (CFS)	W.S.E. (FT)	FROUDE NUMBER	VEL. (FPS)	SHEAR (PSF)
0.00	1323.80	0.000	0.00	0.00
100.00	1325.22	0.666	4.50	0.71
200.00	1325.82	0.677	5.47	1.01
300.00	1326.27	0.685	6.11	1.23
400.00	1326.64	0.690	6.59	1.42
486.00	1326.92	0.693	6.94	1.56
600.00	1327.24	0.697	7.34	1.72
700.00	1327.50	0.700	7.64	1.85
800.00	1327.73	0.703	7.91	1.96
900.00	1327.95	0.705	8.15	2.07
1000.00	1328.15	0.708	8.38	2.17

***** ROADWAY OVERTOPPING DATA *****

ROADWAY SURFACE	PAVED
EMBANKMENT TOP WIDTH (FT)	50.00
CREST LENGTH (FT)	100.00
OVERTOPPING CREST ELEVATION (FT)	1329.00

CURRENT DATE: 02-06-1993
CURRENT TIME: 14:26:57

FILE DATE: 10-24-1992
FILE NAME: NEWLDROS

***** FHWA CULVERT ANALYSIS *****
***** HY-8, VERSION 3.2 *****

C U L V #	SITE DATA			CULVERT SHAPE, MATERIAL, INLET				
	INLET ELEV. (FT)	OUTLET ELEV. (FT)	CULVERT LENGTH (FT)	BARRELS SHAPE MATERIAL	SPAN (FT)	RISE (FT)	MANNING n	INLET TYPE
1	1320.60	1320.50	72.00	3 RCB	8.00	4.00	.012	CONVENTIONAL
2								
3								
4								
5								
6								

***** SUMMARY OF CULVERT FLOWS (CFS) FILE: NEWLDROS DATE: 10-24-1992 *****

ELEV (FT)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
1320.60	0	0	0	0	0	0	0	0	1
1322.97	100	100	0	0	0	0	0	0	1
1323.98	200	200	0	0	0	0	0	0	1
1324.71	300	300	0	0	0	0	0	0	1
1325.48	400	400	0	0	0	0	0	0	1
1326.18	500	500	0	0	0	0	0	0	1
1326.87	600	600	0	0	0	0	0	0	1
1326.92	608	608	0	0	0	0	0	0	1
1327.69	800	624	0	0	0	0	0	172	3
1327.97	900	611	0	0	0	0	0	288	3
1328.22	1000	592	0	0	0	0	0	408	3
1327.00	800	800	0	0	0	0	0	0	OVERTOPPING

***** SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: NEWLDROS DATE: 10-24-1992 *****

HEAD ELEV(FT)	HEAD ERROR(FT)	TOTAL FLOW(CFS)	FLOW ERROR(CFS)	% FLOW ERROR
1320.60	0.00	0	0	0.00
1322.97	0.00	100	0	0.00
1323.98	0.00	200	0	0.00
1324.71	0.00	300	0	0.00
1325.48	0.00	400	0	0.00
1326.18	0.00	500	0	0.00
1326.87	0.00	600	0	0.00
1326.92	0.00	608	0	0.00
1327.69	-0.00	800	3	0.42
1327.97	-0.00	900	1	0.16
1328.22	0.00	1000	-0	-0.01

<1> TOLERANCE (FT) = 0.010 <2> TOLERANCE (%) = 1.000

Wild Rose (South) RCBB

2

CURRENT DATE: 02-06-1993
CURRENT TIME: 14:26:57

FILE DATE: 10-24-1992
FILE NAME: NEWLDROS

***** CULVERT # 1 *****

PERFORMANCE CURVE FOR 3 BARREL(S)

Q (cfs)	HWE (ft)	TWE (ft)	ICH (ft)	OCH (ft)	FLOW TYPE	CCE (ft)	FCE (ft)	TCE (ft)	VO (fps)
0	1320.60	1320.50	0.00	-0.10	0-NF	0.00	1320.60	0.00	0.00
100	1322.97	1322.90	1.22	2.37	3-M1	0.00	0.00	0.00	1.74
200	1323.98	1323.85	1.93	3.38	3-M1	0.00	0.00	0.00	2.49
300	1324.71	1324.54	2.56	4.11	3-M1	0.00	0.00	0.00	2.49
400	1325.48	1325.10	3.15	4.88	4-FF	0.00	0.00	0.00	4.17
500	1326.18	1325.59	3.70	5.58	4-FF	0.00	0.00	0.00	5.21
600	1326.87	1326.02	4.25	6.27	4-FF	0.00	0.00	0.00	6.25
608	1326.92	1326.05	4.30	6.32	4-FF	0.00	0.00	0.00	6.33
624	1327.68	1326.76	4.39	7.08	4-FF	0.00	0.00	0.00	6.50
611	1327.97	1327.08	4.31	7.37	4-FF	0.00	0.00	0.00	6.36
592	1328.22	1327.39	4.21	7.62	4-FF	0.00	0.00	0.00	6.16

El. inlet face invert 1320.60 ft El. outlet invert 1320.50 ft
El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

***** SITE DATA ***** CULVERT INVERT *****
INLET STATION (FT) 0.00
INLET ELEVATION (FT) 1320.60
OUTLET STATION (FT) 72.00
OUTLET ELEVATION (FT) 1320.50
NUMBER OF BARRELS 3.00
SLOPE (V-FT/H-FT) 0.0014
CULVERT LENGTH ALONG SLOPE (FT) 72.00

***** CULVERT DATA SUMMARY *****
BARREL SHAPE BOX
BARREL SPAN 8.00 FT
BARREL RISE 4.00 FT
BARREL MATERIAL CONCRETE
BARREL MANNING'S N 0.012
INLET TYPE CONVENTIONAL
INLET EDGE AND WALL 1:1 BEVEL (45 DEG. FLARE)
INLET DEPRESSION NONE

CURRENT DATE: 02-06-1993
CURRENT TIME: 14:26:57

FILE DATE: 10-24-1992
FILE NAME: NEWLDROS

***** TAILWATER *****

***** REGULAR CHANNEL CROSS SECTION *****

BOTTOM WIDTH (FT)	10.00
SIDE SLOPE H/V (X:1)	4.0
CHANNEL SLOPE V/H (FT/FT)	0.001
MANNING'S N (.01-0.1)	0.030
CHANNEL INVERT ELEVATION (FT)	1320.50
CULVERT NO.1 OUTLET INVERT ELEVATION	1320.50 FT

***** UNIFORM FLOW RATING CURVE FOR DOWNSTREAM CHANNEL

FLOW (CFS)	W.S.E. (FT)	FROUDE NUMBER	VEL. (FPS)	SHEAR (PSF)
0.00	1320.50	0.000	0.00	0.00
100.00	1322.90	0.242	2.12	0.15
200.00	1323.85	0.246	2.55	0.21
300.00	1324.54	0.249	2.84	0.25
400.00	1325.10	0.251	3.06	0.29
500.00	1325.59	0.253	3.24	0.32
600.00	1326.02	0.255	3.39	0.34
608.00	1326.05	0.255	3.40	0.35
800.00	1326.76	0.257	3.65	0.39
900.00	1327.08	0.258	3.76	0.41
1000.00	1327.39	0.259	3.86	0.43

***** ROADWAY OVERTOPPING DATA *****

ROADWAY SURFACE	PAVED
EMBANKMENT TOP WIDTH (FT)	60.00
CREST LENGTH (FT)	100.00
OVERTOPPING CREST ELEVATION (FT)	1327.00

Existing 10'x 3' RCB in Ridge Rd

1

CURRENT DATE: 01-30-1993
CURRENT TIME: 15:56:38

FILE DATE: 01-30-1993
FILE NAME: RIDG1BBL

FHWA CULVERT ANALYSIS
HY-8, VERSION 3.2

SITE DATA				CULVERT SHAPE, MATERIAL, INLET				
C	INLET	OUTLET	CULVERT	BARRELS	SPAN	RISE	MANNING	INLET
U	ELEV.	ELEV.	LENGTH	SHAPE	(FT)	(FT)	n	TYPE
	(FT)	(FT)	(FT)	MATERIAL				
1	1319.60	1319.30	106.00	1 RCB	10.00	3.00	.012	CONVENTIONAL
2								
3								
4								
5								
6								

SUMMARY OF CULVERT FLOWS (CFS)

FILE: RIDG1BBL

DATE: 01-30-1993

ELEV (FT)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
1319.60	0	0	0	0	0	0	0	0	1
1322.90	150	150	0	0	0	0	0	0	1
1326.49	300	300	0	0	0	0	0	0	1
1327.12	450	319	0	0	0	0	0	129	11
1327.21	600	321	0	0	0	0	0	275	6
1327.27	750	323	0	0	0	0	0	423	5
1327.33	900	325	0	0	0	0	0	568	4
1327.37	1000	326	0	0	0	0	0	669	4
1327.44	1200	328	0	0	0	0	0	866	4
1327.48	1350	330	0	0	0	0	0	1017	4
1327.53	1500	331	0	0	0	0	0	1157	3
1327.00	315	315	0	0	0	0	0	0	OVERTOPPING

SUMMARY OF ITERATIVE SOLUTION ERRORS

FILE: RIDG1BBL

DATE: 01-30-1993

HEAD ELEV(FT)	HEAD ERROR(FT)	TOTAL FLOW(CFS)	FLOW ERROR(CFS)	% FLOW ERROR
1319.60	0.00	0	0	0.00
1322.90	0.00	150	0	0.00
1326.49	0.00	300	0	0.00
1327.12	-0.00	450	2	0.44
1327.21	-0.00	600	3	0.54
1327.27	-0.00	750	4	0.51
1327.33	-0.01	900	7	0.80
1327.37	-0.00	1000	4	0.45
1327.44	-0.00	1200	6	0.48
1327.48	-0.00	1350	4	0.28
1327.53	-0.01	1500	12	0.80

<1> TOLERANCE (FT) = 0.010

<2> TOLERANCE (%) = 1.000

Existing 10'x 3' RCB in Ridge Rd

2

CURRENT DATE: 01-30-1993
CURRENT TIME: 15:56:38

FILE DATE: 01-30-1993
FILE NAME: RIDG1BBL

CULVERT # 1

PERFORMANCE CURVE FOR 1 BARREL(S)

Q (cfs)	HWE (ft)	TWE (ft)	ICH (ft)	OCH (ft)	FLOW TYPE	CCE (ft)	FCE (ft)	TCE (ft)	VO (fps)
0	1319.60	1318.50	0.00	-0.30	0-NF	0.00	1319.60	0.00	0.00
150	1322.90	1318.50	3.30	2.96	6-FF	0.00	0.00	0.00	8.04
300	1326.49	1318.50	6.89	5.91	4-FF	0.00	0.00	0.00	10.00
319	1327.12	1318.50	7.52	6.33	4-FF	0.00	0.00	0.00	10.64
321	1327.20	1318.50	7.60	6.38	4-FF	0.00	0.00	0.00	10.72
323	1327.26	1318.50	7.66	6.43	4-FF	0.00	0.00	0.00	10.78
325	1327.32	1318.50	7.72	6.47	4-FF	0.00	0.00	0.00	10.84
326	1327.36	1318.50	7.76	6.49	4-FF	0.00	0.00	0.00	10.87
328	1327.43	1318.50	7.83	6.54	4-FF	0.00	0.00	0.00	10.94
330	1327.47	1318.50	7.87	6.57	4-FF	0.00	0.00	0.00	10.99
331	1327.52	1318.50	7.92	6.60	4-FF	0.00	0.00	0.00	11.03

El. inlet face invert 1319.60 ft El. outlet invert 1319.30 ft
El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

***** SITE DATA ***** CULVERT INVERT *****
INLET STATION (FT) 0.00
INLET ELEVATION (FT) 1319.60
OUTLET STATION (FT) 106.00
OUTLET ELEVATION (FT) 1319.30
NUMBER OF BARRELS 1.00
SLOPE (V-FT/H-FT) 0.0028
CULVERT LENGTH ALONG SLOPE (FT) 106.00

***** CULVERT DATA SUMMARY *****
BARREL SHAPE BOX
BARREL SPAN 10.00 FT
BARREL RISE 3.00 FT
BARREL MATERIAL CONCRETE
BARREL MANNING'S N 0.012
INLET TYPE CONVENTIONAL
INLET EDGE AND WALL SQUARE EDGE (0 DEG. FLARE)
INLET DEPRESSION NONE

Existing 10'x 3' RCB in Ridge Rd

3

CURRENT DATE: 01-30-1993
CURRENT TIME: 15:56:38

FILE DATE: 01-30-1993
FILE NAME: RIDG1BBL

~~~~~  
TAILWATER  
~~~~~

~~~~~  
CONSTANT WATER SURFACE ELEVATION  
1318.50  
~~~~~

~~~~~  
ROADWAY OVERTOPPING DATA  
~~~~~

ROADWAY SURFACE	PAVED
EMBANKMENT TOP WIDTH (FT)	30.00
CREST LENGTH (FT)	1000.00
OVERTOPPING CREST ELEVATION (FT)	1327.00

~~~~~

1

CURRENT DATE: 01-30-1993  
CURRENT TIME: 00:32:21FILE DATE: 01-30-1993  
FILE NAME: RIDG2BBLFHWA CULVERT ANALYSIS  
HY-8, VERSION 3.2

| SITE DATA |             |              |                | CULVERT SHAPE, MATERIAL, INLET |       |      |           |              |
|-----------|-------------|--------------|----------------|--------------------------------|-------|------|-----------|--------------|
| L         | INLET ELEV. | OUTLET ELEV. | CULVERT LENGTH | BARRELS SHAPE                  | SPAN  | RISE | MANNING n | INLET TYPE   |
|           | (FT)        | (FT)         | (FT)           |                                | (FT)  | (FT) |           |              |
| 1         | 1319.60     | 1319.30      | 106.00         | 2 RCB                          | 10.00 | 3.00 | .012      | CONVENTIONAL |
| 2         |             |              |                |                                |       |      |           |              |
| 3         |             |              |                |                                |       |      |           |              |
| 4         |             |              |                |                                |       |      |           |              |
| 5         |             |              |                |                                |       |      |           |              |
| 6         |             |              |                |                                |       |      |           |              |

## SUMMARY OF CULVERT FLOWS (CFS) FILE: RIDG2BBL DATE: 01-30-1993

| ELEV (FT) | TOTAL | 1   | 2 | 3 | 4 | 5 | 6 | ROADWAY ITR   |
|-----------|-------|-----|---|---|---|---|---|---------------|
| 1319.60   | 0     | 0   | 0 | 0 | 0 | 0 | 0 | 0 1           |
| 1321.61   | 150   | 150 | 0 | 0 | 0 | 0 | 0 | 0 1           |
| 1322.90   | 300   | 300 | 0 | 0 | 0 | 0 | 0 | 0 1           |
| 1324.43   | 450   | 450 | 0 | 0 | 0 | 0 | 0 | 0 1           |
| 1326.49   | 600   | 600 | 0 | 0 | 0 | 0 | 0 | 0 1           |
| 1327.11   | 750   | 638 | 0 | 0 | 0 | 0 | 0 | 109 11        |
| 1327.19   | 900   | 642 | 0 | 0 | 0 | 0 | 0 | 250 5         |
| 1327.26   | 1050  | 646 | 0 | 0 | 0 | 0 | 0 | 399 5         |
| 1327.32   | 1200  | 650 | 0 | 0 | 0 | 0 | 0 | 543 4         |
| 1327.38   | 1350  | 653 | 0 | 0 | 0 | 0 | 0 | 691 4         |
| 1327.43   | 1500  | 656 | 0 | 0 | 0 | 0 | 0 | 840 4         |
| 1327.00   | 631   | 631 | 0 | 0 | 0 | 0 | 0 | 0 OVERTOPPING |

## SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: RIDG2BBL DATE: 01-30-1993

| HEAD ELEV(FT) | HEAD ERROR(FT) | TOTAL FLOW(CFS) | FLOW ERROR(CFS) | % FLOW ERROR |
|---------------|----------------|-----------------|-----------------|--------------|
| 1319.60       | 0.00           | 0               | 0               | 0.00         |
| 1321.61       | 0.00           | 150             | 0               | 0.00         |
| 1322.90       | 0.00           | 300             | 0               | 0.00         |
| 1324.43       | 0.00           | 450             | 0               | 0.00         |
| 1326.49       | 0.00           | 600             | 0               | 0.00         |
| 1327.11       | -0.00          | 750             | 3               | 0.45         |
| 1327.19       | -0.00          | 900             | 8               | 0.88         |
| 1327.26       | -0.00          | 1050            | 4               | 0.42         |
| 1327.32       | -0.01          | 1200            | 7               | 0.62         |
| 1327.38       | -0.00          | 1350            | 6               | 0.44         |
| 1327.43       | -0.00          | 1500            | 5               | 0.31         |

&lt;1&gt; TOLERANCE (FT) = 0.010

&lt;2&gt; TOLERANCE (%) = 1.000

CURRENT DATE: 01-30-1993  
CURRENT TIME: 00:32:21

FILE DATE: 01-30-1993  
FILE NAME: RIDG2BBL

-----  
CULVERT # 1  
-----

PERFORMANCE CURVE FOR 2 BARREL(S)

| Q<br>(cfs) | HWE<br>(ft) | TWE<br>(ft) | ICH<br>(ft) | OCH<br>(ft) | FLOW<br>TYPE | CCE<br>(ft) | FCE<br>(ft) | TCE<br>(ft) | VO<br>(fps) |
|------------|-------------|-------------|-------------|-------------|--------------|-------------|-------------|-------------|-------------|
| 0          | 1319.60     | 1318.50     | 0.00        | -0.30       | 0-NF         | 0.00        | 1319.60     | 0.00        | 0.00        |
| 150        | 1321.61     | 1318.50     | 2.01        | 2.00        | 6-FF         | 0.00        | 0.00        | 0.00        | 6.39        |
| 300        | 1322.90     | 1318.50     | 3.30        | 2.96        | 6-FF         | 0.00        | 0.00        | 0.00        | 8.04        |
| 450        | 1324.43     | 1318.50     | 4.83        | 4.26        | 6-FF         | 0.00        | 0.00        | 0.00        | 9.21        |
| 600        | 1326.49     | 1318.50     | 6.89        | 5.91        | 4-FF         | 0.00        | 0.00        | 0.00        | 10.00       |
| 638        | 1327.10     | 1318.50     | 7.50        | 6.32        | 4-FF         | 0.00        | 0.00        | 0.00        | 10.63       |
| 642        | 1327.18     | 1318.50     | 7.58        | 6.38        | 4-FF         | 0.00        | 0.00        | 0.00        | 10.70       |
| 646        | 1327.25     | 1318.50     | 7.65        | 6.42        | 4-FF         | 0.00        | 0.00        | 0.00        | 10.77       |
| 650        | 1327.31     | 1318.50     | 7.71        | 6.46        | 4-FF         | 0.00        | 0.00        | 0.00        | 10.83       |
| 653        | 1327.37     | 1318.50     | 7.77        | 6.50        | 4-FF         | 0.00        | 0.00        | 0.00        | 10.88       |
| 656        | 1327.42     | 1318.50     | 7.82        | 6.53        | 4-FF         | 0.00        | 0.00        | 0.00        | 10.93       |

El. inlet face invert 1319.60 ft El. outlet invert 1319.30 ft  
El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

\*\*\*\*\* SITE DATA \*\*\*\*\* CULVERT INVERT \*\*\*\*\*

INLET STATION (FT) 0.00  
INLET ELEVATION (FT) 1319.60  
OUTLET STATION (FT) 106.00  
OUTLET ELEVATION (FT) 1319.30  
NUMBER OF BARRELS 2.00  
SLOPE (V-FT/H-FT) 0.0028  
CULVERT LENGTH ALONG SLOPE (FT) 106.00

\*\*\*\*\* CULVERT DATA SUMMARY \*\*\*\*\*

BARREL SHAPE BOX  
BARREL SPAN 10.00 FT  
BARREL RISE 3.00 FT  
BARREL MATERIAL CONCRETE  
BARREL MANNING'S N 0.012  
INLET TYPE CONVENTIONAL  
INLET EDGE AND WALL SQUARE EDGE (0 DEG. FLARE)  
INLET DEPRESSION NONE

3

CURRENT DATE: 01-30-1993  
CURRENT TIME: 00:32:21

FILE DATE: 01-30-1993  
FILE NAME: RIDG2BBL

-----  
TAILWATER  
-----

CONSTANT WATER SURFACE ELEVATION  
1318.50

-----  
ROADWAY OVERTOPPING DATA  
-----

|                                  |         |
|----------------------------------|---------|
| ROADWAY SURFACE                  | PAVED   |
| EMBANKMENT TOP WIDTH (FT)        | 30.00   |
| CREST LENGTH (FT)                | 1000.00 |
| OVERTOPPING CREST ELEVATION (FT) | 1327.00 |

-----

1

CURRENT DATE: 01-30-1993  
CURRENT TIME: 00:31:43

FILE DATE: 01-30-1993  
FILE NAME: RIDG3BBL

FEWA CULVERT ANALYSIS  
HY-8, VERSION 3.2

| SITE DATA |         |         |         | CULVERT SHAPE, MATERIAL, INLET |       |      |         |              |
|-----------|---------|---------|---------|--------------------------------|-------|------|---------|--------------|
| L         | INLET   | OUTLET  | CULVERT | BARRELS                        | SPAN  | RISE | MANNING | INLET        |
| V         | ELEV.   | ELEV.   | LENGTH  | SHAPE                          | (FT)  | (FT) | n       | TYPE         |
|           | (FT)    | (FT)    | (FT)    | MATERIAL                       |       |      |         |              |
| 1         | 1319.60 | 1319.30 | 106.00  | 3 RCB                          | 10.00 | 3.00 | .012    | CONVENTIONAL |
| 2         |         |         |         |                                |       |      |         |              |
| 3         |         |         |         |                                |       |      |         |              |
| 4         |         |         |         |                                |       |      |         |              |
| 5         |         |         |         |                                |       |      |         |              |
| 6         |         |         |         |                                |       |      |         |              |

SUMMARY OF CULVERT FLOWS (CFS) FILE: RIDG3BBL DATE: 01-30-1993

| ELEV (FT) | TOTAL | 1   | 2 | 3 | 4 | 5 | 6 | ROADWAY | ITR         |
|-----------|-------|-----|---|---|---|---|---|---------|-------------|
| 1319.60   | 0     | 0   | 0 | 0 | 0 | 0 | 0 | 0       | 1           |
| 1321.35   | 150   | 150 | 0 | 0 | 0 | 0 | 0 | 0       | 1           |
| 1322.04   | 300   | 300 | 0 | 0 | 0 | 0 | 0 | 0       | 1           |
| 1322.90   | 450   | 450 | 0 | 0 | 0 | 0 | 0 | 0       | 1           |
| 1323.87   | 600   | 600 | 0 | 0 | 0 | 0 | 0 | 0       | 1           |
| 1325.05   | 750   | 750 | 0 | 0 | 0 | 0 | 0 | 0       | 1           |
| 1326.49   | 900   | 900 | 0 | 0 | 0 | 0 | 0 | 0       | 1           |
| 1327.10   | 1050  | 955 | 0 | 0 | 0 | 0 | 0 | 89      | 11          |
| 1327.18   | 1200  | 963 | 0 | 0 | 0 | 0 | 0 | 228     | 5           |
| 1327.25   | 1350  | 969 | 0 | 0 | 0 | 0 | 0 | 369     | 4           |
| 1327.31   | 1500  | 974 | 0 | 0 | 0 | 0 | 0 | 517     | 4           |
| 1327.00   | 947   | 947 | 0 | 0 | 0 | 0 | 0 | 0       | OVERTOPPING |

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: RIDG3BBL DATE: 01-30-1993

| HEAD<br>ELEV(FT) | HEAD<br>ERROR(FT) | TOTAL<br>FLOW(CFS) | FLOW<br>ERROR(CFS) | % FLOW<br>ERROR |
|------------------|-------------------|--------------------|--------------------|-----------------|
| 1319.60          | 0.00              | 0                  | 0                  | 0.00            |
| 1321.35          | 0.00              | 150                | 0                  | 0.00            |
| 1322.04          | 0.00              | 300                | 0                  | 0.00            |
| 1322.90          | 0.00              | 450                | 0                  | 0.00            |
| 1323.87          | 0.00              | 600                | 0                  | 0.00            |
| 1325.05          | 0.00              | 750                | 0                  | 0.00            |
| 1326.49          | 0.00              | 900                | 0                  | 0.00            |
| 1327.10          | -0.01             | 1050               | 6                  | 0.55            |
| 1327.18          | -0.01             | 1200               | 9                  | 0.73            |
| 1327.25          | -0.01             | 1350               | 12                 | 0.89            |
| 1327.31          | -0.01             | 1500               | 9                  | 0.59            |

<1> TOLERANCE (FT) = 0.010

<2> TOLERANCE (%) = 1.000

CURRENT DATE: 01-30-1993  
CURRENT TIME: 00:31:43

FILE DATE: 01-30-1993  
FILE NAME: RIDG3BBL

-----  
CULVERT # 1  
-----

PERFORMANCE CURVE FOR 3 BARREL(S)

| Q<br>(cfs) | HWE<br>(ft) | TWE<br>(ft) | ICH<br>(ft) | OCH<br>(ft) | FLOW<br>TYPE | CCE<br>(ft) | FCE<br>(ft) | TCE<br>(ft) | VO<br>(fps) |
|------------|-------------|-------------|-------------|-------------|--------------|-------------|-------------|-------------|-------------|
| 0          | 1319.60     | 1318.50     | 0.00        | -0.30       | 0-NF         | 0.00        | 1319.60     | 0.00        | 0.00        |
| 150        | 1321.35     | 1318.50     | 1.55        | 1.75        | 6-FF         | 0.00        | 0.00        | 0.00        | 5.43        |
| 300        | 1322.04     | 1318.50     | 2.44        | 2.29        | 6-FF         | 0.00        | 0.00        | 0.00        | 7.07        |
| 450        | 1322.90     | 1318.50     | 3.30        | 2.96        | 6-FF         | 0.00        | 0.00        | 0.00        | 8.04        |
| 600        | 1323.87     | 1318.50     | 4.27        | 3.79        | 6-FF         | 0.00        | 0.00        | 0.00        | 8.91        |
| 750        | 1325.05     | 1318.50     | 5.45        | 4.77        | 6-FF         | 0.00        | 0.00        | 0.00        | 9.45        |
| 900        | 1326.49     | 1318.50     | 6.89        | 5.91        | 4-FF         | 0.00        | 0.00        | 0.00        | 10.00       |
| 955        | 1327.10     | 1318.50     | 7.50        | 6.32        | 4-FF         | 0.00        | 0.00        | 0.00        | 10.62       |
| 963        | 1327.18     | 1318.50     | 7.58        | 6.37        | 4-FF         | 0.00        | 0.00        | 0.00        | 10.70       |
| 969        | 1327.25     | 1318.50     | 7.65        | 6.42        | 4-FF         | 0.00        | 0.00        | 0.00        | 10.77       |
| 974        | 1327.31     | 1318.50     | 7.71        | 6.46        | 4-FF         | 0.00        | 0.00        | 0.00        | 10.83       |

El. inlet face invert 1319.60 ft El. outlet invert 1319.30 ft  
El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

\*\*\*\*\* SITE DATA \*\*\*\*\* CULVERT INVERT \*\*\*\*\*  
INLET STATION (FT) 0.00  
INLET ELEVATION (FT) 1319.60  
OUTLET STATION (FT) 106.00  
OUTLET ELEVATION (FT) 1319.30  
NUMBER OF BARRELS 3.00  
SLOPE (V-FT/H-FT) 0.0028  
CULVERT LENGTH ALONG SLOPE (FT) 106.00

\*\*\*\*\* CULVERT DATA SUMMARY \*\*\*\*\*  
BARREL SHAPE BOX  
BARREL SPAN 10.00 FT  
BARREL RISE 3.00 FT  
BARREL MATERIAL CONCRETE  
BARREL MANNING'S N 0.012  
INLET TYPE CONVENTIONAL  
INLET EDGE AND WALL SQUARE EDGE (0 DEG. FLARE)  
INLET DEPRESSION NONE

3

CURRENT DATE: 01-30-1993  
CURRENT TIME: 00:31:43

FILE DATE: 01-30-1993  
FILE NAME: RIDG3BBL

-----  
TAILWATER  
-----

CONSTANT WATER SURFACE ELEVATION  
1318.50

-----  
ROADWAY OVERTOPPING DATA  
-----

|                                  |         |
|----------------------------------|---------|
| ROADWAY SURFACE                  | PAVED   |
| EMBANKMENT TOP WIDTH (FT)        | 30.00   |
| CREST LENGTH (FT)                | 1000.00 |
| OVERTOPPING CREST ELEVATION (FT) | 1327.00 |

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1

CURRENT DATE: 01-30-1993  
CURRENT TIME: 00:30:39FILE DATE: 01-30-1993  
FILE NAME: RIDG4BBLFHWA CULVERT ANALYSIS  
HY-8, VERSION 3.2

| SITE DATA        |                   |                     |         | CULVERT SHAPE, MATERIAL, INLET |           |           |           |              |
|------------------|-------------------|---------------------|---------|--------------------------------|-----------|-----------|-----------|--------------|
| INLET ELEV. (FT) | OUTLET ELEV. (FT) | CULVERT LENGTH (FT) | BARRELS | SHAPE                          | SPAN (FT) | RISE (FT) | MANNING n | INLET TYPE   |
| 1319.60          | 1319.30           | 106.00              | 4 RCB   |                                | 10.00     | 3.00      | .012      | CONVENTIONAL |
| 2                |                   |                     |         |                                |           |           |           |              |
| 3                |                   |                     |         |                                |           |           |           |              |
| 4                |                   |                     |         |                                |           |           |           |              |
| 5                |                   |                     |         |                                |           |           |           |              |
| 6                |                   |                     |         |                                |           |           |           |              |

## SUMMARY OF CULVERT FLOWS (CFS) FILE: RIDG4BBL DATE: 01-30-1993

| ELEV (FT) | TOTAL | 1    | 2 | 3 | 4 | 5 | 6 | ROADWAY ITR   |
|-----------|-------|------|---|---|---|---|---|---------------|
| 1319.60   | 0     | 0    | 0 | 0 | 0 | 0 | 0 | 0 1           |
| 1321.23   | 150   | 150  | 0 | 0 | 0 | 0 | 0 | 0 1           |
| 1321.61   | 300   | 300  | 0 | 0 | 0 | 0 | 0 | 0 1           |
| 1322.25   | 450   | 450  | 0 | 0 | 0 | 0 | 0 | 0 1           |
| 1322.90   | 600   | 600  | 0 | 0 | 0 | 0 | 0 | 0 1           |
| 1323.61   | 750   | 750  | 0 | 0 | 0 | 0 | 0 | 0 1           |
| 1324.43   | 900   | 900  | 0 | 0 | 0 | 0 | 0 | 0 1           |
| 1325.39   | 1050  | 1050 | 0 | 0 | 0 | 0 | 0 | 0 1           |
| 1326.49   | 1200  | 1200 | 0 | 0 | 0 | 0 | 0 | 0 1           |
| 1327.08   | 1350  | 1272 | 0 | 0 | 0 | 0 | 0 | 68 11         |
| 1327.17   | 1500  | 1283 | 0 | 0 | 0 | 0 | 0 | 207 5         |
| 1327.00   | 1262  | 1262 | 0 | 0 | 0 | 0 | 0 | 0 OVERTOPPING |

## SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: RIDG4BBL DATE: 01-30-1993

| HEAD ELEV (FT) | HEAD ERROR (FT) | TOTAL FLOW (CFS) | FLOW ERROR (CFS) | % FLOW ERROR |
|----------------|-----------------|------------------|------------------|--------------|
| 1319.60        | 0.00            | 0                | 0                | 0.00         |
| 1321.23        | 0.00            | 150              | 0                | 0.00         |
| 1321.61        | 0.00            | 300              | 0                | 0.00         |
| 1322.25        | 0.00            | 450              | 0                | 0.00         |
| 1322.90        | 0.00            | 600              | 0                | 0.00         |
| 1323.61        | 0.00            | 750              | 0                | 0.00         |
| 1324.43        | 0.00            | 900              | 0                | 0.00         |
| 1325.39        | 0.00            | 1050             | 0                | 0.00         |
| 1326.49        | 0.00            | 1200             | 0                | 0.00         |
| 1327.08        | -0.01           | 1350             | 10               | 0.75         |
| 1327.17        | -0.01           | 1500             | 10               | 0.67         |

&lt;1&gt; TOLERANCE (FT) = 0.010

&lt;2&gt; TOLERANCE (%) = 1.000

CURRENT DATE: 01-30-1993  
CURRENT TIME: 00:30:39

FILE DATE: 01-30-1993  
FILE NAME: RIDG4BBL

-----  
CULVERT # 1  
-----

PERFORMANCE CURVE FOR 4 BARREL(S)

| Q<br>(cfs) | HWE<br>(ft) | TWE<br>(ft) | ICH<br>(ft) | OCH<br>(ft) | FLOW<br>TYPE | CCE<br>(ft) | FCE<br>(ft) | TCE<br>(ft) | VO<br>(fps) |
|------------|-------------|-------------|-------------|-------------|--------------|-------------|-------------|-------------|-------------|
| 0          | 1319.60     | 1318.50     | 0.00        | -0.30       | 0-NF         | 0.00        | 1319.60     | 0.00        | 0.00        |
| 150        | 1321.23     | 1318.50     | 1.29        | 1.63        | 6-FF         | 0.00        | 0.00        | 0.00        | 4.93        |
| 300        | 1321.61     | 1318.50     | 2.01        | 2.00        | 6-FF         | 0.00        | 0.00        | 0.00        | 6.39        |
| 450        | 1322.25     | 1318.50     | 2.65        | 2.44        | 6-FF         | 0.00        | 0.00        | 0.00        | 7.35        |
| 600        | 1322.90     | 1318.50     | 3.30        | 2.96        | 6-FF         | 0.00        | 0.00        | 0.00        | 8.04        |
| 750        | 1323.61     | 1318.50     | 4.01        | 3.56        | 6-FF         | 0.00        | 0.00        | 0.00        | 8.72        |
| 900        | 1324.43     | 1318.50     | 4.83        | 4.26        | 6-FF         | 0.00        | 0.00        | 0.00        | 9.21        |
| 1050       | 1325.39     | 1318.50     | 5.79        | 5.13        | 2-M2         | 0.00        | 0.00        | 0.00        | 9.43        |
| 1200       | 1326.49     | 1318.50     | 6.89        | 5.91        | 4-FF         | 0.00        | 0.00        | 0.00        | 10.00       |
| 1272       | 1327.08     | 1318.50     | 7.48        | 6.31        | 4-FF         | 0.00        | 0.00        | 0.00        | 10.60       |
| 1283       | 1327.17     | 1318.50     | 7.57        | 6.37        | 4-FF         | 0.00        | 0.00        | 0.00        | 10.69       |

El. inlet face invert 1319.60 ft El. outlet invert 1319.30 ft  
El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

\*\*\*\*\* SITE DATA \*\*\*\*\* CULVERT INVERT \*\*\*\*\*  
INLET STATION (FT) 0.00  
INLET ELEVATION (FT) 1319.60  
OUTLET STATION (FT) 106.00  
OUTLET ELEVATION (FT) 1319.30  
NUMBER OF BARRELS 4.00  
SLOPE (V-FT/H-FT) 0.0028  
CULVERT LENGTH ALONG SLOPE (FT) 106.00

\*\*\*\*\* CULVERT DATA SUMMARY \*\*\*\*\*  
BARREL SHAPE BOX  
BARREL SPAN 10.00 FT  
BARREL RISE 3.00 FT  
BARREL MATERIAL CONCRETE  
BARREL MANNING'S N 0.012  
INLET TYPE CONVENTIONAL  
INLET EDGE AND WALL SQUARE EDGE (0 DEG. FLARE)  
INLET DEPRESSION NONE

3

CURRENT DATE: 01-30-1993  
CURRENT TIME: 00:30:39

FILE DATE: 01-30-1993  
FILE NAME: RIDG4BBL

-----  
TAILWATER  
-----

CONSTANT WATER SURFACE ELEVATION  
1318.50

-----  
ROADWAY OVERTOPPING DATA  
-----

|                                  |         |
|----------------------------------|---------|
| ROADWAY SURFACE                  | PAVED   |
| EMBANKMENT TOP WIDTH (FT)        | 30.00   |
| CREST LENGTH (FT)                | 1000.00 |
| OVERTOPPING CREST ELEVATION (FT) | 1327.00 |

-----

```
*****
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* FEBRUARY 1981 *
* REVISED 02 AUG 88 *
* RUN DATE 02/06/1993 TIME 14:16:00 *
*****
```

```
*****
* U.S. ARMY CORPS OF ENGINEERS *
* THE HYDROLOGIC ENGINEERING CENTER *
* 609 SECOND STREET *
* DAVIS, CALIFORNIA 95616 *
* (916) 551-1748 *
*****
```

```

X   X XXXXXXX XXXX   X
X   X X   X   X   XX
X   X X   X   X   X
XXXXXX XXXX   X   XXXX X
X   X X   X   X   X
X   X X   X   X   X
X   X XXXXXXX XXXX   XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.  
THE DEFINITION OF -AMSK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION  
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,  
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION  
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

## HEC-1 INPUT

PAGE 1

```

LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
1         ID      FOREST LAKES & REFLECTION RIDGE 6TH, 7TH & 8TH
2         ID      PROJ NO 36-92431-2273
3         ID      ANALYSIS OF POND AT SW COR 29TH & RIDGE
4         ID      MODEL SOUTH FOREST LAKES POND & RR6 POND AS ONE BASIN
5         ID      100-YR 24-HR STORMS
6         ID      FOUR OPTIONAL OUTLETS AT RIDGE ROAD
7         ID      PROFESSIONAL ENGINEERING CONSULTANTS, P.A.
8         ID      WICHITA, KANSAS
9         ID      MWB 02/06/93
10        ID      FILE:FORLKS\QREVPND.HEC

*** LIST ***
*** FREE ***

          *DIAGRAM
11        IT      6 01FEB93   0600       0 02FEB93   1154
12        IN      30 01FEB93   0600
13        IO      3      0
14        JP      4
          *
          * JR PREC 0.5938 0.6875 0.9063 1.0000
          *
          * NO FOR LKS DRAIN BASIN - UNDEV., CULT.
          *

15        KK      FL1
16        BA      0.122
17        PB      7.8
18        PC      0.08   0.09   0.10   0.11   0.12   0.133   0.147   0.163   0.181   0.204
19        PC      0.235   0.283   0.663   0.735   0.772   0.799   0.820   0.835   0.850   0.865
20        PC      0.880   0.890   0.900   0.910   0.916   0.925   0.934   0.943   0.952   0.958
21        PC      0.964   0.970   0.976   0.982   0.988   0.994   1.000
22        LS      0      80      0
23        UD      0.55
          *
          * NO FOR LKS DET POND - BANK EL=1332, STATIC POOL = 1328
          *
          * 2-7'X4' RCB USED FOR FLOOD ROUTING
          *

24        KK      FLPND1
25        RS      1      ELEV 1328.0
26        SA      1.80   2.40
27        SE      1328.0 1332.0
          * 2-8X4 DATA
28        SQ      0      56      84      120      154      196      238      280      322
29        SE      1328.0 1329.2 1329.6 1330.0 1330.4 1330.8 1331.2 1331.6 1332.0
          *
          * MID FOR LKS BASIN - 1/4 AC RES, 38% IMP
          *

30        KK      FL2
31        BA      .0902
32        PB      7.8
33        PC      0.08   0.09   0.10   0.11   0.12   0.133   0.147   0.163   0.181   0.204
34        PC      0.235   0.283   0.663   0.735   0.772   0.799   0.820   0.835   0.850   0.865
35        PC      0.880   0.890   0.900   0.910   0.916   0.925   0.934   0.943   0.952   0.958
36        PC      0.964   0.970   0.976   0.982   0.988   0.994   1.000
37        LS      0      76      38

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## HEC-1 INPUT

PAGE 2

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LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
38        UD      0.21
*
*      ADD HYDROGRAPHS FOR MID FOR LKS DET POND
*
39        KK      FL12
40        HC      2      0
*
*      MID FOR LKS DET PND  BANK EL 1329, STATIC POOL = 1325
*      15 FT WEIR  USED FOR FLOOD ROUTING
*
41        KK      FLPND2
42        RS      1      ELEV 1325.0
43        SA      6.8    8.7
44        SE      1325.0 1329.0
45        SS      1325.0 15.0    3.0    1.5
* SQ/SE CARDS NOT USED IN THIS RUN
* SQ  0  84.0 126.0 180.6 231.0 294.0 357.0 420.0 483.0
* SE1325.0 1326.2 1326.6 1327.0 1327.4 1327.8 1328.2 1328.6 1329.0
*
*      SO FOR LKS BASIN - 1/4 AC RES 38 % IMP
*
46        KK      FL3
47        BA      .0922
48        PB      7.8
49        PC      0.08    0.09    0.10    0.11    0.12    0.133    0.147    0.163    0.181    0.204
50        PC      0.235    0.283    0.663    0.735    0.772    0.799    0.820    0.835    0.850    0.865
51        PC      0.880    0.890    0.900    0.910    0.916    0.925    0.934    0.943    0.952    0.958
52        PC      0.964    0.970    0.976    0.982    0.988    0.994    1.000
53        LS      0      68      38
54        UD      0.27
*
*      ADD HYDROGRAPHS FROM 3 FOR LKS BASINS FOR FLOOD ROUTING
*
55        KK      FL123
56        HC      2      0
*
* *****
*      SO FOR LKS POND NOT USED THIS RUN
*      ITS STORAGE ADDED TO POND AT 29TH & RIDGE IN RR6
* *****
*      SO FOR LKS DET POND - BANK EL=1326  STATIC POOL =1322
*      2-8'X4' RCB USED FOR FLOOD ROUTING
* KK FLPND3
* KP      3
* KO      1      0
* RS      1      ELEV 1322.0
* SA      5.4    6.2
* SE1322.0 1326.0
* 3-8X4DATA 96    144    206.4 264.0 336.0 408.0 480.0 552.0
* SQ      0      64      84      120      154      196      272      320      368
* SE1322.0 1323.2 1323.6 1324.0 1324.4 1324.8 1325.2 1325.6 1326.0
*

```

## HEC-1 INPUT

PAGE 3

| LINE | ID         | 1                                      | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10    |  |
|------|------------|----------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--|
| 57   | KK WRR7\$8 | AREA WEST OF RR 7TH & 8TH              |       |       |       |       |       |       |       |       |       |  |
| 58   | BA         | 0.1094                                 |       |       |       |       |       |       |       |       |       |  |
| 59   | PB         | 7.8                                    |       |       |       |       |       |       |       |       |       |  |
| 60   | PC         | 0.08                                   | 0.09  | 0.10  | 0.11  | 0.12  | 0.133 | 0.147 | 0.163 | 0.181 | 0.204 |  |
| 61   | PC         | 0.235                                  | 0.283 | 0.663 | 0.735 | 0.772 | 0.799 | 0.820 | 0.835 | 0.850 | 0.865 |  |
| 62   | PC         | 0.880                                  | 0.890 | 0.900 | 0.910 | 0.916 | 0.925 | 0.934 | 0.943 | 0.952 | 0.958 |  |
| 63   | PC         | 0.964                                  | 0.970 | 0.976 | 0.982 | 0.988 | 0.994 | 1.000 |       |       |       |  |
| 64   | LS         | 0                                      | 72    | 0     |       |       |       |       |       |       |       |  |
| 65   | UD         | 0.15                                   |       |       |       |       |       |       |       |       |       |  |
|      | *          |                                        |       |       |       |       |       |       |       |       |       |  |
|      | *          | AREA NO OF 29TH & WEST OF FOREST LAKES |       |       |       |       |       |       |       |       |       |  |
| 66   | KK WFORLKS | AREA WEST OF FOREST LAKES              |       |       |       |       |       |       |       |       |       |  |
| 67   | BA         | .3831                                  |       |       |       |       |       |       |       |       |       |  |
| 68   | PB         | 7.8                                    |       |       |       |       |       |       |       |       |       |  |
| 69   | PC         | 0.08                                   | 0.09  | 0.10  | 0.11  | 0.12  | 0.133 | 0.147 | 0.163 | 0.181 | 0.204 |  |
| 70   | PC         | 0.235                                  | 0.283 | 0.663 | 0.735 | 0.772 | 0.799 | 0.820 | 0.835 | 0.850 | 0.865 |  |
| 71   | PC         | 0.880                                  | 0.890 | 0.900 | 0.910 | 0.916 | 0.925 | 0.934 | 0.943 | 0.952 | 0.958 |  |
| 72   | PC         | 0.964                                  | 0.970 | 0.976 | 0.982 | 0.988 | 0.994 | 1.000 |       |       |       |  |
| 73   | LS         | 0                                      | 74    | 0     |       |       |       |       |       |       |       |  |
| 74   | UD         | 0.97                                   |       |       |       |       |       |       |       |       |       |  |
| 75   | KK WTIME   | COMB FLOW IN S DT 29TH W OF TEE TIME   |       |       |       |       |       |       |       |       |       |  |
| 76   | RC         | 2                                      | 0     |       |       |       |       |       |       |       |       |  |
| 77   | KK RR7\$8  | AREA OF RR 7TH & 8TH                   |       |       |       |       |       |       |       |       |       |  |
| 78   | BA         | 0.078                                  |       |       |       |       |       |       |       |       |       |  |
| 79   | PB         | 7.8                                    |       |       |       |       |       |       |       |       |       |  |
| 80   | PC         | 0.08                                   | 0.09  | 0.10  | 0.11  | 0.12  | 0.133 | 0.147 | 0.163 | 0.181 | 0.204 |  |
| 81   | PC         | 0.235                                  | 0.283 | 0.663 | 0.735 | 0.772 | 0.799 | 0.820 | 0.835 | 0.850 | 0.865 |  |
| 82   | PC         | 0.880                                  | 0.890 | 0.900 | 0.910 | 0.916 | 0.925 | 0.934 | 0.943 | 0.952 | 0.958 |  |
| 83   | PC         | 0.964                                  | 0.970 | 0.976 | 0.982 | 0.988 | 0.994 | 1.000 |       |       |       |  |
| 84   | LS         | 0                                      | 72    | 0     |       |       |       |       |       |       |       |  |
| 85   | UD         | 0.15                                   |       |       |       |       |       |       |       |       |       |  |
|      | *          |                                        |       |       |       |       |       |       |       |       |       |  |
|      | *          | COMB FLOW IN SOUTH DITCH OF 29TH       |       |       |       |       |       |       |       |       |       |  |
|      | *          |                                        |       |       |       |       |       |       |       |       |       |  |
| 86   | KK DITCH   |                                        |       |       |       |       |       |       |       |       |       |  |
| 87   | RC         | 2                                      | 0     |       |       |       |       |       |       |       |       |  |
|      | *          |                                        |       |       |       |       |       |       |       |       |       |  |
|      | *          |                                        |       |       |       |       |       |       |       |       |       |  |
| 88   | KK WW      | BASIN WW -- RESERVE AROUND POND #4     |       |       |       |       |       |       |       |       |       |  |
| 89   | BA         | .0094                                  |       |       |       |       |       |       |       |       |       |  |
| 90   | PB         | 7.8                                    |       |       |       |       |       |       |       |       |       |  |
| 91   | PC         | 0.08                                   | 0.09  | 0.10  | 0.11  | 0.12  | 0.133 | 0.147 | 0.163 | 0.181 | 0.204 |  |
| 92   | PC         | 0.235                                  | 0.283 | 0.663 | 0.735 | 0.772 | 0.799 | 0.820 | 0.835 | 0.850 | 0.865 |  |
| 93   | PC         | 0.880                                  | 0.890 | 0.900 | 0.910 | 0.916 | 0.925 | 0.934 | 0.943 | 0.952 | 0.958 |  |
| 94   | PC         | 0.964                                  | 0.970 | 0.976 | 0.982 | 0.988 | 0.994 | 1.000 |       |       |       |  |
| 95   | LS         | 0                                      | 98    | 0     |       |       |       |       |       |       |       |  |
| 96   | UD         | 0.10                                   |       |       |       |       |       |       |       |       |       |  |

## HEC-1 INPUT

PAGE 4

| LINE | ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10               |
|------|-------------------------------------------------------------------------------|
| 97   | KK INPND4                                                                     |
| 98   | HC 3 0                                                                        |
| 99   | KK POND4 STAGE-STORAGE THRU POND #4 AT 29TH & RIDGE                           |
| 100  | KP 1                                                                          |
| 101  | * PLAN 1 IS 1-10X3 RCBB AT RIDGE ROAD                                         |
|      | RS 1 ELEV 1319.6                                                              |
|      | * SA/ SE CARDS NOT USED---DATA FOR RR6 POND #4                                |
|      | * SA 2.5 3.8 6.1                                                              |
|      | * SE 1319.6 1325.7 1328.0                                                     |
|      | * SV/SE DATA FOR COMBINED PONDS                                               |
| 102  | SV 0 5.4 6.6 20.5 27.8 37.5 43.5 50.0 60.0                                    |
| 103  | SE 1319.6 1321.6 1322 1323.6 1324.4 1325.4 1326.0 1327 1328                   |
| 104  | SQ 0 150 300 315 600 900 1000 1200 1350 1500                                  |
| 105  | SE 1319.6 1322.9 1326.5 1327.0 1327.2 1327.33 1327.37 1327.44 1327.48 1327.53 |
| 106  | KP 2                                                                          |
|      | * PLAN 2 IS 2-10X3 RCBB AT RIDGE ROAD                                         |
| 107  | RS 1 ELEV 1319.6                                                              |
|      | * SA/ SE CARDS NOT USED---DATA FOR RR6 POND #4                                |
|      | * SA 2.5 3.8 6.1                                                              |
|      | * SE 1319.6 1325.7 1328.0                                                     |
|      | * SV/SE DATA FOR COMBINED PONDS                                               |
| 108  | SV 0 5.4 6.6 20.5 27.8 37.5 43.5 50.0 60.0                                    |
| 109  | SE 1319.6 1321.6 1322 1323.6 1324.4 1325.4 1326.0 1327 1328                   |
| 110  | SQ 0 150 300 450 600 631 750 900 1200 1400                                    |
| 111  | SE 1319.6 1321.6 1322.9 1324.4 1326.5 1327.0 1327.1 1327.2 1327.3 1327.4      |
| 112  | KP 3                                                                          |
| 113  | KO 1 0                                                                        |
|      | * PLAN 3 IS 3-10X3 RCBB AT RIDGE ROAD                                         |
| 114  | RS 1 ELEV 1319.6                                                              |
|      | * SA/ SE CARDS NOT USED---DATA FOR RR6 POND #4                                |
|      | * SA 2.5 3.8 6.1                                                              |
|      | * SE 1319.6 1325.7 1328.0                                                     |
|      | * SV/SE DATA FOR COMBINED PONDS                                               |
| 115  | SV 0 5.4 6.6 20.5 27.8 37.5 43.5 50.0 60.0                                    |
| 116  | SE 1319.6 1321.6 1322 1323.6 1324.4 1325.4 1326.0 1327 1328                   |
| 117  | SQ 0 300 450 600 750 900 947 1050 1200 1500                                   |
| 118  | SE 1319.6 1322.0 1322.9 1323.9 1325.1 1326.5 1327.0 1327.1 1327.2 1327.3      |
| 119  | KP 4                                                                          |
|      | * PLAN 4 IS 4-10X3 RCBB AT RIDGE ROAD                                         |
| 120  | RS 1 ELEV 1319.6                                                              |
|      | * SA/ SE CARDS NOT USED---DATA FOR RR6 POND #4                                |
|      | * SA 2.5 3.8 6.1                                                              |
|      | * SE 1319.6 1325.7 1328.0                                                     |
|      | * SV/SE DATA FOR COMBINED PONDS                                               |
| 121  | SV 0 5.4 6.6 20.5 27.8 37.5 43.5 50.0 60.0                                    |
| 122  | SE 1319.6 1321.6 1322 1323.6 1324.4 1325.4 1326.0 1327 1328                   |
| 123  | SQ 0 300 450 600 750 900 1050 1200 1262 1500                                  |
| 124  | SE 1319.6 1321.6 1322.2 1322.9 1323.6 1324.4 1325.4 1326.5 1327.0 1327.2      |
| 125  | ZZ                                                                            |

## SCHEMATIC DIAGRAM OF STREAM NETWORK

| INPUT<br>LINE | (V) ROUTING   | (--->) DIVERSION OR PUMP FLOW            |
|---------------|---------------|------------------------------------------|
| NO.           | (.) CONNECTOR | (<---) RETURN OF DIVERTED OR PUMPED FLOW |
| 15            | FL1           |                                          |
|               | V             |                                          |
|               | V             |                                          |
| 24            | FLPND1        |                                          |
|               | .             |                                          |
| 30            | .             | FL2                                      |
|               | .             |                                          |
|               | .             |                                          |
| 39            | FL12.....     |                                          |
|               | V             |                                          |
|               | V             |                                          |
| 41            | FLPND2        |                                          |
|               | .             |                                          |
| 46            | .             | FL3                                      |
|               | .             |                                          |
|               | .             |                                          |
| 55            | FL123.....    |                                          |
|               | .             |                                          |
| 57            | .             | WRR7\$8                                  |
|               | .             |                                          |
| 66            | .             | WFORLKS                                  |
|               | .             |                                          |
| 75            | .             | WTIME.....                               |
|               | .             |                                          |
| 77            | .             | RR7\$8                                   |
|               | .             |                                          |
| 86            | .             | DITCH.....                               |
|               | .             |                                          |
| 88            | .             | WW                                       |
|               | .             |                                          |
| 97            | INPND4.....   |                                          |
|               | V             |                                          |
|               | V             |                                          |
| 99            | POND4         |                                          |

(\*\*\*) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1)
* FEBRUARY 1981
* REVISED 02 AUG 88
*
* RUN DATE 02/06/1993 TIME 14:16:00
*
*****
```

```
*****
*
* U.S. ARMY CORPS OF ENGINEERS
* THE HYDROLOGIC ENGINEERING CENTER
* 609 SECOND STREET
* DAVIS, CALIFORNIA 95616
* (916) 551-1748
*
*****
```

FOREST LAKES & REFLECTION RIDGE 6TH, 7TH & 8TH  
PROJ NO 36-92431-2273  
ANALYSIS OF POND AT SW COR 29TH & RIDGE  
MODEL SOUTH FOREST LAKES POND & RR6 POND AS ONE BASIN  
100-YR 24-HR STORMS  
FOUR OPTIONAL OUTLETS AT RIDGE ROAD  
PROFESSIONAL ENGINEERING CONSULTANTS, P.A.  
WICHITA, KANSAS  
MWB 02/06/93  
FILE:FORLKS\QREVEND.HEC

13 IO OUTPUT CONTROL VARIABLES  
IPRNT 3 PRINT CONTROL  
IPILOT 0 PLOT CONTROL  
QSCAL 0. HYDROGRAPH PLOT SCALE

IT HYDROGRAPH TIME DATA  
NMIN 6 MINUTES IN COMPUTATION INTERVAL  
IDATE 1FEB93 STARTING DATE  
ITIME 0600 STARTING TIME  
NQ 300 NUMBER OF HYDROGRAPH ORDINATES  
NDDATE 2FEB93 ENDING DATE  
NDTIME 1154 ENDING TIME  
ICENT 19 CENTURY MARK

COMPUTATION INTERVAL .10 HOURS  
TOTAL TIME BASE 29.90 HOURS

ENGLISH UNITS  
DRAINAGE AREA SQUARE MILES  
PRECIPITATION DEPTH INCHES  
LENGTH, ELEVATION FEET  
FLOW CUBIC FEET PER SECOND  
STORAGE VOLUME ACRE-FEET  
SURFACE AREA ACRES  
TEMPERATURE DEGREES FAHRENHEIT

JP MULTI-PLAN OPTION  
NPLAN 4 NUMBER OF PLANS

JR MULTI-RATIO OPTION  
RATIOS OF RUNOFF  
1.00

\*\*\* \*\*

```
*****
*
*
* FL1
*
*****
```

12 IN TIME DATA FOR INPUT TIME SERIES  
JXMIN 30 TIME INTERVAL IN MINUTES  
JXDATE 1FEB93 STARTING DATE  
JXTIME 600 STARTING TIME

SUBBASIN RUNOFF DATA

16 BA SUBBASIN CHARACTERISTICS  
TAREA .12 SUBBASIN AREA

PRECIPITATION DATA

[illegible]

PLAN 3 INPUT DATA FOR STATION FL1 ARE SAME AS FOR PLAN 1

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PLAN 4 INPUT DATA FOR STATION FL1 ARE SAME AS FOR PLAN 1

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24 KK \* FLPND1 \*  
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#### HYDROGRAPH ROUTING DATA

|       |                 |         |                             |         |         |         |         |         |         |         |
|-------|-----------------|---------|-----------------------------|---------|---------|---------|---------|---------|---------|---------|
| 25 RS | STORAGE ROUTING |         |                             |         |         |         |         |         |         |         |
|       | NSTPS           | 1       | NUMBER OF SUBREACHES        |         |         |         |         |         |         |         |
|       | ITYP            | ELEV    | TYPE OF INITIAL CONDITION   |         |         |         |         |         |         |         |
|       | RSVRIC          | 1328.00 | INITIAL CONDITION           |         |         |         |         |         |         |         |
|       | X               | .00     | WORKING R AND D COEFFICIENT |         |         |         |         |         |         |         |
| 26 SA | AREA            | 1.8     | 2.4                         |         |         |         |         |         |         |         |
| 27 SE | ELEVATION       | 1328.00 | 1332.00                     |         |         |         |         |         |         |         |
| 28 SQ | DISCHARGE       | 0.      | 56.                         | 84.     | 120.    | 154.    | 196.    | 238.    | 280.    | 322.    |
| 29 SE | ELEVATION       | 1328.00 | 1329.20                     | 1329.60 | 1330.00 | 1330.40 | 1330.80 | 1331.20 | 1331.60 | 1332.00 |

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#### COMPUTED STORAGE-ELEVATION DATA

|           |         |         |
|-----------|---------|---------|
| STORAGE   | .00     | 8.37    |
| ELEVATION | 1328.00 | 1332.00 |

#### COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

|           |         |         |         |         |         |         |         |         |         |
|-----------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| STORAGE   | .00     | 2.26    | 3.06    | 3.89    | 4.73    | 5.61    | 6.50    | 7.42    | 8.37    |
| OUTFLOW   | .00     | 56.00   | 84.00   | 120.00  | 154.00  | 196.00  | 238.00  | 280.00  | 322.00  |
| ELEVATION | 1328.00 | 1329.20 | 1329.60 | 1330.00 | 1330.40 | 1330.80 | 1331.20 | 1331.60 | 1332.00 |

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HYDROGRAPH AT STATION FLPND1  
FOR PLAN 1, RATIO = 1.00

| PEAK FLOW    | TIME |          | MAXIMUM AVERAGE FLOW    |         |         |          |
|--------------|------|----------|-------------------------|---------|---------|----------|
| (CFS)        | (HR) | (CFS)    | 6-HR                    | 24-HR   | 72-HR   | 29.90-HR |
| + 198.       | 6.60 | 58.      | 18.                     | 14.     | 14.     |          |
|              |      | (INCHES) | 4.431                   | 5.438   | 5.438   | 5.438    |
|              |      | (AC-FT)  | 29.                     | 35.     | 35.     | 35.      |
| PEAK STORAGE | TIME |          | MAXIMUM AVERAGE STORAGE |         |         |          |
| (AC-FT)      | (HR) |          | 6-HR                    | 24-HR   | 72-HR   | 29.90-HR |
| + 6.         | 6.60 | 2.       | 1.                      | 1.      | 1.      |          |
| PEAK STAGE   | TIME |          | MAXIMUM AVERAGE STAGE   |         |         |          |
| (FEET)       | (HR) |          | 6-HR                    | 24-HR   | 72-HR   | 29.90-HR |
| + 1330.82    | 6.60 | 1329.03  | 1328.33                 | 1328.26 | 1328.26 |          |

CUMULATIVE AREA = .12 SQ MI

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PLAN 2 INPUT DATA FOR STATION FLPND1 ARE SAME AS FOR PLAN 1

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HYDROGRAPH AT STATION FLPND1  
FOR PLAN 2, RATIO = 1.00

| PEAK FLOW    | TIME |          | 6-HR    | 24-HR   | 72-HR   | 29.90-HR |
|--------------|------|----------|---------|---------|---------|----------|
| + (CFS)      | (HR) |          |         |         |         |          |
| + 198.       | 6.60 | (CFS)    | 58.     | 18.     | 14.     | 14.      |
|              |      | (INCHES) | 4.431   | 5.438   | 5.438   | 5.438    |
|              |      | (AC-FT)  | 29.     | 35.     | 35.     | 35.      |
| PEAK STORAGE | TIME |          | 6-HR    | 24-HR   | 72-HR   | 29.90-HR |
| + (AC-FT)    | (HR) |          |         |         |         |          |
| + 6.         | 6.60 |          | 2.      | 1.      | 1.      | 1.       |
| PEAK STAGE   | TIME |          | 6-HR    | 24-HR   | 72-HR   | 29.90-HR |
| + (FEET)     | (HR) |          |         |         |         |          |
| + 1330.82    | 6.60 |          | 1329.03 | 1328.33 | 1328.26 | 1328.26  |

CUMULATIVE AREA = .12 SQ MI

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PLAN 3 INPUT DATA FOR STATION FLPND1 ARE SAME AS FOR PLAN 1

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HYDROGRAPH AT STATION FLPND1  
FOR PLAN 3, RATIO = 1.00

| PEAK FLOW    | TIME |          | 6-HR    | 24-HR   | 72-HR   | 29.90-HR |
|--------------|------|----------|---------|---------|---------|----------|
| + (CFS)      | (HR) |          |         |         |         |          |
| + 198.       | 6.60 | (CFS)    | 58.     | 18.     | 14.     | 14.      |
|              |      | (INCHES) | 4.431   | 5.438   | 5.438   | 5.438    |
|              |      | (AC-FT)  | 29.     | 35.     | 35.     | 35.      |
| PEAK STORAGE | TIME |          | 6-HR    | 24-HR   | 72-HR   | 29.90-HR |
| + (AC-FT)    | (HR) |          |         |         |         |          |
| + 6.         | 6.60 |          | 2.      | 1.      | 1.      | 1.       |
| PEAK STAGE   | TIME |          | 6-HR    | 24-HR   | 72-HR   | 29.90-HR |
| + (FEET)     | (HR) |          |         |         |         |          |
| + 1330.82    | 6.60 |          | 1329.03 | 1328.33 | 1328.26 | 1328.26  |

CUMULATIVE AREA = .12 SQ MI

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PLAN 4 INPUT DATA FOR STATION FLPND1 ARE SAME AS FOR PLAN 1

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HYDROGRAPH AT STATION FLPND1  
FOR PLAN 4, RATIO = 1.00

| PEAK FLOW    | TIME |          | 6-HR  | 24-HR | 72-HR | 29.90-HR |
|--------------|------|----------|-------|-------|-------|----------|
| + (CFS)      | (HR) |          |       |       |       |          |
| + 198.       | 6.60 | (CFS)    | 58.   | 18.   | 14.   | 14.      |
|              |      | (INCHES) | 4.431 | 5.438 | 5.438 | 5.438    |
|              |      | (AC-FT)  | 29.   | 35.   | 35.   | 35.      |
| PEAK STORAGE | TIME |          | 6-HR  | 24-HR | 72-HR | 29.90-HR |
| + (AC-FT)    | (HR) |          |       |       |       |          |
| + 6.         | 6.60 |          | 2.    | 1.    | 1.    | 1.       |
| PEAK STAGE   | TIME |          | 6-HR  | 24-HR | 72-HR | 29.90-HR |
|              |      |          |       |       |       |          |

CUMULATIVE AREA = .12 SQ MI

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★★★                      ★★★                      ★★★                      ★★★                      ★★★

| PEAK FLOW | TIME     | 6-HR  | 24-HR | 72-HR | 29.90-HR |
|-----------|----------|-------|-------|-------|----------|
| + (CFS)   | (HR)     |       |       |       |          |
| + 277.    | 6.10     | 46.   | 15.   | 12.   | 12.      |
|           | (INCHES) | 4.755 | 6.049 | 6.049 | 6.049    |

(AC-FT) 23. 29. 29. 29.

CUMULATIVE AREA = .09 SQ MI

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HYDROGRAPH AT STATION FL2  
FOR PLAN 1, RATIO = 1.00

| PEAK FLOW | TIME  |          | MAXIMUM AVERAGE FLOW |       |       |          |
|-----------|-------|----------|----------------------|-------|-------|----------|
| +         | (CFS) | (HR)     | 6-HR                 | 24-HR | 72-HR | 29.90-HR |
| +         | 277.  | 6.10     | (CFS)                |       |       |          |
|           |       |          | 46.                  | 15.   | 12.   | 12.      |
|           |       | (INCHES) | 4.755                | 6.049 | 6.049 | 6.049    |
|           |       | (AC-FT)  | 23.                  | 29.   | 29.   | 29.      |

CUMULATIVE AREA = .09 SQ MI

\*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\*

PLAN 2 INPUT DATA FOR STATION FL2 ARE SAME AS FOR PLAN 1

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PLAN 3 INPUT DATA FOR STATION FL2 ARE SAME AS FOR PLAN 1

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PLAN 4 INPUT DATA FOR STATION FL2 ARE SAME AS FOR PLAN 1

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\* \*  
39 KK \* FL12 \*  
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40 HC HYDROGRAPH COMBINATION  
ICOMP 2 NUMBER OF HYDROGRAPHS TO COMBINE

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HYDROGRAPH AT STATION FL12  
FOR PLAN 1, RATIO = 1.00

| PEAK FLOW | TIME  |          | MAXIMUM AVERAGE FLOW |       |       |          |
|-----------|-------|----------|----------------------|-------|-------|----------|
| +         | (CFS) | (HR)     | 6-HR                 | 24-HR | 72-HR | 29.90-HR |
| +         | 345.  | 6.10     | (CFS)                |       |       |          |
|           |       |          | 103.                 | 33.   | 26.   | 26.      |
|           |       | (INCHES) | 4.529                | 5.698 | 5.698 | 5.698    |
|           |       | (AC-FT)  | 51.                  | 64.   | 64.   | 64.      |

CUMULATIVE AREA = .21 SQ MI

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HYDROGRAPH AT STATION FL12  
FOR PLAN 2, RATIO = 1.00

| PEAK FLOW | TIME  |          | MAXIMUM AVERAGE FLOW |       |       |          |
|-----------|-------|----------|----------------------|-------|-------|----------|
| +         | (CFS) | (HR)     | 6-HR                 | 24-HR | 72-HR | 29.90-HR |
| +         | 345.  | 6.10     | (CFS)                |       |       |          |
|           |       |          | 103.                 | 33.   | 26.   | 26.      |
|           |       | (INCHES) | 4.529                | 5.698 | 5.698 | 5.698    |
|           |       | (AC-FT)  | 51.                  | 64.   | 64.   | 64.      |

CUMULATIVE AREA = .21 SQ MI

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HYDROGRAPH AT STATION FL12  
FOR PLAN 3, RATIO = 1.00

| PEAK FLOW<br>(CFS) | TIME<br>(HR) |          | 6-HR<br>MAXIMUM AVERAGE FLOW | 24-HR | 72-HR | 29.90-HR |
|--------------------|--------------|----------|------------------------------|-------|-------|----------|
| 345.               | 6.10         | (CFS)    | 103.                         | 33.   | 26.   | 26.      |
|                    |              | (INCHES) | 4.529                        | 5.698 | 5.698 | 5.698    |
|                    |              | (AC-FT)  | 51.                          | 64.   | 64.   | 64.      |

CUMULATIVE AREA = .21 SQ MI

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HYDROGRAPH AT STATION FL12  
FOR PLAN 4, RATIO = 1.00

| PEAK FLOW<br>(CFS) | TIME<br>(HR) |          | 6-HR<br>MAXIMUM AVERAGE FLOW | 24-HR | 72-HR | 29.90-HR |
|--------------------|--------------|----------|------------------------------|-------|-------|----------|
| 345.               | 6.10         | (CFS)    | 103.                         | 33.   | 26.   | 26.      |
|                    |              | (INCHES) | 4.529                        | 5.698 | 5.698 | 5.698    |
|                    |              | (AC-FT)  | 51.                          | 64.   | 64.   | 64.      |

CUMULATIVE AREA = .21 SQ MI

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\* \*  
41 KK \* FLND2 \*  
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## HYDROGRAPH ROUTING DATA

42 RS STORAGE ROUTING  
NSTPS 1 NUMBER OF SUBREACHES  
ITYP ELEV TYPE OF INITIAL CONDITION  
RSVRIC 1325.00 INITIAL CONDITION  
X .00 WORKING R AND D COEFFICIENT

43 SA AREA 6.8 8.7

44 SE ELEVATION 1325.00 1329.00

45 SS SPILLWAY  
CREL 1325.00 SPILLWAY CREST ELEVATION  
SPWID 15.00 SPILLWAY WIDTH  
COOW 3.00 WEIR COEFFICIENT  
EXPW 1.50 EXPONENT OF HEAD

\*\*\*

## COMPUTED STORAGE-ELEVATION DATA

| STORAGE   | .00     | 30.92   |
|-----------|---------|---------|
| ELEVATION | 1325.00 | 1329.00 |

## COMPUTED OUTFLOW-ELEVATION DATA

| OUTFLOW   | .00     | .00     | .06     | .49     | 1.67    | 3.95    | 7.71    | 13.33   | 21.18   | 31.61   |
|-----------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| ELEVATION | 1325.00 | 1325.00 | 1325.01 | 1325.05 | 1325.11 | 1325.20 | 1325.31 | 1325.44 | 1325.60 | 1325.79 |

| OUTFLOW   | 45.00   | 61.73   | 82.16   | 106.67  | 135.62  | 169.39  | 208.34  | 252.84  | 303.27  | 360.00  |
|-----------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| ELEVATION | 1326.00 | 1326.23 | 1326.49 | 1326.78 | 1327.09 | 1327.42 | 1327.78 | 1328.16 | 1328.57 | 1329.00 |

## COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

|           | STORAGE | .00     | .08     | .34     | .76     | 1.35    | 2.12    | 3.07    | 4.20    | 5.51    | 7.03 |
|-----------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|------|
| OUTFLOW   | .00     | .06     | .49     | 1.67    | 3.95    | 7.71    | 13.33   | 21.18   | 31.61   | 45.00   |      |
| ELEVATION | 1325.00 | 1325.01 | 1325.05 | 1325.11 | 1325.20 | 1325.31 | 1325.44 | 1325.60 | 1325.79 | 1326.00 |      |

|           | STORAGE | 8.74    | 10.66   | 12.81   | 15.18   | 17.79   | 20.66   | 23.79   | 27.21   | 30.92 |
|-----------|---------|---------|---------|---------|---------|---------|---------|---------|---------|-------|
| OUTFLOW   | 61.73   | 82.16   | 106.67  | 135.62  | 169.39  | 208.34  | 252.84  | 303.27  | 360.00  |       |
| ELEVATION | 1326.23 | 1326.49 | 1326.78 | 1327.09 | 1327.42 | 1327.78 | 1328.16 | 1328.57 | 1329.00 |       |

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HYDROGRAPH AT STATION FLPND2  
FOR PLAN 1, RATIO = 1.00

| PEAK FLOW | TIME  |          | 6-HR  | 24-HR | 72-HR | 29.90-HR |
|-----------|-------|----------|-------|-------|-------|----------|
| +         | (CFS) | (HR)     |       |       |       |          |
| +         | 192.  | 7.00     | (CFS) |       |       |          |
|           |       |          | 97.   | 32.   | 26.   | 26.      |
|           |       | (INCHES) | 4.261 | 5.642 | 5.668 | 5.668    |
|           |       | (AC-FT)  | 48.   | 64.   | 64.   | 64.      |

| PEAK STORAGE | TIME    |      | 6-HR | 24-HR | 72-HR | 29.90-HR |
|--------------|---------|------|------|-------|-------|----------|
| +            | (AC-FT) | (HR) |      |       |       |          |
| +            | 19.     | 7.00 | 12.  | 5.    | 4.    | 4.       |

| PEAK STAGE | TIME    |      | 6-HR    | 24-HR   | 72-HR   | 29.90-HR |
|------------|---------|------|---------|---------|---------|----------|
| +          | (FEET)  | (HR) |         |         |         |          |
| +          | 1327.62 | 7.00 | 1326.61 | 1325.66 | 1325.54 | 1325.54  |

CUMULATIVE AREA = .21 SQ MI

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PLAN 2 INPUT DATA FOR STATION FLPND2 ARE SAME AS FOR PLAN 1

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HYDROGRAPH AT STATION FLPND2  
FOR PLAN 2, RATIO = 1.00

| PEAK FLOW | TIME  |          | 6-HR  | 24-HR | 72-HR | 29.90-HR |
|-----------|-------|----------|-------|-------|-------|----------|
| +         | (CFS) | (HR)     |       |       |       |          |
| +         | 192.  | 7.00     | (CFS) |       |       |          |
|           |       |          | 97.   | 32.   | 26.   | 26.      |
|           |       | (INCHES) | 4.261 | 5.642 | 5.668 | 5.668    |
|           |       | (AC-FT)  | 48.   | 64.   | 64.   | 64.      |

| PEAK STORAGE | TIME    |      | 6-HR | 24-HR | 72-HR | 29.90-HR |
|--------------|---------|------|------|-------|-------|----------|
| +            | (AC-FT) | (HR) |      |       |       |          |
| +            | 19.     | 7.00 | 12.  | 5.    | 4.    | 4.       |

| PEAK STAGE | TIME    |      | 6-HR    | 24-HR   | 72-HR   | 29.90-HR |
|------------|---------|------|---------|---------|---------|----------|
| +          | (FEET)  | (HR) |         |         |         |          |
| +          | 1327.62 | 7.00 | 1326.61 | 1325.66 | 1325.54 | 1325.54  |

CUMULATIVE AREA = .21 SQ MI

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PLAN 3 INPUT DATA FOR STATION FLPND2 ARE SAME AS FOR PLAN 1

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HYDROGRAPH AT STATION FLPND2  
FOR PLAN 3, RATIO = 1.00

| PEAK FLOW | TIME |  | 6-HR | 24-HR | 72-HR | 29.90-HR |
|-----------|------|--|------|-------|-------|----------|
|           |      |  |      |       |       |          |

|   |       |      |          |       |       |       |       |
|---|-------|------|----------|-------|-------|-------|-------|
| + | (CFS) | (HR) | (CFS)    |       |       |       |       |
| + | 192.  | 7.00 |          | 97.   | 32.   | 26.   | 26.   |
|   |       |      | (INCHES) | 4.261 | 5.642 | 5.668 | 5.668 |
|   |       |      | (AC-FT)  | 48.   | 64.   | 64.   | 64.   |

|              |      |      |                         |
|--------------|------|------|-------------------------|
| PEAK STORAGE | TIME |      | MAXIMUM AVERAGE STORAGE |
|              |      | 6-HR | 24-HR 72-HR 29.90-HR    |

|   |         |      |     |    |    |    |
|---|---------|------|-----|----|----|----|
| + | (AC-FT) | (HR) |     |    |    |    |
|   | 19.     | 7.00 | 12. | 5. | 4. | 4. |

|            |      |      |                       |
|------------|------|------|-----------------------|
| PEAK STAGE | TIME |      | MAXIMUM AVERAGE STAGE |
|            |      | 6-HR | 24-HR 72-HR 29.90-HR  |

|   |         |      |         |         |         |         |
|---|---------|------|---------|---------|---------|---------|
| + | (FEET)  | (HR) |         |         |         |         |
|   | 1327.62 | 7.00 | 1326.61 | 1325.66 | 1325.54 | 1325.54 |

CUMULATIVE AREA = .21 SQ MI

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PLAN 4 INPUT DATA FOR STATION FLND2 ARE SAME AS FOR PLAN 1

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HYDROGRAPH AT STATION FLND2  
FOR PLAN 4, RATIO = 1.00

|           |       |          |                      |
|-----------|-------|----------|----------------------|
| PEAK FLOW | TIME  |          | MAXIMUM AVERAGE FLOW |
|           |       | 6-HR     | 24-HR 72-HR 29.90-HR |
| +         | (CFS) | (HR)     |                      |
| +         | 192.  | 7.00     | 97.                  |
|           |       |          | 32.                  |
|           |       |          | 26.                  |
|           |       |          | 26.                  |
|           |       | (INCHES) | 4.261                |
|           |       |          | 5.642                |
|           |       |          | 5.668                |
|           |       | (AC-FT)  | 48.                  |
|           |       |          | 64.                  |
|           |       |          | 64.                  |
|           |       |          | 64.                  |

|              |         |      |                         |
|--------------|---------|------|-------------------------|
| PEAK STORAGE | TIME    |      | MAXIMUM AVERAGE STORAGE |
|              |         | 6-HR | 24-HR 72-HR 29.90-HR    |
| +            | (AC-FT) | (HR) |                         |
|              | 19.     | 7.00 | 12.                     |
|              |         |      | 5.                      |
|              |         |      | 4.                      |
|              |         |      | 4.                      |

|            |         |      |                       |
|------------|---------|------|-----------------------|
| PEAK STAGE | TIME    |      | MAXIMUM AVERAGE STAGE |
|            |         | 6-HR | 24-HR 72-HR 29.90-HR  |
| +          | (FEET)  | (HR) |                       |
|            | 1327.62 | 7.00 | 1326.61               |
|            |         |      | 1325.66               |
|            |         |      | 1325.54               |
|            |         |      | 1325.54               |

CUMULATIVE AREA = .21 SQ MI

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\* \*  
46 KK \* FL3 \*  
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12 IN TIME DATA FOR INPUT TIME SERIES  
JXMIN 30 TIME INTERVAL IN MINUTES  
JXDATE 1FEB93 STARTING DATE  
JXTIME 600 STARTING TIME

SUBBASIN RUNOFF DATA

47 BA SUBBASIN CHARACTERISTICS  
TAREA .09 SUBBASIN AREA

PRECIPITATION DATA

48 PB STORM 7.80 BASIN TOTAL PRECIPITATION

49 PI INCREMENTAL PRECIPITATION PATTERN

|     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |

■ **P.E.C.**

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55 KK \* FL123 \*  
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56 HC HYDROGRAPH COMBINATION  
ICOMP 2 NUMBER OF HYDROGRAPHS TO COMBINE

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HYDROGRAPH AT STATION FL123  
FOR PLAN 1, RATIO = 1.00

| PEAK FLOW         | TIME  |          | MAXIMUM AVERAGE FLOW |       |       |          |
|-------------------|-------|----------|----------------------|-------|-------|----------|
| +                 | (CFS) | (HR)     | 6-HR                 | 24-HR | 72-HR | 29.90-HR |
| +                 | 327.  | 6.20     | (CFS)                |       |       |          |
|                   |       |          | 138.                 | 46.   | 37.   | 37.      |
|                   |       | (INCHES) | 4.210                | 5.584 | 5.613 | 5.613    |
|                   |       | (AC-FT)  | 68.                  | 91.   | 91.   | 91.      |
| CUMULATIVE AREA = |       |          | .30 SQ MI            |       |       |          |

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HYDROGRAPH AT STATION FL123  
FOR PLAN 2, RATIO = 1.00

| PEAK FLOW         | TIME  |          | MAXIMUM AVERAGE FLOW |       |       |          |
|-------------------|-------|----------|----------------------|-------|-------|----------|
| +                 | (CFS) | (HR)     | 6-HR                 | 24-HR | 72-HR | 29.90-HR |
| +                 | 327.  | 6.20     | (CFS)                |       |       |          |
|                   |       |          | 138.                 | 46.   | 37.   | 37.      |
|                   |       | (INCHES) | 4.210                | 5.584 | 5.613 | 5.613    |
|                   |       | (AC-FT)  | 68.                  | 91.   | 91.   | 91.      |
| CUMULATIVE AREA = |       |          | .30 SQ MI            |       |       |          |

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HYDROGRAPH AT STATION FL123  
FOR PLAN 3, RATIO = 1.00

| PEAK FLOW         | TIME  |          | MAXIMUM AVERAGE FLOW |       |       |          |
|-------------------|-------|----------|----------------------|-------|-------|----------|
| +                 | (CFS) | (HR)     | 6-HR                 | 24-HR | 72-HR | 29.90-HR |
| +                 | 327.  | 6.20     | (CFS)                |       |       |          |
|                   |       |          | 138.                 | 46.   | 37.   | 37.      |
|                   |       | (INCHES) | 4.210                | 5.584 | 5.613 | 5.613    |
|                   |       | (AC-FT)  | 68.                  | 91.   | 91.   | 91.      |
| CUMULATIVE AREA = |       |          | .30 SQ MI            |       |       |          |

\*\*\* \*\*

HYDROGRAPH AT STATION FL123  
FOR PLAN 4, RATIO = 1.00

| PEAK FLOW         | TIME  |          | MAXIMUM AVERAGE FLOW |       |       |          |
|-------------------|-------|----------|----------------------|-------|-------|----------|
| +                 | (CFS) | (HR)     | 6-HR                 | 24-HR | 72-HR | 29.90-HR |
| +                 | 327.  | 6.20     | (CFS)                |       |       |          |
|                   |       |          | 138.                 | 46.   | 37.   | 37.      |
|                   |       | (INCHES) | 4.210                | 5.584 | 5.613 | 5.613    |
|                   |       | (AC-FT)  | 68.                  | 91.   | 91.   | 91.      |
| CUMULATIVE AREA = |       |          | .30 SQ MI            |       |       |          |

\*\*\*\*\*  
\* \*  
57 KK \* WRR7\$8 \* AREA WEST OF RR 7TH & 8TH  
\* \*  
\*\*\*\*\*

SUBBASIN RUNOFF DATA

### PRECIPITATION DATA

60 PI INCREMENTAL PRECIPITATION PATTERN

[illegible]

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64 LS      SCS LOSS RATE
           STRL      .78  INITIAL ABSTRACTION
           CRVNER    72.00 CURVE NUMBER
           RTIMP     .00  PERCENT IMPERVIOUS AREA

```

65 UD                  SCS DIMENSIONLESS UNITGRAPH  
TLAG                  .15 LAG

UNIT HYDROGRAPH  
10 END-OF-PERIOD ORDINATES  
34. 15. 7.

★★★                      ★★★                      ★★★                      ★★★                      ★★★

HYDROGRAPH AT STATION WRR758  
FOR PLAN 1, RATIO = 1.00

TOTAL RAINFALL = 7.80, TOTAL LOSS = 3.28, TOTAL EXCESS = 4.52

| PEAK FLOW | TIME     | MAXIMUM AVERAGE FLOW |       |       |          |
|-----------|----------|----------------------|-------|-------|----------|
| (CFS)     | (HR)     | 6-HR                 | 24-HR | 72-HR | 29.90-HR |
| 290.      | 6.00     | 44.                  | 13.   | 11.   | 11.      |
|           | (INCHES) | 3.719                | 4.519 | 4.519 | 4.519    |
|           | (AC-FT)  | 22.                  | 26.   | 26.   | 26.      |

CUMULATIVE AREA = .11 SQ MI

★★★                      ★★★                      ★★★                      ★★★                      ★★★

HYDROGRAPH AT STATION WRR758  
FOR PLAN 1, RATIO = 1.00

CUMULATIVE AREA = .11 SQ MI

[illegible]

PLAN 2 INPUT DATA FOR STATION WRR7\$8 ARE SAME AS FOR PLAN 1

[illegible]

PLAN 3 INPUT DATA FOR STATION WRR7\$8 ARE SAME AS FOR PLAN 1

[illegible]

PLAN 4 INPUT DATA FOR STATION WRR7\$8 ARE SAME AS FOR PLAN 1

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*****
*           *
66 KK  * WFORLKS *      AREA WEST OF FOREST LAKES
*           *
*****

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12 IN      TIME DATA FOR INPUT TIME SERIES
           JXMIN      30  TIME INTERVAL IN MINUTES
           JKDATE     1FEB93  STARTING DATE
           JXTIME      600  STARTING TIME

```

SUBBASIN RUNOFF DATA

67 BA SUBBASIN CHARACTERISTICS  
TAREA .38 SUBBASIN AREA

### PRECIPITATION DATA

68 PB STORM 7.80 BASIN TOTAL PRECIPITATION

69 PI INCREMENTAL PRECIPITATION PATTERN

[illegible]

```

73 LS          SCS LOSS RATE
                STRTL          .70 INITIAL ABSTRACTION
                CRVNR          74.00 CURVE NUMBER
                RTIMP          .00 PERCENT IMPERVIOUS AREA

```

74 UD                  SCS DIMENSIONLESS UNITGRAPH  
TLAG                      .97 LAG

\*\*\*

UNIT HYDROGRAPH  
50 END-OF-PERIOD ORDINATES

|      |      |      |      |      |      |      |      |      |      |
|------|------|------|------|------|------|------|------|------|------|
| 5.   | 18.  | 34.  | 55.  | 82.  | 116. | 145. | 166. | 178. | 181. |
| 180. | 171. | 159. | 146. | 129. | 108. | 90.  | 75.  | 64.  | 54.  |
| 47.  | 40.  | 35.  | 29.  | 25.  | 21.  | 18.  | 15.  | 13.  | 11.  |
| 9.   | 8.   | 7.   | 6.   | 5.   | 4.   | 4.   | 3.   | 3.   | 2.   |
| 2.   | 2.   | 2.   | 1.   | 1.   | 1.   | 1.   | 1.   | 0.   | 0.   |

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HYDROGRAPH AT STATION WFORLKS  
FOR PLAN 1, RATIO = 1.00

TOTAL RAINFALL = 7.80, TOTAL LOSS = 3.05, TOTAL EXCESS = 4.75

| PEAK FLOW | TIME |      | MAXIMUM AVERAGE FLOW |       |       |          |       |
|-----------|------|------|----------------------|-------|-------|----------|-------|
| (CFS)     | (HR) |      | 6-HR                 | 24-HR | 72-HR | 29.90-HR |       |
| +         | 444. | 6.90 | (CFS)                | 159.  | 49.   | 39.      | 39.   |
|           |      |      | (INCHES)             | 3.853 | 4.747 | 4.747    | 4.747 |
|           |      |      | (AC-FT)              | 79.   | 97.   | 97.      | 97.   |

CUMULATIVE AREA = .38 SQ MI

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HYDROGRAPH AT STATION WFORLKS  
FOR PLAN 1, RATIO = 1.00

| PEAK FLOW | TIME |      | MAXIMUM AVERAGE FLOW |       |       |          |       |
|-----------|------|------|----------------------|-------|-------|----------|-------|
| (CFS)     | (HR) |      | 6-HR                 | 24-HR | 72-HR | 29.90-HR |       |
| +         | 444. | 6.90 | (CFS)                | 159.  | 49.   | 39.      | 39.   |
|           |      |      | (INCHES)             | 3.853 | 4.747 | 4.747    | 4.747 |
|           |      |      | (AC-FT)              | 79.   | 97.   | 97.      | 97.   |

CUMULATIVE AREA = .38 SQ MI

\*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\*

PLAN 2 INPUT DATA FOR STATION WFORLKS ARE SAME AS FOR PLAN 1

\*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\*

PLAN 3 INPUT DATA FOR STATION WFORLKS ARE SAME AS FOR PLAN 1

\*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\*

PLAN 4 INPUT DATA FOR STATION WFORLKS ARE SAME AS FOR PLAN 1

\*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\*

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 \* \*  
 75 KK \* WTIME \* COMB FLOW IN S DT 29TH W OF TEE TIME  
 \* \*  
 \*\*\*\*\*

76 HC HYDROGRAPH COMBINATION  
 ICOMP 2 NUMBER OF HYDROGRAPHS TO COMBINE

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HYDROGRAPH AT STATION WTIME  
FOR PLAN 1, RATIO = 1.00

| PEAK FLOW | TIME  | 6-HR     | MAXIMUM AVERAGE FLOW |       |          |
|-----------|-------|----------|----------------------|-------|----------|
| +         | (CFS) | (HR)     | 24-HR                | 72-HR | 29.90-HR |
| +         | 486.  | 6.80     | 202.                 | 62.   | 50.      |
|           |       | (CFS)    |                      |       |          |
|           |       | (INCHES) | 3.809                | 4.697 | 4.697    |
|           |       | (AC-FT)  | 100.                 | 123.  | 123.     |

CUMULATIVE AREA = .49 SQ MI

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HYDROGRAPH AT STATION WTTIME  
FOR PLAN 2, RATIO = 1.00

| PEAK FLOW | TIME  | 6-HR     | MAXIMUM AVERAGE FLOW |       |          |
|-----------|-------|----------|----------------------|-------|----------|
| +         | (CFS) | (HR)     | 24-HR                | 72-HR | 29.90-HR |
| +         | 486.  | 6.80     | 202.                 | 62.   | 50.      |
|           |       | (CFS)    |                      |       |          |
|           |       | (INCHES) | 3.809                | 4.697 | 4.697    |
|           |       | (AC-FT)  | 100.                 | 123.  | 123.     |

CUMULATIVE AREA = .49 SQ MI

\*\*\*

HYDROGRAPH AT STATION WTTIME  
FOR PLAN 3, RATIO = 1.00

| PEAK FLOW | TIME  | 6-HR     | MAXIMUM AVERAGE FLOW |       |          |
|-----------|-------|----------|----------------------|-------|----------|
| +         | (CFS) | (HR)     | 24-HR                | 72-HR | 29.90-HR |
| +         | 486.  | 6.80     | 202.                 | 62.   | 50.      |
|           |       | (CFS)    |                      |       |          |
|           |       | (INCHES) | 3.809                | 4.697 | 4.697    |
|           |       | (AC-FT)  | 100.                 | 123.  | 123.     |

CUMULATIVE AREA = .49 SQ MI

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HYDROGRAPH AT STATION WTTIME  
FOR PLAN 4, RATIO = 1.00

| PEAK FLOW | TIME  | 6-HR     | MAXIMUM AVERAGE FLOW |       |          |
|-----------|-------|----------|----------------------|-------|----------|
| +         | (CFS) | (HR)     | 24-HR                | 72-HR | 29.90-HR |
| +         | 486.  | 6.80     | 202.                 | 62.   | 50.      |
|           |       | (CFS)    |                      |       |          |
|           |       | (INCHES) | 3.809                | 4.697 | 4.697    |
|           |       | (AC-FT)  | 100.                 | 123.  | 123.     |

CUMULATIVE AREA = .49 SQ MI

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\*\*\*\*\*  
 \* \*  
 77 KK \* RR7\$8 \* AREA OF RR 7TH & 8TH  
 \* \*  
 \*\*\*\*\*

12 IN TIME DATA FOR INPUT TIME SERIES  
 JXMIN 30 TIME INTERVAL IN MINUTES  
 JXDATE 1FEB93 STARTING DATE  
 JXTIME 600 STARTING TIME

SUBBASIN RUNOFF DATA

78 BA SUBBASIN CHARACTERISTICS  
 TAREA .08 SUBBASIN AREA

■ P.E.C.

PLAN 3 INPUT DATA FOR STATION RR7\$8 ARE SAME AS FOR PLAN 1

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PLAN 4 INPUT DATA FOR STATION RR7\$8 ARE SAME AS FOR PLAN 1

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\*  
86 KK \* DITCH \*  
\*  
\*\*\*\*\*

87 HC HYDROGRAPH COMBINATION  
ICOMP 2 NUMBER OF HYDROGRAPHS TO COMBINE

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HYDROGRAPH AT STATION DITCH  
FOR PLAN 1, RATIO = 1.00

| PEAK FLOW         | TIME  |          | MAXIMUM AVERAGE FLOW |       |       |          |
|-------------------|-------|----------|----------------------|-------|-------|----------|
| +                 | (CFS) | (HR)     | 6-HR                 | 24-HR | 72-HR | 29.90-HR |
| +                 | 608.  | 6.10     | (CFS)                |       |       |          |
|                   |       |          | 233.                 | 72.   | 58.   | 58.      |
|                   |       | (INCHES) | 3.794                | 4.672 | 4.672 | 4.672    |
|                   |       | (AC-FT)  | 115.                 | 142.  | 142.  | 142.     |
| CUMULATIVE AREA = |       |          | .57 SQ MI            |       |       |          |

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HYDROGRAPH AT STATION DITCH  
FOR PLAN 2, RATIO = 1.00

| PEAK FLOW         | TIME  |          | MAXIMUM AVERAGE FLOW |       |       |          |
|-------------------|-------|----------|----------------------|-------|-------|----------|
| +                 | (CFS) | (HR)     | 6-HR                 | 24-HR | 72-HR | 29.90-HR |
| +                 | 608.  | 6.10     | (CFS)                |       |       |          |
|                   |       |          | 233.                 | 72.   | 58.   | 58.      |
|                   |       | (INCHES) | 3.794                | 4.672 | 4.672 | 4.672    |
|                   |       | (AC-FT)  | 115.                 | 142.  | 142.  | 142.     |
| CUMULATIVE AREA = |       |          | .57 SQ MI            |       |       |          |

\*\*\* \*\*

HYDROGRAPH AT STATION DITCH  
FOR PLAN 3, RATIO = 1.00

| PEAK FLOW         | TIME  |          | MAXIMUM AVERAGE FLOW |       |       |          |
|-------------------|-------|----------|----------------------|-------|-------|----------|
| +                 | (CFS) | (HR)     | 6-HR                 | 24-HR | 72-HR | 29.90-HR |
| +                 | 608.  | 6.10     | (CFS)                |       |       |          |
|                   |       |          | 233.                 | 72.   | 58.   | 58.      |
|                   |       | (INCHES) | 3.794                | 4.672 | 4.672 | 4.672    |
|                   |       | (AC-FT)  | 115.                 | 142.  | 142.  | 142.     |
| CUMULATIVE AREA = |       |          | .57 SQ MI            |       |       |          |

\*\*\* \*\*

HYDROGRAPH AT STATION DITCH  
FOR PLAN 4, RATIO = 1.00

| PEAK FLOW | TIME  |      | MAXIMUM AVERAGE FLOW |       |       |          |
|-----------|-------|------|----------------------|-------|-------|----------|
| +         | (CFS) | (HR) | 6-HR                 | 24-HR | 72-HR | 29.90-HR |
| +         |       |      | (CFS)                |       |       |          |

CUMULATIVE AREA = .57 SQ MI

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12 IN      TIME DATA FOR INPUT TIME SERIES
           JXMIN      30  TIME INTERVAL IN MINUTES
           JXDATE     1FEB93  STARTING DATE
           JXTIME      600  STARTING TIME

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89 BA SUBBASIN CHARACTERISTICS  
TAREA .01 SUBBASIN AREA

90 PB STORM 7.80 BASIN TOTAL PRECIPITATION

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95 LS          SCS LOSS RATE
                STRL      .04  INITIAL ABSTRACTION
                CRVNR     98.00 CURVE NUMBER
                RTIMP      .00  PERCENT IMPERVIOUS AREA

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|     |     |     |     |     |     |    |
|-----|-----|-----|-----|-----|-----|----|
| 23. | 25. | 8.  | 3.  | 1.  | 0.  | 0. |
| *** | *** | *** | *** | *** | *** |    |

TOTAL RAINFALL = 7.80, TOTAL LOSS = .24, TOTAL EXCESS = 7.56

| PEAK FLOW<br>(CFS) | TIME<br>(HR) | MAXIMUM AVERAGE FLOW |       |       |          |       |
|--------------------|--------------|----------------------|-------|-------|----------|-------|
|                    |              | 6-HR                 | 24-HR | 72-HR | 29.90-HR |       |
| 39.                | 6.00         | 6.                   | 2.    | 2.    | 2.       |       |
|                    |              | (INCHES)             | 5.910 | 7.560 | 7.560    | 7.560 |
|                    |              | (AC-FT)              | 3.    | 4.    | 4.       | 4.    |

CUMULATIVE AREA = .01 SQ MI

\*\*\* \*\*\* \*\*\* \*\*\* \*\*\*

HYDROGRAPH AT STATION WW  
FOR PLAN 1, RATIO = 1.00

| PEAK FLOW<br>(CFS) | TIME<br>(HR) | (CFS)    | 6-HR<br>MAXIMUM AVERAGE FLOW | 24-HR | 72-HR | 29.90-HR |
|--------------------|--------------|----------|------------------------------|-------|-------|----------|
| + 39.              | 6.00         | 6.       | 2.                           | 2.    | 2.    | 2.       |
|                    |              | (INCHES) | 5.910                        | 7.560 | 7.560 | 7.560    |
|                    |              | (AC-FT)  | 3.                           | 4.    | 4.    | 4.       |

CUMULATIVE AREA = .01 SQ MI

\*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\*

PLAN 2 INPUT DATA FOR STATION WW ARE SAME AS FOR PLAN 1

\*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\*

PLAN 3 INPUT DATA FOR STATION WW ARE SAME AS FOR PLAN 1

\*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\*

PLAN 4 INPUT DATA FOR STATION WW ARE SAME AS FOR PLAN 1

\*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\* \*\*\*

\*\*\*\*\*  
\* \*  
97 KK \* INPND4 \*  
\* \*  
\*\*\*\*\*

98 HC HYDROGRAPH COMBINATION  
ICOMP 3 NUMBER OF HYDROGRAPHS TO COMBINE

\*\*\*

\*\*\* \*\*\* \*\*\* \*\*\* \*\*\*

HYDROGRAPH AT STATION INPND4  
FOR PLAN 1, RATIO = 1.00

| PEAK FLOW<br>(CFS) | TIME<br>(HR) | (CFS)    | 6-HR<br>MAXIMUM AVERAGE FLOW | 24-HR | 72-HR | 29.90-HR |
|--------------------|--------------|----------|------------------------------|-------|-------|----------|
| + 958.             | 6.10         | 376.     | 119.                         | 96.   | 96.   | 96.      |
|                    |              | (INCHES) | 3.954                        | 5.017 | 5.027 | 5.027    |
|                    |              | (AC-FT)  | 186.                         | 237.  | 237.  | 237.     |

CUMULATIVE AREA = .88 SQ MI

\*\*\* \*\*\* \*\*\* \*\*\* \*\*\*

HYDROGRAPH AT STATION INPND4  
FOR PLAN 2, RATIO = 1.00

| PEAK FLOW<br>(CFS) | TIME<br>(HR) | (CFS)    | 6-HR<br>MAXIMUM AVERAGE FLOW | 24-HR | 72-HR | 29.90-HR |
|--------------------|--------------|----------|------------------------------|-------|-------|----------|
| + 958.             | 6.10         | 376.     | 119.                         | 96.   | 96.   | 96.      |
|                    |              | (INCHES) | 3.954                        | 5.017 | 5.027 | 5.027    |
|                    |              | (AC-FT)  | 186.                         | 237.  | 237.  | 237.     |

CUMULATIVE AREA = .88 SQ MI

\*\*\* \*\*\* \*\*\* \*\*\* \*\*\*

HYDROGRAPH AT STATION INPND4  
FOR PLAN 3, RATIO = 1.00

| PEAK FLOW | TIME |          | MAXIMUM AVERAGE FLOW |       |       |          |
|-----------|------|----------|----------------------|-------|-------|----------|
| (CFS)     | (HR) |          | 6-HR                 | 24-HR | 72-HR | 29.90-HR |
| + 958.    | 6.10 | (CFS)    | 376.                 | 119.  | 96.   | 96.      |
|           |      | (INCHES) | 3.954                | 5.017 | 5.027 | 5.027    |
|           |      | (AC-FT)  | 186.                 | 237.  | 237.  | 237.     |

CUMULATIVE AREA = .88 SQ MI

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HYDROGRAPH AT STATION INPND4  
FOR PLAN 4, RATIO = 1.00

| PEAK FLOW | TIME |          | MAXIMUM AVERAGE FLOW |       |       |          |
|-----------|------|----------|----------------------|-------|-------|----------|
| (CFS)     | (HR) |          | 6-HR                 | 24-HR | 72-HR | 29.90-HR |
| + 958.    | 6.10 | (CFS)    | 376.                 | 119.  | 96.   | 96.      |
|           |      | (INCHES) | 3.954                | 5.017 | 5.027 | 5.027    |
|           |      | (AC-FT)  | 186.                 | 237.  | 237.  | 237.     |

CUMULATIVE AREA = .88 SQ MI

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 \* \*  
 99 KK \* POND4 \* STAGE-STORAGE THRU POND #4 AT 29TH & RIDGE  
 \* \*  
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100 KP PLAN 1 FOR STATION POND4 STAGE-STORAGE THRU POND #4 AT 29TH &amp; RIDGE

HYDROGRAPH ROUTING DATA

101 RS STORAGE ROUTING  
 NSTPS 1 NUMBER OF SUBREACHES  
 ITYP ELEV TYPE OF INITIAL CONDITION  
 RSVRIC 1319.60 INITIAL CONDITION  
 X .00 WORKING R AND D COEFFICIENT

|        |           |         |         |         |         |         |         |         |         |         |
|--------|-----------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 102 SV | STORAGE   | .0      | 5.4     | 6.6     | 20.5    | 27.8    | 37.5    | 43.5    | 50.0    | 60.0    |
| 103 SE | ELEVATION | 1319.60 | 1321.60 | 1322.00 | 1323.60 | 1324.40 | 1325.40 | 1326.00 | 1327.00 | 1328.00 |
| 104 SQ | DISCHARGE | 0.      | 150.    | 300.    | 315.    | 600.    | 900.    | 1000.   | 1200.   | 1350.   |
| 105 SE | ELEVATION | 1319.60 | 1322.90 | 1326.50 | 1327.00 | 1327.20 | 1327.33 | 1327.37 | 1327.44 | 1327.53 |

\*\*\*

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

|           |         |         |         |         |         |         |         |         |         |         |
|-----------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| STORAGE   | .00     | 5.40    | 6.60    | 14.42   | 20.50   | 27.80   | 37.50   | 43.50   | 46.75   | 50.00   |
| OUTFLOW   | .00     | 90.91   | 109.09  | 150.00  | 179.16  | 212.50  | 254.17  | 279.17  | 300.00  | 315.00  |
| ELEVATION | 1319.60 | 1321.60 | 1322.00 | 1322.90 | 1323.60 | 1324.40 | 1325.40 | 1326.00 | 1326.50 | 1327.00 |
| STORAGE   | 52.00   | 53.30   | 53.70   | 54.40   | 54.80   | 55.30   | 60.00   |         |         |         |
| OUTFLOW   | 600.00  | 900.00  | 1000.00 | 1200.00 | 1350.00 | 1500.00 | 2908.54 |         |         |         |
| ELEVATION | 1327.20 | 1327.33 | 1327.37 | 1327.44 | 1327.48 | 1327.53 | 1328.00 |         |         |         |

\*\*\* WARNING \*\*\* MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 900. TO 2909.  
 THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.  
 THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

\*\*\*      \*\*\*      \*\*\*      \*\*\*      \*\*\*

HYDROGRAPH AT STATION POND4  
 FOR PLAN 1, RATIO = 1.00

| PEAK FLOW | TIME |          | 6-HR  | 24-HR | 72-HR | 29.90-HR |
|-----------|------|----------|-------|-------|-------|----------|
| + (CFS)   | (HR) |          |       |       |       |          |
| + 756.    | 6.90 | (CFS)    | 337.  | 119.  | 96.   | 96.      |
|           |      | (INCHES) | 3.540 | 5.015 | 5.026 | 5.026    |
|           |      | (AC-FT)  | 167.  | 237.  | 237.  | 237.     |

| PEAK STORAGE | TIME |  | 6-HR | 24-HR | 72-HR | 29.90-HR |
|--------------|------|--|------|-------|-------|----------|
| + (AC-FT)    | (HR) |  |      |       |       |          |
| + 53.        | 6.90 |  | 41.  | 13.   | 10.   | 10.      |

| PEAK STAGE | TIME |  | 6-HR    | 24-HR   | 72-HR   | 29.90-HR |
|------------|------|--|---------|---------|---------|----------|
| + (FEET)   | (HR) |  |         |         |         |          |
| + 1327.27  | 6.90 |  | 1325.89 | 1321.95 | 1321.49 | 1321.49  |

CUMULATIVE AREA = .88 SQ MI

\*\*\*      \*\*\*      \*\*\*      \*\*\*      \*\*\*      \*\*\*      \*\*\*      \*\*\*      \*\*\*      \*\*\*      \*\*\*      \*\*\*      \*\*\*      \*\*\*      \*\*\*

106 KP      PLAN 2 FOR STATION POND4      STAGE-STORAGE THRU POND #4 AT 29TH & RIDGE

#### HYDROGRAPH ROUTING DATA

107 RS      STORAGE ROUTING

|        |         |                             |
|--------|---------|-----------------------------|
| NSTPS  | 1       | NUMBER OF SUBREACHES        |
| ITYP   | ELEV    | TYPE OF INITIAL CONDITION   |
| RSVRIC | 1319.60 | INITIAL CONDITION           |
| X      | .00     | WORKING R AND D COEFFICIENT |

|        |           |         |         |         |         |         |         |         |         |         |
|--------|-----------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 108 SV | STORAGE   | .0      | 5.4     | 6.6     | 20.5    | 27.8    | 37.5    | 43.5    | 50.0    | 60.0    |
| 109 SE | ELEVATION | 1319.60 | 1321.60 | 1322.00 | 1323.60 | 1324.40 | 1325.40 | 1326.00 | 1327.00 | 1328.00 |
| 110 SQ | DISCHARGE | 0.      | 150.    | 300.    | 450.    | 600.    | 631.    | 750.    | 900.    | 1200.   |
| 111 SE | ELEVATION | 1319.60 | 1321.60 | 1322.90 | 1324.40 | 1326.50 | 1327.00 | 1327.10 | 1327.20 | 1327.30 |

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#### COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

|           |         |         |         |         |         |         |         |         |         |         |
|-----------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| STORAGE   | .00     | 5.40    | 6.60    | 14.42   | 20.50   | 27.80   | 37.50   | 43.50   | 46.75   | 50.00   |
| OUTFLOW   | .00     | 150.00  | 196.15  | 300.00  | 370.00  | 450.00  | 521.43  | 564.29  | 600.00  | 631.00  |
| ELEVATION | 1319.60 | 1321.60 | 1322.00 | 1322.90 | 1323.60 | 1324.40 | 1325.40 | 1326.00 | 1326.50 | 1327.00 |

|           |         |         |         |         |         |
|-----------|---------|---------|---------|---------|---------|
| STORAGE   | 51.00   | 52.00   | 53.00   | 54.00   | 60.00   |
| OUTFLOW   | 750.00  | 900.00  | 1200.00 | 1400.00 | 2600.24 |
| ELEVATION | 1327.10 | 1327.20 | 1327.30 | 1327.40 | 1328.00 |

\*\*\* WARNING \*\*\* MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 900. TO 1200.  
 THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.  
 THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

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HYDROGRAPH AT STATION POND4  
 FOR PLAN 2, RATIO = 1.00

| PEAK FLOW | TIME |       | 6-HR | 24-HR | 72-HR | 29.90-HR |
|-----------|------|-------|------|-------|-------|----------|
| + (CFS)   | (HR) |       |      |       |       |          |
| + 584.    | 7.40 | (CFS) | 373. | 119.  | 96.   | 96.      |

|                   |          |           |         |         |          |
|-------------------|----------|-----------|---------|---------|----------|
|                   | (INCHES) | 3.916     | 5.016   | 5.027   | 5.027    |
|                   | (AC-FT)  | 185.      | 237.    | 237.    | 237.     |
| PEAK STORAGE      | TIME     |           |         |         |          |
|                   |          | 6-HR      | 24-HR   | 72-HR   | 29.90-HR |
| + (AC-FT)         | (HR)     |           |         |         |          |
| 45.               | 7.40     | 23.       | 7.      | 5.      | 5.       |
| PEAK STAGE        | TIME     |           |         |         |          |
|                   |          | 6-HR      | 24-HR   | 72-HR   | 29.90-HR |
| + (FEET)          | (HR)     |           |         |         |          |
| 1326.28           | 7.40     | 1323.80   | 1321.00 | 1320.73 | 1320.73  |
| CUMULATIVE AREA = |          | .88 SQ MI |         |         |          |

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112 KP PLAN 3 FOR STATION POND4 STAGE-STORAGE THRU POND #4 AT 29TH & RIDGE

113 KO OUTPUT CONTROL VARIABLES

IPRNT 1 PRINT CONTROL  
 IPLOT 0 PLOT CONTROL  
 QSCAL 0. HYDROGRAPH PLOT SCALE

HYDROGRAPH ROUTING DATA

114 RS STORAGE ROUTING

NSTPS 1 NUMBER OF SUBREACHES  
 ITYP ELEV TYPE OF INITIAL CONDITION  
 RSVRIC 1319.60 INITIAL CONDITION  
 X .00 WORKING R AND D COEFFICIENT

|        |           |         |         |         |         |         |         |         |         |         |
|--------|-----------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 115 SV | STORAGE   | .0      | 5.4     | 6.6     | 20.5    | 27.8    | 37.5    | 43.5    | 50.0    | 60.0    |
| 116 SE | ELEVATION | 1319.60 | 1321.60 | 1322.00 | 1323.60 | 1324.40 | 1325.40 | 1326.00 | 1327.00 | 1328.00 |
| 117 SQ | DISCHARGE | 0.      | 300.    | 450.    | 600.    | 750.    | 900.    | 947.    | 1050.   | 1200.   |
| 118 SE | ELEVATION | 1319.60 | 1322.00 | 1322.90 | 1323.90 | 1325.10 | 1326.50 | 1327.00 | 1327.10 | 1327.20 |

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#### COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

|           |         |         |         |         |         |         |         |         |         |         |
|-----------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| STORAGE   | .00     | 5.40    | 6.60    | 14.42   | 20.50   | 23.24   | 27.80   | 34.59   | 37.50   | 43.50   |
| OUTFLOW   | .00     | 250.00  | 300.00  | 450.00  | 554.99  | 600.00  | 662.50  | 750.00  | 782.15  | 846.43  |
| ELEVATION | 1319.60 | 1321.60 | 1322.00 | 1322.90 | 1323.60 | 1323.90 | 1324.40 | 1325.10 | 1325.40 | 1326.00 |
| STORAGE   | 46.75   | 50.00   | 51.00   | 52.00   | 53.00   | 60.00   |         |         |         |         |
| OUTFLOW   | 900.00  | 947.00  | 1050.00 | 1200.00 | 1500.00 | 3597.80 |         |         |         |         |
| ELEVATION | 1326.50 | 1327.00 | 1327.10 | 1327.20 | 1327.30 | 1328.00 |         |         |         |         |

\*\*\* WARNING \*\*\* MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 1200. TO 3598.  
 THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.  
 THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

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HYDROGRAPH AT STATION POND4  
 PLAN 3, RATIO = 1.00

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| DA | MON | HR   | MIN | ORD | OUTFLOW | STORAGE | STAGE | DA | MON | HR   | MIN | ORD  | OUTFLOW | STORAGE | STAGE | DA | MON | HR   | MIN | ORD | OUTFLOW | STORAGE | STAGE |
|----|-----|------|-----|-----|---------|---------|-------|----|-----|------|-----|------|---------|---------|-------|----|-----|------|-----|-----|---------|---------|-------|
| 1  | FEB | 0600 | 1   | 0.  | .0      | 1319.6  | *     | 1  | FEB | 1600 | 101 | 175. | 3.8     | 1321.0  | *     | 2  | FEB | 0200 | 201 | 14. | .3      | 1319.7  |       |
| 1  | FEB | 0606 | 2   | 0.  | .0      | 1319.6  | *     | 1  | FEB | 1606 | 102 | 169. | 3.7     | 1321.0  | *     | 2  | FEB | 0206 | 202 | 13. | .3      | 1319.7  |       |
| 1  | FEB | 0612 | 3   | 0.  | .0      | 1319.6  | *     | 1  | FEB | 1612 | 103 | 164. | 3.5     | 1320.9  | *     | 2  | FEB | 0212 | 203 | 12. | .3      | 1319.7  |       |
| 1  | FEB | 0618 | 4   | 1.  | .0      | 1319.6  | *     | 1  | FEB | 1618 | 104 | 158. | 3.4     | 1320.9  | *     | 2  | FEB | 0218 | 204 | 11. | .2      | 1319.7  |       |
| 1  | FEB | 0624 | 5   | 1.  | .0      | 1319.6  | *     | 1  | FEB | 1624 | 105 | 152. | 3.3     | 1320.8  | *     | 2  | FEB | 0224 | 205 | 10. | .2      | 1319.7  |       |
| 1  | FEB | 0630 | 6   | 2.  | .0      | 1319.6  | *     | 1  | FEB | 1630 | 106 | 146. | 3.2     | 1320.8  | *     | 2  | FEB | 0230 | 206 | 9.  | .2      | 1319.7  |       |
| 1  | FEB | 0636 | 7   | 2.  | .0      | 1319.6  | *     | 1  | FEB | 1636 | 107 | 141. | 3.1     | 1320.7  | *     | 2  | FEB | 0236 | 207 | 9.  | .2      | 1319.7  |       |
| 1  | FEB | 0642 | 8   | 3.  | .1      | 1319.6  | *     | 1  | FEB | 1642 | 108 | 137. | 3.0     | 1320.7  | *     | 2  | FEB | 0242 | 208 | 8.  | .2      | 1319.7  |       |
| 1  | FEB | 0648 | 9   | 3.  | .1      | 1319.6  | *     | 1  | FEB | 1648 | 109 | 133. | 2.9     | 1320.7  | *     | 2  | FEB | 0248 | 209 | 8.  | .2      | 1319.7  |       |
| 1  | FEB | 0654 | 10  | 4.  | .1      | 1319.6  | *     | 1  | FEB | 1654 | 110 | 129. | 2.8     | 1320.6  | *     | 2  | FEB | 0254 | 210 | 7.  | .2      | 1319.7  |       |
| 1  | FEB | 0700 | 11  | 4.  | .1      | 1319.6  | *     | 1  | FEB | 1700 | 111 | 126. | 2.7     | 1320.6  | *     | 2  | FEB | 0300 | 211 | 7.  | .2      | 1319.7  |       |

|               |      |      |          |                |      |     |          |                |    |    |        |
|---------------|------|------|----------|----------------|------|-----|----------|----------------|----|----|--------|
| 1 FEB 0706 12 | 4.   | .1   | 1319.6 * | 1 FEB 1706 112 | 122. | 2.6 | 1320.6 * | 2 FEB 0306 212 | 7. | .1 | 1319.7 |
| 1 FEB 0712 13 | 4.   | .1   | 1319.6 * | 1 FEB 1712 113 | 119. | 2.6 | 1320.6 * | 2 FEB 0312 213 | 6. | .1 | 1319.7 |
| 1 FEB 0718 14 | 5.   | .1   | 1319.6 * | 1 FEB 1718 114 | 117. | 2.5 | 1320.5 * | 2 FEB 0318 214 | 6. | .1 | 1319.6 |
| 1 FEB 0724 15 | 5.   | .1   | 1319.6 * | 1 FEB 1724 115 | 114. | 2.5 | 1320.5 * | 2 FEB 0324 215 | 6. | .1 | 1319.6 |
| 1 FEB 0730 16 | 5.   | .1   | 1319.6 * | 1 FEB 1730 116 | 111. | 2.4 | 1320.5 * | 2 FEB 0330 216 | 5. | .1 | 1319.6 |
| 1 FEB 0736 17 | 5.   | .1   | 1319.6 * | 1 FEB 1736 117 | 109. | 2.4 | 1320.5 * | 2 FEB 0336 217 | 5. | .1 | 1319.6 |
| 1 FEB 0742 18 | 5.   | .1   | 1319.6 * | 1 FEB 1742 118 | 106. | 2.3 | 1320.4 * | 2 FEB 0342 218 | 5. | .1 | 1319.6 |
| 1 FEB 0748 19 | 5.   | .1   | 1319.6 * | 1 FEB 1748 119 | 102. | 2.2 | 1320.4 * | 2 FEB 0348 219 | 5. | .1 | 1319.6 |
| 1 FEB 0754 20 | 5.   | .1   | 1319.6 * | 1 FEB 1754 120 | 99.  | 2.1 | 1320.4 * | 2 FEB 0354 220 | 4. | .1 | 1319.6 |
| 1 FEB 0800 21 | 5.   | .1   | 1319.6 * | 1 FEB 1800 121 | 95.  | 2.1 | 1320.4 * | 2 FEB 0400 221 | 4. | .1 | 1319.6 |
| 1 FEB 0806 22 | 5.   | .1   | 1319.6 * | 1 FEB 1806 122 | 92.  | 2.0 | 1320.3 * | 2 FEB 0406 222 | 4. | .1 | 1319.6 |
| 1 FEB 0812 23 | 6.   | .1   | 1319.6 * | 1 FEB 1812 123 | 90.  | 1.9 | 1320.3 * | 2 FEB 0412 223 | 4. | .1 | 1319.6 |
| 1 FEB 0818 24 | 6.   | .1   | 1319.6 * | 1 FEB 1818 124 | 89.  | 1.9 | 1320.3 * | 2 FEB 0418 224 | 4. | .1 | 1319.6 |
| 1 FEB 0824 25 | 6.   | .1   | 1319.6 * | 1 FEB 1824 125 | 88.  | 1.9 | 1320.3 * | 2 FEB 0424 225 | 4. | .1 | 1319.6 |
| 1 FEB 0830 26 | 6.   | .1   | 1319.7 * | 1 FEB 1830 126 | 87.  | 1.9 | 1320.3 * | 2 FEB 0430 226 | 3. | .1 | 1319.6 |
| 1 FEB 0836 27 | 7.   | .1   | 1319.7 * | 1 FEB 1836 127 | 86.  | 1.9 | 1320.3 * | 2 FEB 0436 227 | 3. | .1 | 1319.6 |
| 1 FEB 0842 28 | 7.   | .2   | 1319.7 * | 1 FEB 1842 128 | 85.  | 1.8 | 1320.3 * | 2 FEB 0442 228 | 3. | .1 | 1319.6 |
| 1 FEB 0848 29 | 7.   | .2   | 1319.7 * | 1 FEB 1848 129 | 84.  | 1.8 | 1320.3 * | 2 FEB 0448 229 | 3. | .1 | 1319.6 |
| 1 FEB 0854 30 | 7.   | .2   | 1319.7 * | 1 FEB 1854 130 | 83.  | 1.8 | 1320.3 * | 2 FEB 0454 230 | 3. | .1 | 1319.6 |
| 1 FEB 0900 31 | 8.   | .2   | 1319.7 * | 1 FEB 1900 131 | 83.  | 1.8 | 1320.3 * | 2 FEB 0500 231 | 3. | .1 | 1319.6 |
| 1 FEB 0906 32 | 8.   | .2   | 1319.7 * | 1 FEB 1906 132 | 82.  | 1.8 | 1320.3 * | 2 FEB 0506 232 | 3. | .1 | 1319.6 |
| 1 FEB 0912 33 | 8.   | .2   | 1319.7 * | 1 FEB 1912 133 | 82.  | 1.8 | 1320.3 * | 2 FEB 0512 233 | 3. | .1 | 1319.6 |
| 1 FEB 0918 34 | 8.   | .2   | 1319.7 * | 1 FEB 1918 134 | 81.  | 1.8 | 1320.2 * | 2 FEB 0518 234 | 3. | .1 | 1319.6 |
| 1 FEB 0924 35 | 9.   | .2   | 1319.7 * | 1 FEB 1924 135 | 81.  | 1.7 | 1320.2 * | 2 FEB 0524 235 | 3. | .1 | 1319.6 |
| 1 FEB 0930 36 | 9.   | .2   | 1319.7 * | 1 FEB 1930 136 | 81.  | 1.7 | 1320.2 * | 2 FEB 0530 236 | 2. | .1 | 1319.6 |
| 1 FEB 0936 37 | 9.   | .2   | 1319.7 * | 1 FEB 1936 137 | 81.  | 1.7 | 1320.2 * | 2 FEB 0536 237 | 2. | .1 | 1319.6 |
| 1 FEB 0942 38 | 10.  | .2   | 1319.7 * | 1 FEB 1942 138 | 80.  | 1.7 | 1320.2 * | 2 FEB 0542 238 | 2. | .1 | 1319.6 |
| 1 FEB 0948 39 | 10.  | .2   | 1319.7 * | 1 FEB 1948 139 | 80.  | 1.7 | 1320.2 * | 2 FEB 0548 239 | 2. | .0 | 1319.6 |
| 1 FEB 0954 40 | 10.  | .2   | 1319.7 * | 1 FEB 1954 140 | 80.  | 1.7 | 1320.2 * | 2 FEB 0554 240 | 2. | .0 | 1319.6 |
| 1 FEB 1000 41 | 11.  | .2   | 1319.7 * | 1 FEB 2000 141 | 80.  | 1.7 | 1320.2 * | 2 FEB 0600 241 | 2. | .0 | 1319.6 |
| 1 FEB 1006 42 | 11.  | .2   | 1319.7 * | 1 FEB 2006 142 | 80.  | 1.7 | 1320.2 * | 2 FEB 0606 242 | 2. | .0 | 1319.6 |
| 1 FEB 1012 43 | 12.  | .3   | 1319.7 * | 1 FEB 2012 143 | 79.  | 1.7 | 1320.2 * | 2 FEB 0612 243 | 2. | .0 | 1319.6 |
| 1 FEB 1018 44 | 14.  | .3   | 1319.7 * | 1 FEB 2018 144 | 77.  | 1.7 | 1320.2 * | 2 FEB 0618 244 | 2. | .0 | 1319.6 |
| 1 FEB 1024 45 | 15.  | .3   | 1319.7 * | 1 FEB 2024 145 | 76.  | 1.6 | 1320.2 * | 2 FEB 0624 245 | 2. | .0 | 1319.6 |
| 1 FEB 1030 46 | 17.  | .4   | 1319.7 * | 1 FEB 2030 146 | 74.  | 1.6 | 1320.2 * | 2 FEB 0630 246 | 2. | .0 | 1319.6 |
| 1 FEB 1036 47 | 19.  | .4   | 1319.7 * | 1 FEB 2036 147 | 73.  | 1.6 | 1320.2 * | 2 FEB 0636 247 | 2. | .0 | 1319.6 |
| 1 FEB 1042 48 | 21.  | .5   | 1319.8 * | 1 FEB 2042 148 | 72.  | 1.5 | 1320.2 * | 2 FEB 0642 248 | 2. | .0 | 1319.6 |
| 1 FEB 1048 49 | 24.  | .5   | 1319.8 * | 1 FEB 2048 149 | 70.  | 1.5 | 1320.2 * | 2 FEB 0648 249 | 2. | .0 | 1319.6 |
| 1 FEB 1054 50 | 28.  | .6   | 1319.8 * | 1 FEB 2054 150 | 69.  | 1.5 | 1320.2 * | 2 FEB 0654 250 | 2. | .0 | 1319.6 |
| 1 FEB 1100 51 | 31.  | .7   | 1319.9 * | 1 FEB 2100 151 | 68.  | 1.5 | 1320.1 * | 2 FEB 0700 251 | 2. | .0 | 1319.6 |
| 1 FEB 1106 52 | 36.  | .8   | 1319.9 * | 1 FEB 2106 152 | 67.  | 1.4 | 1320.1 * | 2 FEB 0706 252 | 2. | .0 | 1319.6 |
| 1 FEB 1112 53 | 41.  | .9   | 1319.9 * | 1 FEB 2112 153 | 66.  | 1.4 | 1320.1 * | 2 FEB 0712 253 | 2. | .0 | 1319.6 |
| 1 FEB 1118 54 | 49.  | 1.0  | 1320.0 * | 1 FEB 2118 154 | 65.  | 1.4 | 1320.1 * | 2 FEB 0718 254 | 1. | .0 | 1319.6 |
| 1 FEB 1124 55 | 57.  | 1.2  | 1320.1 * | 1 FEB 2124 155 | 64.  | 1.4 | 1320.1 * | 2 FEB 0724 255 | 1. | .0 | 1319.6 |
| 1 FEB 1130 56 | 65.  | 1.4  | 1320.1 * | 1 FEB 2130 156 | 63.  | 1.4 | 1320.1 * | 2 FEB 0730 256 | 1. | .0 | 1319.6 |
| 1 FEB 1136 57 | 86.  | 1.9  | 1320.3 * | 1 FEB 2136 157 | 62.  | 1.3 | 1320.1 * | 2 FEB 0736 257 | 1. | .0 | 1319.6 |
| 1 FEB 1142 58 | 145. | 3.1  | 1320.8 * | 1 FEB 2142 158 | 61.  | 1.3 | 1320.1 * | 2 FEB 0742 258 | 1. | .0 | 1319.6 |
| 1 FEB 1148 59 | 250. | 5.4  | 1321.6 * | 1 FEB 2148 159 | 60.  | 1.3 | 1320.1 * | 2 FEB 0748 259 | 1. | .0 | 1319.6 |
| 1 FEB 1154 60 | 336. | 8.5  | 1322.2 * | 1 FEB 2154 160 | 60.  | 1.3 | 1320.1 * | 2 FEB 0754 260 | 1. | .0 | 1319.6 |
| 1 FEB 1200 61 | 410. | 12.3 | 1322.7 * | 1 FEB 2200 161 | 59.  | 1.3 | 1320.1 * | 2 FEB 0800 261 | 1. | .0 | 1319.6 |
| 1 FEB 1206 62 | 484. | 16.4 | 1323.1 * | 1 FEB 2206 162 | 59.  | 1.3 | 1320.1 * | 2 FEB 0806 262 | 1. | .0 | 1319.6 |
| 1 FEB 1212 63 | 540. | 19.6 | 1323.5 * | 1 FEB 2212 163 | 58.  | 1.3 | 1320.1 * | 2 FEB 0812 263 | 1. | .0 | 1319.6 |
| 1 FEB 1218 64 | 575. | 21.7 | 1323.7 * | 1 FEB 2218 164 | 58.  | 1.2 | 1320.1 * | 2 FEB 0818 264 | 1. | .0 | 1319.6 |
| 1 FEB 1224 65 | 598. | 23.1 | 1323.9 * | 1 FEB 2224 165 | 57.  | 1.2 | 1320.1 * | 2 FEB 0824 265 | 1. | .0 | 1319.6 |
| 1 FEB 1230 66 | 616. | 24.4 | 1324.0 * | 1 FEB 2230 166 | 57.  | 1.2 | 1320.1 * | 2 FEB 0830 266 | 1. | .0 | 1319.6 |
| 1 FEB 1236 67 | 633. | 25.6 | 1324.2 * | 1 FEB 2236 167 | 56.  | 1.2 | 1320.1 * | 2 FEB 0836 267 | 1. | .0 | 1319.6 |
| 1 FEB 1242 68 | 648. | 26.7 | 1324.3 * | 1 FEB 2242 168 | 56.  | 1.2 | 1320.0 * | 2 FEB 0842 268 | 1. | .0 | 1319.6 |
| 1 FEB 1248 69 | 661. | 27.7 | 1324.4 * | 1 FEB 2248 169 | 56.  | 1.2 | 1320.0 * | 2 FEB 0848 269 | 1. | .0 | 1319.6 |
| 1 FEB 1254 70 | 671. | 28.4 | 1324.5 * | 1 FEB 2254 170 | 56.  | 1.2 | 1320.0 * | 2 FEB 0854 270 | 1. | .0 | 1319.6 |
| 1 FEB 1300 71 | 678. | 29.0 | 1324.5 * | 1 FEB 2300 171 | 55.  | 1.2 | 1320.0 * | 2 FEB 0900 271 | 1. | .0 | 1319.6 |
| 1 FEB 1306 72 | 682. | 29.3 | 1324.6 * | 1 FEB 2306 172 | 55.  | 1.2 | 1320.0 * | 2 FEB 0906 272 | 1. | .0 | 1319.6 |
| 1 FEB 1312 73 | 683. | 29.4 | 1324.6 * | 1 FEB 2312 173 | 55.  | 1.2 | 1320.0 * | 2 FEB 0912 273 | 1. | .0 | 1319.6 |
| 1 FEB 1318 74 | 680. | 29.1 | 1324.5 * | 1 FEB 2318 174 | 55.  | 1.2 | 1320.0 * | 2 FEB 0918 274 | 1. | .0 | 1319.6 |
| 1 FEB 1324 75 | 672. | 28.6 | 1324.5 * | 1 FEB 2324 175 | 55.  | 1.2 | 1320.0 * | 2 FEB 0924 275 | 1. | .0 | 1319.6 |
| 1 FEB 1330 76 | 662. | 27.8 | 1324.4 * | 1 FEB 2330 176 | 54.  | 1.2 | 1320.0 * | 2 FEB 0930 276 | 1. | .0 | 1319.6 |
| 1 FEB 1336 77 | 648. | 26.7 | 1324.3 * | 1 FEB 2336 177 | 54.  | 1.2 | 1320.0 * | 2 FEB 0936 277 | 1. | .0 | 1319.6 |
| 1 FEB 1342 78 | 631. | 25.5 | 1324.2 * | 1 FEB 2342 178 | 54.  | 1.2 | 1320.0 * | 2 FEB 0942 278 | 1. | .0 | 1319.6 |
| 1 FEB 1348 79 | 613. | 24.2 | 1324.0 * | 1 FEB 2348 179 | 54.  | 1.2 | 1320.0 * | 2 FEB 0948 279 | 1. | .0 | 1319.6 |
| 1 FEB 1354 80 | 592. | 22.8 | 1323.8 * | 1 FEB 2354 180 | 54.  | 1.2 | 1320.0 * | 2 FEB 0954 280 | 1. | .0 | 1319.6 |
| 1 FEB 1400 81 | 568. | 21.3 | 1323.7 * | 2 FEB 0000 181 | 54.  | 1.2 | 1320.0 * | 2 FEB 1000 281 | 1. | .0 | 1319.6 |
| 1 FEB 1406 82 | 544. | 19.8 | 1323.5 * | 2 FEB 0006 182 | 53.  | 1.2 | 1320.0 * | 2 FEB 1006 282 | 1. | .0 | 1319.6 |
| 1 FEB 1412 83 | 518. | 18.4 | 1323.4 * | 2 FEB 0012 183 | 52.  | 1.1 | 1320.0 * | 2 FEB 1012 283 | 1. | .0 | 1319.6 |
| 1 FEB 1418 84 | 493. | 16.9 | 1323.2 * | 2 FEB 0018 184 | 49.  | 1.1 | 1320.0 * | 2 FEB 1018 284 | 1. | .0 | 1319.6 |
| 1 FEB 1424 85 | 469. | 15.5 | 1323.0 * | 2 FEB 0024 185 | 46.  | 1.0 | 1320.0 * | 2 FEB 1024 285 | 1. | .0 | 1319.6 |
| 1 FEB 1430 86 | 444. | 14.1 | 1322.9 * | 2 FEB 0030 186 | 43.  | .9  | 1319.9 * | 2 FEB 1030 286 | 1. | .0 | 1319.6 |
| 1 FEB 1436 87 | 419. | 12.8 | 1322.7 * | 2 FEB 0036 187 | 40.  | .9  | 1319.9 * | 2 FEB 1036 287 | 1. | .0 | 1319.6 |
| 1 FEB 1442 88 | 396. | 11.6 | 1322.6 * | 2 FEB 0042 188 | 38.  | .8  | 1319.9 * | 2 FEB 1042 288 | 1. | .0 | 1319.6 |
| 1 FEB 1448 89 | 374. | 10.5 | 1322.4 * | 2 FEB 0048 189 | 35.  | .8  | 1319.9 * | 2 FEB 1048 289 | 1. | .0 | 1319.6 |
| 1 FEB 1454 90 | 354. | 9.4  | 1322.3 * | 2 FEB 0054 190 | 33.  | .7  | 1319.9 * | 2 FEB 1054 290 | 1. | .0 | 1319.6 |
| 1 FEB 1500 91 | 335. | 8.4  | 1322.2 * | 2 FEB 0100 191 | 31.  | .7  | 1319.8 * | 2 FEB 1100 291 | 1. | .0 | 1319.6 |

|                |      |     |          |                |     |    |          |                |    |    |        |
|----------------|------|-----|----------|----------------|-----|----|----------|----------------|----|----|--------|
| 1 FEB 1506 92  | 317. | 7.5 | 1322.1 * | 2 FEB 0106 192 | 29. | .6 | 1319.8 * | 2 FEB 1106 292 | 1. | .0 | 1319.6 |
| 1 FEB 1512 93  | 300. | 6.6 | 1322.0 * | 2 FEB 0112 193 | 27. | .6 | 1319.8 * | 2 FEB 1112 293 | 1. | .0 | 1319.6 |
| 1 FEB 1518 94  | 271. | 5.9 | 1321.8 * | 2 FEB 0118 194 | 25. | .5 | 1319.8 * | 2 FEB 1118 294 | 1. | .0 | 1319.6 |
| 1 FEB 1524 95  | 247. | 5.3 | 1321.6 * | 2 FEB 0124 195 | 23. | .5 | 1319.8 * | 2 FEB 1124 295 | 1. | .0 | 1319.6 |
| 1 FEB 1530 96  | 227. | 4.9 | 1321.4 * | 2 FEB 0130 196 | 21. | .5 | 1319.8 * | 2 FEB 1130 296 | 1. | .0 | 1319.6 |
| 1 FEB 1536 97  | 211. | 4.6 | 1321.3 * | 2 FEB 0136 197 | 19. | .4 | 1319.8 * | 2 FEB 1136 297 | 1. | .0 | 1319.6 |
| 1 FEB 1542 98  | 199. | 4.3 | 1321.2 * | 2 FEB 0142 198 | 18. | .4 | 1319.7 * | 2 FEB 1142 298 | 1. | .0 | 1319.6 |
| 1 FEB 1548 99  | 189. | 4.1 | 1321.1 * | 2 FEB 0148 199 | 16. | .3 | 1319.7 * | 2 FEB 1148 299 | 1. | .0 | 1319.6 |
| 1 FEB 1554 100 | 181. | 3.9 | 1321.1 * | 2 FEB 0154 200 | 15. | .3 | 1319.7 * | 2 FEB 1154 300 | 1. | .0 | 1319.6 |

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| PEAK FLOW | TIME  |          | 6-HR  | 24-HR | 72-HR | 29.90-HR |
|-----------|-------|----------|-------|-------|-------|----------|
| +         | (CFS) | (HR)     |       |       |       |          |
| +         | 683.  | 7.20     | (CFS) |       |       |          |
|           |       |          | 375.  | 119.  | 96.   | 96.      |
|           |       | (INCHES) | 3.938 | 5.017 | 5.027 | 5.027    |
|           |       | (AC-FT)  | 186.  | 237.  | 237.  | 237.     |

| PEAK STORAGE | TIME    |      | 6-HR | 24-HR | 72-HR | 29.90-HR |
|--------------|---------|------|------|-------|-------|----------|
| +            | (AC-FT) | (HR) |      |       |       |          |
|              | 29.     | 7.20 | 13.  | 4.    | 3.    | 3.       |

| PEAK STAGE | TIME    |      | 6-HR    | 24-HR   | 72-HR   | 29.90-HR |
|------------|---------|------|---------|---------|---------|----------|
| +          | (FEET)  | (HR) |         |         |         |          |
|            | 1324.56 | 7.20 | 1322.39 | 1320.50 | 1320.33 | 1320.33  |

CUMULATIVE AREA = .88 SQ MI

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119 KP PLAN 4 FOR STATION POND4 STAGE-STORAGE THRU POND #4 AT 29TH &amp; RIDGE

## HYDROGRAPH ROUTING DATA

120 RS STORAGE ROUTING

|        |         |                             |
|--------|---------|-----------------------------|
| NSTPS  | 1       | NUMBER OF SUBREACHES        |
| ITYP   | ELEV    | TYPE OF INITIAL CONDITION   |
| RSVRIC | 1319.60 | INITIAL CONDITION           |
| X      | .00     | WORKING R AND D COEFFICIENT |

|        |           |         |         |         |         |         |         |         |         |         |         |
|--------|-----------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 121 SV | STORAGE   | .0      | 5.4     | 6.6     | 20.5    | 27.8    | 37.5    | 43.5    | 50.0    | 60.0    |         |
| 122 SE | ELEVATION | 1319.60 | 1321.60 | 1322.00 | 1323.60 | 1324.40 | 1325.40 | 1326.00 | 1327.00 | 1328.00 |         |
| 123 SQ | DISCHARGE | 0.      | 300.    | 450.    | 600.    | 750.    | 900.    | 1050.   | 1200.   | 1262.   | 1500.   |
| 124 SE | ELEVATION | 1319.60 | 1321.60 | 1322.20 | 1322.90 | 1323.60 | 1324.40 | 1325.40 | 1326.50 | 1327.00 | 1327.20 |

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## COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

|           |         |         |         |         |         |         |         |         |         |         |
|-----------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| STORAGE   | .00     | 5.40    | 6.60    | 8.34    | 14.42   | 20.50   | 27.80   | 37.50   | 43.50   | 46.75   |
| OUTFLOW   | .00     | 300.00  | 400.01  | 450.00  | 600.00  | 750.00  | 900.00  | 1050.00 | 1131.82 | 1200.00 |
| ELEVATION | 1319.60 | 1321.60 | 1322.00 | 1322.20 | 1322.90 | 1323.60 | 1324.40 | 1325.40 | 1326.00 | 1326.50 |
| STORAGE   | 50.00   | 52.00   | 60.00   |         |         |         |         |         |         |         |
| OUTFLOW   | 1262.00 | 1500.00 | 2452.29 |         |         |         |         |         |         |         |
| ELEVATION | 1327.00 | 1327.20 | 1328.00 |         |         |         |         |         |         |         |

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HYDROGRAPH AT STATION POND4  
PLAN 4, RATIO = 1.00

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| DA MON HRMN ORD | OUTFLOW | STORAGE | STAGE | DA MON HRMN ORD | OUTFLOW    | STORAGE | STAGE | DA MON HRMN ORD | OUTFLOW  | STORAGE    | STAGE |     |    |        |
|-----------------|---------|---------|-------|-----------------|------------|---------|-------|-----------------|----------|------------|-------|-----|----|--------|
| 1 FEB 0600      | 1       | 0.      | .0    | 1319.6 *        | 1 FEB 1600 | 101     | 169.  | 3.0             | 1320.7 * | 2 FEB 0200 | 201   | 13. | .2 | 1319.7 |
| 1 FEB 0606      | 2       | 0.      | .0    | 1319.6 *        | 1 FEB 1606 | 102     | 165.  | 3.0             | 1320.7 * | 2 FEB 0206 | 202   | 12. | .2 | 1319.7 |
| 1 FEB 0612      | 3       | 0.      | .0    | 1319.6 *        | 1 FEB 1612 | 103     | 160.  | 2.9             | 1320.7 * | 2 FEB 0212 | 203   | 11. | .2 | 1319.7 |

|            |    |      |      |          |            |     |      |     |          |            |     |     |    |        |
|------------|----|------|------|----------|------------|-----|------|-----|----------|------------|-----|-----|----|--------|
| 1 FEB 0618 | 4  | 1.   | .0   | 1319.6 * | 1 FEB 1618 | 104 | 154. | 2.8 | 1320.6 * | 2 FEB 0218 | 204 | 10. | .2 | 1319.7 |
| 1 FEB 0624 | 5  | 1.   | .0   | 1319.6 * | 1 FEB 1624 | 105 | 149. | 2.7 | 1320.6 * | 2 FEB 0224 | 205 | 10. | .2 | 1319.7 |
| 1 FEB 0630 | 6  | 2.   | .0   | 1319.6 * | 1 FEB 1630 | 106 | 143. | 2.6 | 1320.6 * | 2 FEB 0230 | 206 | 9.  | .2 | 1319.7 |
| 1 FEB 0636 | 7  | 2.   | .0   | 1319.6 * | 1 FEB 1636 | 107 | 139. | 2.5 | 1320.5 * | 2 FEB 0236 | 207 | 9.  | .2 | 1319.7 |
| 1 FEB 0642 | 8  | 3.   | .1   | 1319.6 * | 1 FEB 1642 | 108 | 135. | 2.4 | 1320.5 * | 2 FEB 0242 | 208 | 8.  | .1 | 1319.7 |
| 1 FEB 0648 | 9  | 3.   | .1   | 1319.6 * | 1 FEB 1648 | 109 | 131. | 2.4 | 1320.5 * | 2 FEB 0248 | 209 | 8.  | .1 | 1319.7 |
| 1 FEB 0654 | 10 | 4.   | .1   | 1319.6 * | 1 FEB 1654 | 110 | 127. | 2.3 | 1320.4 * | 2 FEB 0254 | 210 | 7.  | .1 | 1319.6 |
| 1 FEB 0700 | 11 | 4.   | .1   | 1319.6 * | 1 FEB 1700 | 111 | 124. | 2.2 | 1320.4 * | 2 FEB 0300 | 211 | 7.  | .1 | 1319.6 |
| 1 FEB 0706 | 12 | 4.   | .1   | 1319.6 * | 1 FEB 1706 | 112 | 121. | 2.2 | 1320.4 * | 2 FEB 0306 | 212 | 6.  | .1 | 1319.6 |
| 1 FEB 0712 | 13 | 4.   | .1   | 1319.6 * | 1 FEB 1712 | 113 | 118. | 2.1 | 1320.4 * | 2 FEB 0312 | 213 | 6.  | .1 | 1319.6 |
| 1 FEB 0718 | 14 | 5.   | .1   | 1319.6 * | 1 FEB 1718 | 114 | 115. | 2.1 | 1320.4 * | 2 FEB 0318 | 214 | 6.  | .1 | 1319.6 |
| 1 FEB 0724 | 15 | 5.   | .1   | 1319.6 * | 1 FEB 1724 | 115 | 113. | 2.0 | 1320.4 * | 2 FEB 0324 | 215 | 5.  | .1 | 1319.6 |
| 1 FEB 0730 | 16 | 5.   | .1   | 1319.6 * | 1 FEB 1730 | 116 | 110. | 2.0 | 1320.3 * | 2 FEB 0330 | 216 | 5.  | .1 | 1319.6 |
| 1 FEB 0736 | 17 | 5.   | .1   | 1319.6 * | 1 FEB 1736 | 117 | 108. | 1.9 | 1320.3 * | 2 FEB 0336 | 217 | 5.  | .1 | 1319.6 |
| 1 FEB 0742 | 18 | 5.   | .1   | 1319.6 * | 1 FEB 1742 | 118 | 105. | 1.9 | 1320.3 * | 2 FEB 0342 | 218 | 5.  | .1 | 1319.6 |
| 1 FEB 0748 | 19 | 5.   | .1   | 1319.6 * | 1 FEB 1748 | 119 | 101. | 1.8 | 1320.3 * | 2 FEB 0348 | 219 | 5.  | .1 | 1319.6 |
| 1 FEB 0754 | 20 | 5.   | .1   | 1319.6 * | 1 FEB 1754 | 120 | 97.  | 1.7 | 1320.2 * | 2 FEB 0354 | 220 | 4.  | .1 | 1319.6 |
| 1 FEB 0800 | 21 | 5.   | .1   | 1319.6 * | 1 FEB 1800 | 121 | 94.  | 1.7 | 1320.2 * | 2 FEB 0400 | 221 | 4.  | .1 | 1319.6 |
| 1 FEB 0806 | 22 | 5.   | .1   | 1319.6 * | 1 FEB 1806 | 122 | 91.  | 1.6 | 1320.2 * | 2 FEB 0406 | 222 | 4.  | .1 | 1319.6 |
| 1 FEB 0812 | 23 | 6.   | .1   | 1319.6 * | 1 FEB 1812 | 123 | 89.  | 1.6 | 1320.2 * | 2 FEB 0412 | 223 | 4.  | .1 | 1319.6 |
| 1 FEB 0818 | 24 | 6.   | .1   | 1319.6 * | 1 FEB 1818 | 124 | 88.  | 1.6 | 1320.2 * | 2 FEB 0418 | 224 | 4.  | .1 | 1319.6 |
| 1 FEB 0824 | 25 | 6.   | .1   | 1319.6 * | 1 FEB 1824 | 125 | 87.  | 1.6 | 1320.2 * | 2 FEB 0424 | 225 | 4.  | .1 | 1319.6 |
| 1 FEB 0830 | 26 | 7.   | .1   | 1319.6 * | 1 FEB 1830 | 126 | 86.  | 1.6 | 1320.2 * | 2 FEB 0430 | 226 | 3.  | .1 | 1319.6 |
| 1 FEB 0836 | 27 | 7.   | .1   | 1319.6 * | 1 FEB 1836 | 127 | 85.  | 1.5 | 1320.2 * | 2 FEB 0436 | 227 | 3.  | .1 | 1319.6 |
| 1 FEB 0842 | 28 | 7.   | .1   | 1319.6 * | 1 FEB 1842 | 128 | 85.  | 1.5 | 1320.2 * | 2 FEB 0442 | 228 | 3.  | .1 | 1319.6 |
| 1 FEB 0848 | 29 | 7.   | .1   | 1319.6 * | 1 FEB 1848 | 129 | 84.  | 1.5 | 1320.2 * | 2 FEB 0448 | 229 | 3.  | .1 | 1319.6 |
| 1 FEB 0854 | 30 | 8.   | .1   | 1319.7 * | 1 FEB 1854 | 130 | 83.  | 1.5 | 1320.2 * | 2 FEB 0454 | 230 | 3.  | .1 | 1319.6 |
| 1 FEB 0900 | 31 | 8.   | .1   | 1319.7 * | 1 FEB 1900 | 131 | 82.  | 1.5 | 1320.1 * | 2 FEB 0500 | 231 | 3.  | .1 | 1319.6 |
| 1 FEB 0906 | 32 | 8.   | .1   | 1319.7 * | 1 FEB 1906 | 132 | 82.  | 1.5 | 1320.1 * | 2 FEB 0506 | 232 | 3.  | .1 | 1319.6 |
| 1 FEB 0912 | 33 | 8.   | .1   | 1319.7 * | 1 FEB 1912 | 133 | 81.  | 1.5 | 1320.1 * | 2 FEB 0512 | 233 | 3.  | .0 | 1319.6 |
| 1 FEB 0918 | 34 | 9.   | .2   | 1319.7 * | 1 FEB 1918 | 134 | 81.  | 1.5 | 1320.1 * | 2 FEB 0518 | 234 | 3.  | .0 | 1319.6 |
| 1 FEB 0924 | 35 | 9.   | .2   | 1319.7 * | 1 FEB 1924 | 135 | 81.  | 1.5 | 1320.1 * | 2 FEB 0524 | 235 | 3.  | .0 | 1319.6 |
| 1 FEB 0930 | 36 | 9.   | .2   | 1319.7 * | 1 FEB 1930 | 136 | 81.  | 1.5 | 1320.1 * | 2 FEB 0530 | 236 | 2.  | .0 | 1319.6 |
| 1 FEB 0936 | 37 | 9.   | .2   | 1319.7 * | 1 FEB 1936 | 137 | 80.  | 1.4 | 1320.1 * | 2 FEB 0536 | 237 | 2.  | .0 | 1319.6 |
| 1 FEB 0942 | 38 | 10.  | .2   | 1319.7 * | 1 FEB 1942 | 138 | 80.  | 1.4 | 1320.1 * | 2 FEB 0542 | 238 | 2.  | .0 | 1319.6 |
| 1 FEB 0948 | 39 | 10.  | .2   | 1319.7 * | 1 FEB 1948 | 139 | 80.  | 1.4 | 1320.1 * | 2 FEB 0548 | 239 | 2.  | .0 | 1319.6 |
| 1 FEB 0954 | 40 | 11.  | .2   | 1319.7 * | 1 FEB 1954 | 140 | 80.  | 1.4 | 1320.1 * | 2 FEB 0554 | 240 | 2.  | .0 | 1319.6 |
| 1 FEB 1000 | 41 | 11.  | .2   | 1319.7 * | 1 FEB 2000 | 141 | 80.  | 1.4 | 1320.1 * | 2 FEB 0600 | 241 | 2.  | .0 | 1319.6 |
| 1 FEB 1006 | 42 | 12.  | .2   | 1319.7 * | 1 FEB 2006 | 142 | 80.  | 1.4 | 1320.1 * | 2 FEB 0606 | 242 | 2.  | .0 | 1319.6 |
| 1 FEB 1012 | 43 | 13.  | .2   | 1319.7 * | 1 FEB 2012 | 143 | 79.  | 1.4 | 1320.1 * | 2 FEB 0612 | 243 | 2.  | .0 | 1319.6 |
| 1 FEB 1018 | 44 | 14.  | .3   | 1319.7 * | 1 FEB 2018 | 144 | 77.  | 1.4 | 1320.1 * | 2 FEB 0618 | 244 | 2.  | .0 | 1319.6 |
| 1 FEB 1024 | 45 | 15.  | .3   | 1319.7 * | 1 FEB 2024 | 145 | 75.  | 1.4 | 1320.1 * | 2 FEB 0624 | 245 | 2.  | .0 | 1319.6 |
| 1 FEB 1030 | 46 | 17.  | .3   | 1319.7 * | 1 FEB 2030 | 146 | 74.  | 1.3 | 1320.1 * | 2 FEB 0630 | 246 | 2.  | .0 | 1319.6 |
| 1 FEB 1036 | 47 | 19.  | .3   | 1319.7 * | 1 FEB 2036 | 147 | 72.  | 1.3 | 1320.1 * | 2 FEB 0636 | 247 | 2.  | .0 | 1319.6 |
| 1 FEB 1042 | 48 | 22.  | .4   | 1319.7 * | 1 FEB 2042 | 148 | 71.  | 1.3 | 1320.1 * | 2 FEB 0642 | 248 | 2.  | .0 | 1319.6 |
| 1 FEB 1048 | 49 | 25.  | .5   | 1319.8 * | 1 FEB 2048 | 149 | 70.  | 1.3 | 1320.1 * | 2 FEB 0648 | 249 | 2.  | .0 | 1319.6 |
| 1 FEB 1054 | 50 | 29.  | .5   | 1319.8 * | 1 FEB 2054 | 150 | 69.  | 1.2 | 1320.1 * | 2 FEB 0654 | 250 | 2.  | .0 | 1319.6 |
| 1 FEB 1100 | 51 | 33.  | .6   | 1319.8 * | 1 FEB 2100 | 151 | 68.  | 1.2 | 1320.1 * | 2 FEB 0700 | 251 | 2.  | .0 | 1319.6 |
| 1 FEB 1106 | 52 | 37.  | .7   | 1319.8 * | 1 FEB 2106 | 152 | 66.  | 1.2 | 1320.0 * | 2 FEB 0706 | 252 | 2.  | .0 | 1319.6 |
| 1 FEB 1112 | 53 | 43.  | .8   | 1319.9 * | 1 FEB 2112 | 153 | 65.  | 1.2 | 1320.0 * | 2 FEB 0712 | 253 | 1.  | .0 | 1319.6 |
| 1 FEB 1118 | 54 | 51.  | .9   | 1319.9 * | 1 FEB 2118 | 154 | 64.  | 1.2 | 1320.0 * | 2 FEB 0718 | 254 | 1.  | .0 | 1319.6 |
| 1 FEB 1124 | 55 | 59.  | 1.1  | 1320.0 * | 1 FEB 2124 | 155 | 63.  | 1.1 | 1320.0 * | 2 FEB 0724 | 255 | 1.  | .0 | 1319.6 |
| 1 FEB 1130 | 56 | 68.  | 1.2  | 1320.1 * | 1 FEB 2130 | 156 | 62.  | 1.1 | 1320.0 * | 2 FEB 0730 | 256 | 1.  | .0 | 1319.6 |
| 1 FEB 1136 | 57 | 91.  | 1.6  | 1320.2 * | 1 FEB 2136 | 157 | 62.  | 1.1 | 1320.0 * | 2 FEB 0736 | 257 | 1.  | .0 | 1319.6 |
| 1 FEB 1142 | 58 | 158. | 2.8  | 1320.7 * | 1 FEB 2142 | 158 | 61.  | 1.1 | 1320.0 * | 2 FEB 0742 | 258 | 1.  | .0 | 1319.6 |
| 1 FEB 1148 | 59 | 275. | 4.9  | 1321.4 * | 1 FEB 2148 | 159 | 60.  | 1.1 | 1320.0 * | 2 FEB 0748 | 259 | 1.  | .0 | 1319.6 |
| 1 FEB 1154 | 60 | 427. | 7.5  | 1322.1 * | 1 FEB 2154 | 160 | 59.  | 1.1 | 1320.0 * | 2 FEB 0754 | 260 | 1.  | .0 | 1319.6 |
| 1 FEB 1200 | 61 | 506. | 10.6 | 1322.5 * | 1 FEB 2200 | 161 | 59.  | 1.1 | 1320.0 * | 2 FEB 0800 | 261 | 1.  | .0 | 1319.6 |
| 1 FEB 1206 | 62 | 586. | 13.9 | 1322.8 * | 1 FEB 2206 | 162 | 58.  | 1.0 | 1320.0 * | 2 FEB 0806 | 262 | 1.  | .0 | 1319.6 |
| 1 FEB 1212 | 63 | 645. | 16.2 | 1323.1 * | 1 FEB 2212 | 163 | 58.  | 1.0 | 1320.0 * | 2 FEB 0812 | 263 | 1.  | .0 | 1319.6 |
| 1 FEB 1218 | 64 | 675. | 17.5 | 1323.3 * | 1 FEB 2218 | 164 | 57.  | 1.0 | 1320.0 * | 2 FEB 0818 | 264 | 1.  | .0 | 1319.6 |
| 1 FEB 1224 | 65 | 691. | 18.1 | 1323.3 * | 1 FEB 2224 | 165 | 57.  | 1.0 | 1320.0 * | 2 FEB 0824 | 265 | 1.  | .0 | 1319.6 |
| 1 FEB 1230 | 66 | 704. | 18.6 | 1323.4 * | 1 FEB 2230 | 166 | 57.  | 1.0 | 1320.0 * | 2 FEB 0830 | 266 | 1.  | .0 | 1319.6 |
| 1 FEB 1236 | 67 | 716. | 19.1 | 1323.4 * | 1 FEB 2236 | 167 | 56.  | 1.0 | 1320.0 * | 2 FEB 0836 | 267 | 1.  | .0 | 1319.6 |
| 1 FEB 1242 | 68 | 727. | 19.6 | 1323.5 * | 1 FEB 2242 | 168 | 56.  | 1.0 | 1320.0 * | 2 FEB 0842 | 268 | 1.  | .0 | 1319.6 |
| 1 FEB 1248 | 69 | 735. | 19.9 | 1323.5 * | 1 FEB 2248 | 169 | 56.  | 1.0 | 1320.0 * | 2 FEB 0848 | 269 | 1.  | .0 | 1319.6 |
| 1 FEB 1254 | 70 | 739. | 20.1 | 1323.5 * | 1 FEB 2254 | 170 | 55.  | 1.0 | 1320.0 * | 2 FEB 0854 | 270 | 1.  | .0 | 1319.6 |
| 1 FEB 1300 | 71 | 740. | 20.1 | 1323.6 * | 1 FEB 2300 | 171 | 55.  | 1.0 | 1320.0 * | 2 FEB 0900 | 271 | 1.  | .0 | 1319.6 |
| 1 FEB 1306 | 72 | 736. | 19.9 | 1323.5 * | 1 FEB 2306 | 172 | 55.  | 1.0 | 1320.0 * | 2 FEB 0906 | 272 | 1.  | .0 | 1319.6 |
| 1 FEB 1312 | 73 | 728. | 19.6 | 1323.5 * | 1 FEB 2312 | 173 | 55.  | 1.0 | 1320.0 * | 2 FEB 0912 | 273 | 1.  | .0 | 1319.6 |
| 1 FEB 1318 | 74 | 713. | 19.0 | 1323.4 * | 1 FEB 2318 | 174 | 55.  | 1.0 | 1320.0 * | 2 FEB 0918 | 274 | 1.  | .0 | 1319.6 |
| 1 FEB 1324 | 75 | 694. | 18.2 | 1323.3 * | 1 FEB 2324 | 175 | 54.  | 1.0 | 1320.0 * | 2 FEB 0924 | 275 | 1.  | .0 | 1319.6 |
| 1 FEB 1330 | 76 | 671. | 17.3 | 1323.2 * | 1 FEB 2330 | 176 | 54.  | 1.0 | 1320.0 * | 2 FEB 0930 | 276 | 1.  | .0 | 1319.6 |
| 1 FEB 1336 | 77 | 645. | 16.2 | 1323.1 * | 1 FEB 2336 | 177 | 54.  | 1.0 | 1320.0 * | 2 FEB 0936 | 277 | 1.  | .0 | 1319.6 |
| 1 FEB 1342 | 78 | 617. | 15.1 | 1323.0 * | 1 FEB 2342 | 178 | 54.  | 1.0 | 1320.0 * | 2 FEB 0942 | 278 | 1.  | .0 | 1319.6 |
| 1 FEB 1348 | 79 | 588. | 13.9 | 1322.8 * | 1 FEB 2348 | 179 | 54.  | 1.0 | 1320.0 * | 2 FEB 0948 | 279 | 1.  | .0 | 1319.6 |
| 1 FEB 1354 | 80 | 559. | 12.8 | 1322.7 * | 1 FEB 2354 | 180 | 54.  | 1.0 | 1320.0 * | 2 FEB 0954 | 280 | 1.  | .0 | 1319.6 |
| 1 FEB 1400 | 81 | 530. | 11.6 | 1322.6 * | 2 FEB 0000 | 181 | 54.  | 1.0 | 1320.0 * | 2 FEB 1000 | 281 | 1.  | .0 | 1319.6 |
| 1 FEB 1406 | 82 | 502. | 10.5 | 1322.4 * | 2 FEB 0006 | 182 | 53.  | 1.0 | 1320.0 * | 2 FEB 1006 | 282 | 1.  | .0 | 1319.6 |
| 1 FEB 1412 | 83 | 475. | 9.3  | 1322.3 * | 2 FEB 0012 | 183 | 51.  | .9  | 1319.9 * | 2 FEB 1012 | 283 | 1.  | .0 | 1319.6 |

|                |      |     |          |                |     |    |          |                |    |    |        |
|----------------|------|-----|----------|----------------|-----|----|----------|----------------|----|----|--------|
| 1 FEB 1418 84  | 448. | 8.3 | 1322.2 * | 2 FEB 0018 184 | 48. | .9 | 1319.9 * | 2 FEB 1018 284 | 1. | .0 | 1319.6 |
| 1 FEB 1424 85  | 418. | 7.2 | 1322.1 * | 2 FEB 0024 185 | 45. | .8 | 1319.9 * | 2 FEB 1024 285 | 1. | .0 | 1319.6 |
| 1 FEB 1430 86  | 378. | 6.3 | 1321.9 * | 2 FEB 0030 186 | 42. | .8 | 1319.9 * | 2 FEB 1030 286 | 1. | .0 | 1319.6 |
| 1 FEB 1436 87  | 325. | 5.7 | 1321.7 * | 2 FEB 0036 187 | 39. | .7 | 1319.9 * | 2 FEB 1036 287 | 1. | .0 | 1319.6 |
| 1 FEB 1442 88  | 294. | 5.3 | 1321.6 * | 2 FEB 0042 188 | 37. | .7 | 1319.8 * | 2 FEB 1042 288 | 1. | .0 | 1319.6 |
| 1 FEB 1448 89  | 276. | 5.0 | 1321.4 * | 2 FEB 0048 189 | 34. | .6 | 1319.8 * | 2 FEB 1048 289 | 1. | .0 | 1319.6 |
| 1 FEB 1454 90  | 261. | 4.7 | 1321.3 * | 2 FEB 0054 190 | 32. | .6 | 1319.8 * | 2 FEB 1054 290 | 1. | .0 | 1319.6 |
| 1 FEB 1500 91  | 247. | 4.4 | 1321.2 * | 2 FEB 0100 191 | 30. | .5 | 1319.8 * | 2 FEB 1100 291 | 1. | .0 | 1319.6 |
| 1 FEB 1506 92  | 235. | 4.2 | 1321.2 * | 2 FEB 0106 192 | 28. | .5 | 1319.8 * | 2 FEB 1106 292 | 1. | .0 | 1319.6 |
| 1 FEB 1512 93  | 224. | 4.0 | 1321.1 * | 2 FEB 0112 193 | 26. | .5 | 1319.8 * | 2 FEB 1112 293 | 1. | .0 | 1319.6 |
| 1 FEB 1518 94  | 214. | 3.9 | 1321.0 * | 2 FEB 0118 194 | 24. | .4 | 1319.8 * | 2 FEB 1118 294 | 1. | .0 | 1319.6 |
| 1 FEB 1524 95  | 205. | 3.7 | 1321.0 * | 2 FEB 0124 195 | 22. | .4 | 1319.7 * | 2 FEB 1124 295 | 1. | .0 | 1319.6 |
| 1 FEB 1530 96  | 197. | 3.5 | 1320.9 * | 2 FEB 0130 196 | 20. | .4 | 1319.7 * | 2 FEB 1130 296 | 1. | .0 | 1319.6 |
| 1 FEB 1536 97  | 190. | 3.4 | 1320.9 * | 2 FEB 0136 197 | 18. | .3 | 1319.7 * | 2 FEB 1136 297 | 1. | .0 | 1319.6 |
| 1 FEB 1542 98  | 184. | 3.3 | 1320.8 * | 2 FEB 0142 198 | 17. | .3 | 1319.7 * | 2 FEB 1142 298 | 1. | .0 | 1319.6 |
| 1 FEB 1548 99  | 178. | 3.2 | 1320.8 * | 2 FEB 0148 199 | 15. | .3 | 1319.7 * | 2 FEB 1148 299 | 1. | .0 | 1319.6 |
| 1 FEB 1554 100 | 173. | 3.1 | 1320.8 * | 2 FEB 0154 200 | 14. | .3 | 1319.7 * | 2 FEB 1154 300 | 1. | .0 | 1319.6 |

\*\*\*\*\*

| PEAK FLOW    | TIME |          | MAXIMUM AVERAGE FLOW    |         |         |          |
|--------------|------|----------|-------------------------|---------|---------|----------|
|              |      |          | 6-HR                    | 24-HR   | 72-HR   | 29.90-HR |
| + (CFS)      | (HR) | (CFS)    |                         |         |         |          |
| + 740.       | 7.00 |          | 375.                    | 119.    | 96.     | 96.      |
|              |      | (INCHES) | 3.943                   | 5.017   | 5.027   | 5.027    |
|              |      | (AC-FT)  | 186.                    | 237.    | 237.    | 237.     |
| PEAK STORAGE | TIME |          | MAXIMUM AVERAGE STORAGE |         |         |          |
|              |      |          | 6-HR                    | 24-HR   | 72-HR   | 29.90-HR |
| + (AC-FT)    | (HR) |          |                         |         |         |          |
| + 20.        | 7.00 |          | 9.                      | 3.      | 2.      | 2.       |
| PEAK STAGE   | TIME |          | MAXIMUM AVERAGE STAGE   |         |         |          |
|              |      |          | 6-HR                    | 24-HR   | 72-HR   | 29.90-HR |
| + (FEET)     | (HR) |          |                         |         |         |          |
| + 1323.55    | 7.00 |          | 1321.77                 | 1320.31 | 1320.17 | 1320.17  |

CUMULATIVE AREA = .88 SQ MI

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS  
 FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES  
 TIME TO PEAK IN HOURS

| OPERATION     | STATION | AREA | PLAN                      | RATIO 1 | RATIOS APPLIED TO FLOWS |
|---------------|---------|------|---------------------------|---------|-------------------------|
|               |         |      |                           | 1.00    |                         |
| HYDROGRAPH AT |         |      |                           |         |                         |
| +             | FL1     | .12  | 1                         | FLOW    | 238.                    |
|               |         |      |                           | TIME    | 6.40                    |
|               |         |      | 2                         | FLOW    | 238.                    |
|               |         |      |                           | TIME    | 6.40                    |
|               |         |      | 3                         | FLOW    | 238.                    |
|               |         |      |                           | TIME    | 6.40                    |
|               |         |      | 4                         | FLOW    | 238.                    |
|               |         |      |                           | TIME    | 6.40                    |
| ROUTED TO     |         |      |                           |         |                         |
| +             | FLPND1  | .12  | 1                         | FLOW    | 198.                    |
|               |         |      |                           | TIME    | 6.60                    |
|               |         |      | 2                         | FLOW    | 198.                    |
|               |         |      |                           | TIME    | 6.60                    |
|               |         |      | 3                         | FLOW    | 198.                    |
|               |         |      |                           | TIME    | 6.60                    |
|               |         |      | 4                         | FLOW    | 198.                    |
|               |         |      |                           | TIME    | 6.60                    |
|               |         |      | ** PEAK STAGES IN FEET ** |         |                         |
|               |         |      | 1                         | STAGE   | 1330.82                 |
|               |         |      |                           | TIME    | 6.60                    |
|               |         |      | 2                         | STAGE   | 1330.82                 |
|               |         |      |                           | TIME    | 6.60                    |
|               |         |      | 3                         | STAGE   | 1330.82                 |
|               |         |      |                           | TIME    | 6.60                    |
|               |         |      | 4                         | STAGE   | 1330.82                 |
|               |         |      |                           | TIME    | 6.60                    |
| HYDROGRAPH AT |         |      |                           |         |                         |
| +             | FL2     | .09  | 1                         | FLOW    | 277.                    |
|               |         |      |                           | TIME    | 6.10                    |
|               |         |      | 2                         | FLOW    | 277.                    |
|               |         |      |                           | TIME    | 6.10                    |
|               |         |      | 3                         | FLOW    | 277.                    |
|               |         |      |                           | TIME    | 6.10                    |
|               |         |      | 4                         | FLOW    | 277.                    |
|               |         |      |                           | TIME    | 6.10                    |
| 2 COMBINED AT |         |      |                           |         |                         |
| +             | FL12    | .21  | 1                         | FLOW    | 345.                    |
|               |         |      |                           | TIME    | 6.10                    |
|               |         |      | 2                         | FLOW    | 345.                    |
|               |         |      |                           | TIME    | 6.10                    |
|               |         |      | 3                         | FLOW    | 345.                    |
|               |         |      |                           | TIME    | 6.10                    |
|               |         |      | 4                         | FLOW    | 345.                    |
|               |         |      |                           | TIME    | 6.10                    |
| ROUTED TO     |         |      |                           |         |                         |
| +             | FLPND2  | .21  | 1                         | FLOW    | 192.                    |
|               |         |      |                           | TIME    | 7.00                    |
|               |         |      | 2                         | FLOW    | 192.                    |
|               |         |      |                           | TIME    | 7.00                    |
|               |         |      | 3                         | FLOW    | 192.                    |
|               |         |      |                           | TIME    | 7.00                    |
|               |         |      | 4                         | FLOW    | 192.                    |
|               |         |      |                           | TIME    | 7.00                    |
|               |         |      | ** PEAK STAGES IN FEET ** |         |                         |
|               |         |      | 1                         | STAGE   | 1327.62                 |
|               |         |      |                           | TIME    | 7.00                    |
|               |         |      | 2                         | STAGE   | 1327.62                 |
|               |         |      |                           | TIME    | 7.00                    |
|               |         |      | 3                         | STAGE   | 1327.62                 |
|               |         |      |                           | TIME    | 7.00                    |
|               |         |      | 4                         | STAGE   | 1327.62                 |
|               |         |      |                           | TIME    | 7.00                    |

|               |         |     |   |      |      |
|---------------|---------|-----|---|------|------|
| HYDROGRAPH AT |         |     |   |      |      |
| +             | FL3     | .09 | 1 | FLOW | 238. |
|               |         |     |   | TIME | 6.10 |
|               |         |     | 2 | FLOW | 238. |
|               |         |     |   | TIME | 6.10 |
|               |         |     | 3 | FLOW | 238. |
|               |         |     |   | TIME | 6.10 |
|               |         |     | 4 | FLOW | 238. |
|               |         |     |   | TIME | 6.10 |
| 2 COMBINED AT |         |     |   |      |      |
| +             | FL123   | .30 | 1 | FLOW | 327. |
|               |         |     |   | TIME | 6.20 |
|               |         |     | 2 | FLOW | 327. |
|               |         |     |   | TIME | 6.20 |
|               |         |     | 3 | FLOW | 327. |
|               |         |     |   | TIME | 6.20 |
|               |         |     | 4 | FLOW | 327. |
|               |         |     |   | TIME | 6.20 |
| HYDROGRAPH AT |         |     |   |      |      |
| +             | WRR7\$8 | .11 | 1 | FLOW | 290. |
|               |         |     |   | TIME | 6.00 |
|               |         |     | 2 | FLOW | 290. |
|               |         |     |   | TIME | 6.00 |
|               |         |     | 3 | FLOW | 290. |
|               |         |     |   | TIME | 6.00 |
|               |         |     | 4 | FLOW | 290. |
|               |         |     |   | TIME | 6.00 |
| HYDROGRAPH AT |         |     |   |      |      |
| +             | WFORLKS | .38 | 1 | FLOW | 444. |
|               |         |     |   | TIME | 6.90 |
|               |         |     | 2 | FLOW | 444. |
|               |         |     |   | TIME | 6.90 |
|               |         |     | 3 | FLOW | 444. |
|               |         |     |   | TIME | 6.90 |
|               |         |     | 4 | FLOW | 444. |
|               |         |     |   | TIME | 6.90 |
| 2 COMBINED AT |         |     |   |      |      |
| +             | WTIME   | .49 | 1 | FLOW | 486. |
|               |         |     |   | TIME | 6.80 |
|               |         |     | 2 | FLOW | 486. |
|               |         |     |   | TIME | 6.80 |
|               |         |     | 3 | FLOW | 486. |
|               |         |     |   | TIME | 6.80 |
|               |         |     | 4 | FLOW | 486. |
|               |         |     |   | TIME | 6.80 |
| HYDROGRAPH AT |         |     |   |      |      |
| +             | RR7\$8  | .08 | 1 | FLOW | 207. |
|               |         |     |   | TIME | 6.00 |
|               |         |     | 2 | FLOW | 207. |
|               |         |     |   | TIME | 6.00 |
|               |         |     | 3 | FLOW | 207. |
|               |         |     |   | TIME | 6.00 |
|               |         |     | 4 | FLOW | 207. |
|               |         |     |   | TIME | 6.00 |
| 2 COMBINED AT |         |     |   |      |      |
| +             | DITCH   | .57 | 1 | FLOW | 608. |
|               |         |     |   | TIME | 6.10 |
|               |         |     | 2 | FLOW | 608. |
|               |         |     |   | TIME | 6.10 |
|               |         |     | 3 | FLOW | 608. |
|               |         |     |   | TIME | 6.10 |
|               |         |     | 4 | FLOW | 608. |
|               |         |     |   | TIME | 6.10 |
| HYDROGRAPH AT |         |     |   |      |      |
| +             | WW      | .01 | 1 | FLOW | 39.  |
|               |         |     |   | TIME | 6.00 |
|               |         |     | 2 | FLOW | 39.  |
|               |         |     |   | TIME | 6.00 |
|               |         |     | 3 | FLOW | 39.  |
|               |         |     |   | TIME | 6.00 |
|               |         |     | 4 | FLOW | 39.  |
|               |         |     |   | TIME | 6.00 |

3 COMBINED AT  
+ INPND4 .88 1 FLOW 958.  
TIME 6.10  
2 FLOW 958.  
TIME 6.10  
3 FLOW 958.  
TIME 6.10  
4 FLOW 958.  
TIME 6.10

ROUTED TO  
+ POND4 .88 1 FLOW 756.  
TIME 6.90  
2 FLOW 584.  
TIME 7.40  
3 FLOW 683.  
TIME 7.20  
4 FLOW 740.  
TIME 7.00

\*\* PEAK STAGES IN FEET \*\*

1 STAGE 1327.27  
TIME 6.90  
2 STAGE 1326.28  
TIME 7.40  
3 STAGE 1324.56  
TIME 7.20  
4 STAGE 1323.55  
TIME 7.00

\*\*\* NORMAL END OF HEC-1 \*\*\*



Date 2/8/93 MJB Page        of       

Project FOREST LAKES

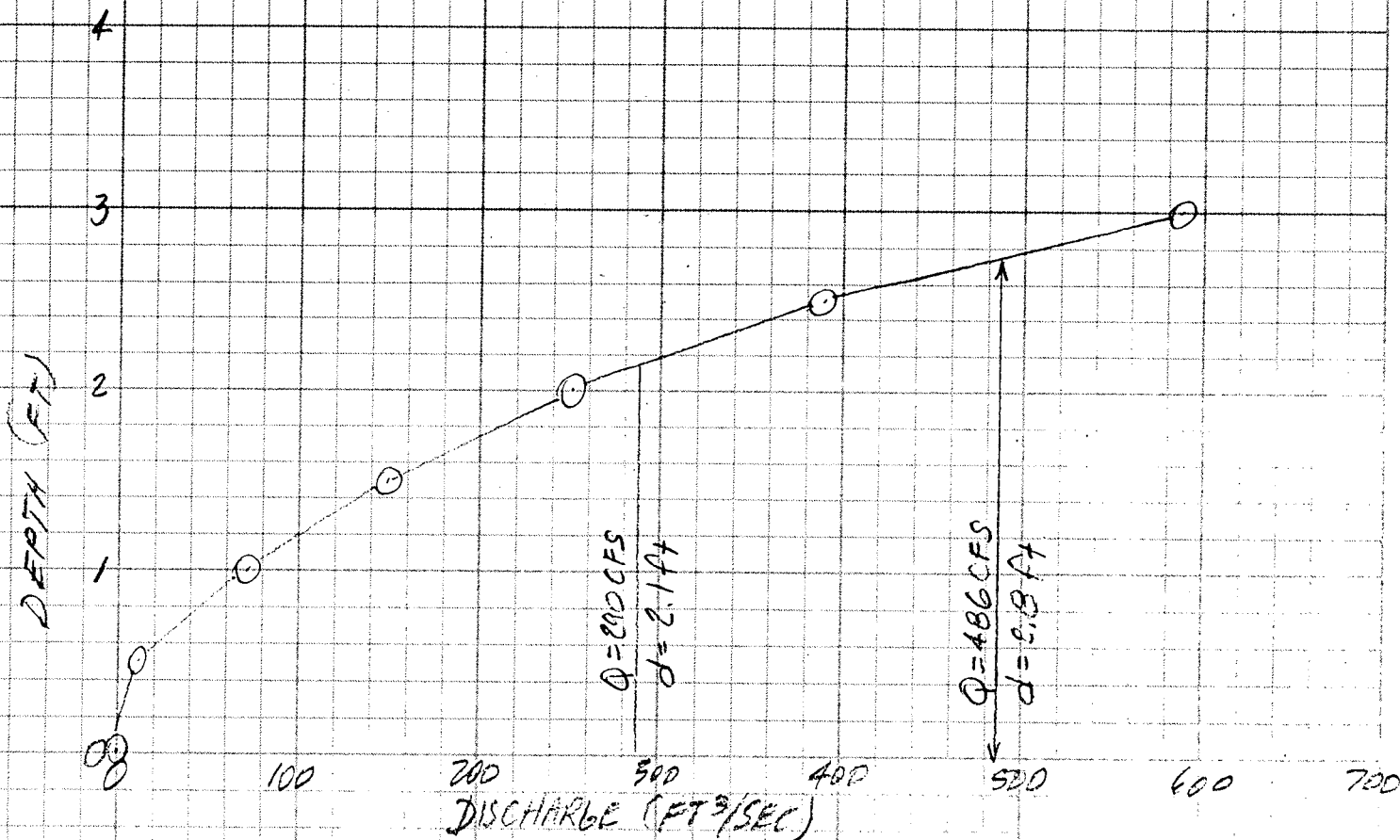
Item 29TH ST DITCH CAPACITY

SLOPE = 1%

B = 10' Z = 4:1

RETARDANCE CLASS E

| FLOW DEPTH | AREA | HYD. R. | VEL. | DISCHARGE |
|------------|------|---------|------|-----------|
| 0.5        | 6    | 0.4     | 2.0  | 12        |
| 1.0        | 15   | 0.8     | 4.7  | 71        |
| 1.5        | 24   | 1.1     | 6.2  | 149       |
| 2.0        | 34   | 1.35    | 7.0  | 252       |
| 2.5        | 50   | 1.65    | 7.8  | 390       |
| 3.0        | 66   | 1.9     | 8.4  | 587       |
| 3.5        | 84   | 2.15    | 9.1  | 764       |
| 4.0        | 110  | 2.45    |      |           |
| 4.5        | 125  | 2.7     |      |           |
| 5.0        | 150  | 2.92    |      |           |





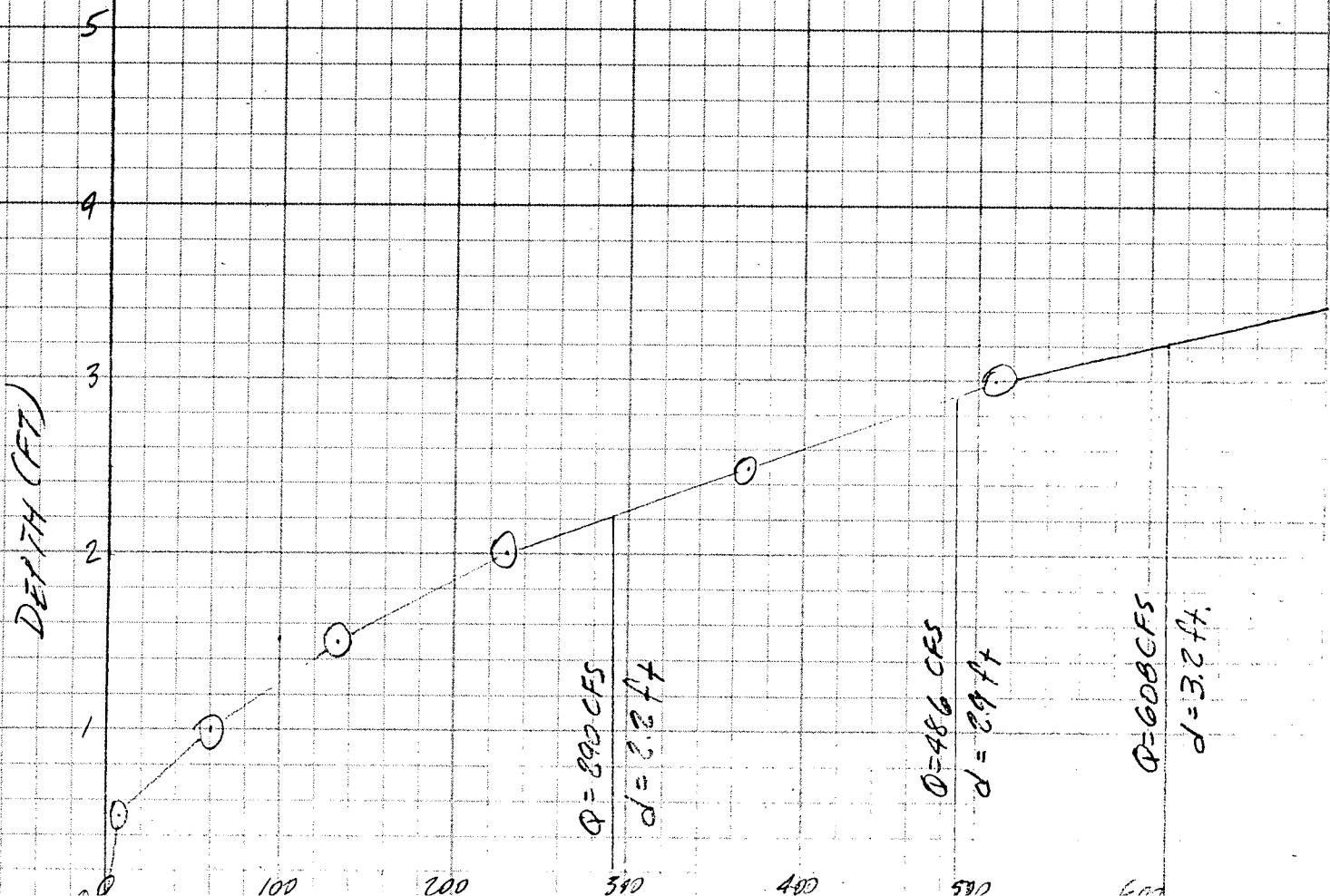
Date 2/8/93 MNB Page        of       

Project FOREST LAKES

Item 29TH ST DITCH CAPACITY

SLOPE = 0.8%  
 B = 10' Z = 4:1 RETARDANCE CLASS E

| FLOW<br>DEPTH<br>ft | AREA<br>ft <sup>2</sup> | HYDR.<br>RAD<br>ft | VEL.<br>ft/sec | Q<br>ft <sup>3</sup> /sec |
|---------------------|-------------------------|--------------------|----------------|---------------------------|
| 0.5                 | 6                       | 0.4                | 1.8            | 11                        |
| 1.0                 | 15                      | 0.8                | 4.0            | 60                        |
| 1.5                 | 24                      | 1.1                | 5.6            | 134                       |
| 2.0                 | 36                      | 1.35               | 6.4            | 230                       |
| 2.5                 | 50                      | 1.65               | 7.4            | 370                       |
| 3.0                 | 66                      | 1.9                | 7.7            | 508                       |
| 3.5                 | 84                      | 2.15               | 8.6            | 722                       |
| 4.0                 | 110                     | 2.45               | 9.2            |                           |





Date 10/24/92 MWB Page        of       

Project FOREST LAKES

Item DITCH CAPACITY

SLOPE = 0.2%

B = 10'

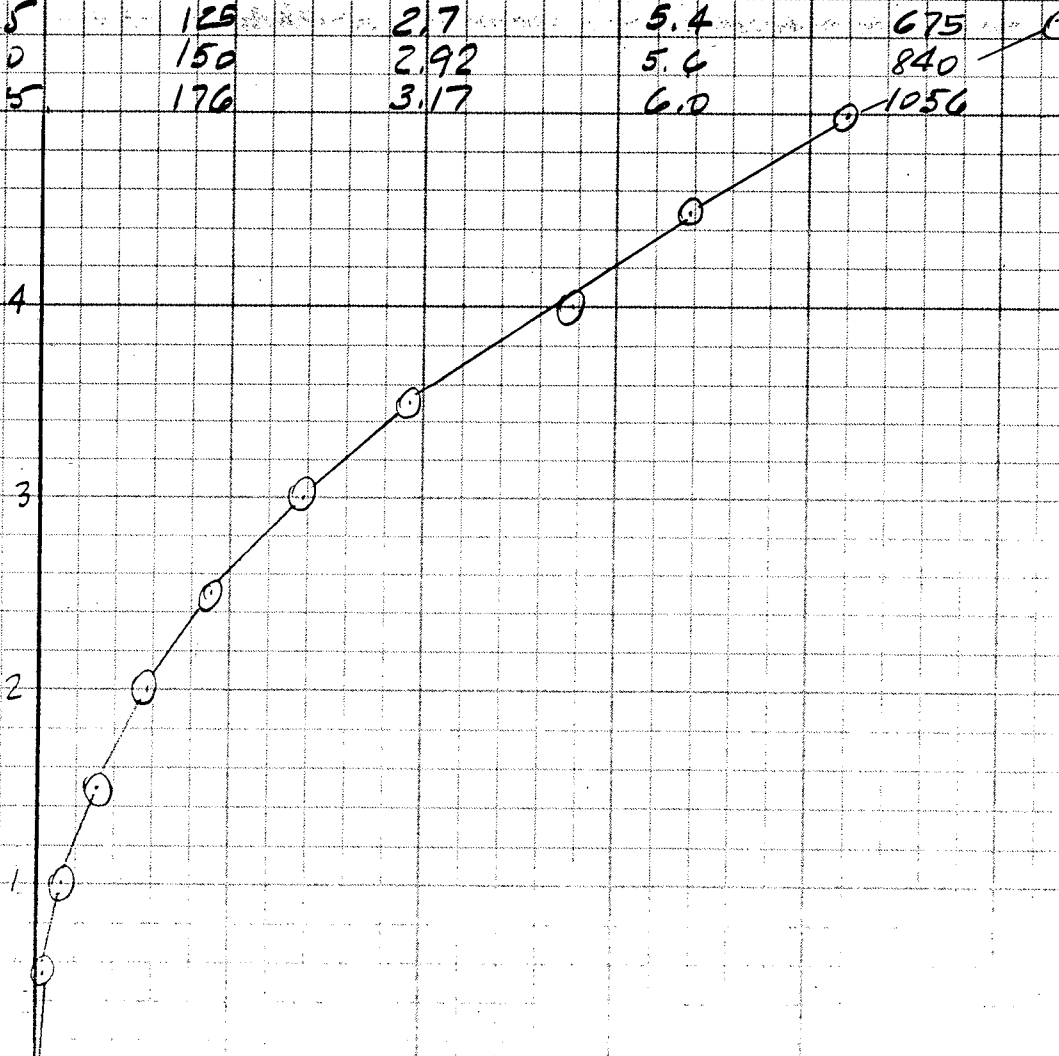
Z = 4:1

RETARDANCE CLASS E

| FLOW<br>DEPTH<br>ft | AREA<br>ft <sup>2</sup> | HYDRAULIC<br>RADIUS<br>ft | VELOCITY<br>ft/sec | DISCHARGE<br>ft <sup>3</sup> /sec |
|---------------------|-------------------------|---------------------------|--------------------|-----------------------------------|
| 0.5                 | 6                       | 0.4                       | 0.58               | 3.5                               |
| 1.0                 | 15                      | 0.8                       | 1.7                | 25.5                              |
| 1.5                 | 24                      | 1.1                       | 2.4                | 57.6                              |
| 2.0                 | 36                      | 1.35                      | 3.2                | 115.2                             |
| 2.5                 | 50                      | 1.65                      | 4.7                | 185.0                             |
| 3.0                 | 66                      | 1.9                       | 4.2                | 277                               |
| 3.5                 | 84                      | 2.15                      | 4.6                | 386                               |
| 4.0                 | 110                     | 2.45                      | 5.0                | 550                               |
| 4.5                 | 125                     | 2.7                       | 5.4                | 675                               |
| 5.0                 | 150                     | 2.92                      | 5.6                | 840                               |
| 5.5                 | 176                     | 3.17                      | 6.0                | 1056                              |

DEPTH OF FLOW (FT)

4  
3  
2  
1



# RETARDANCE CLASS E

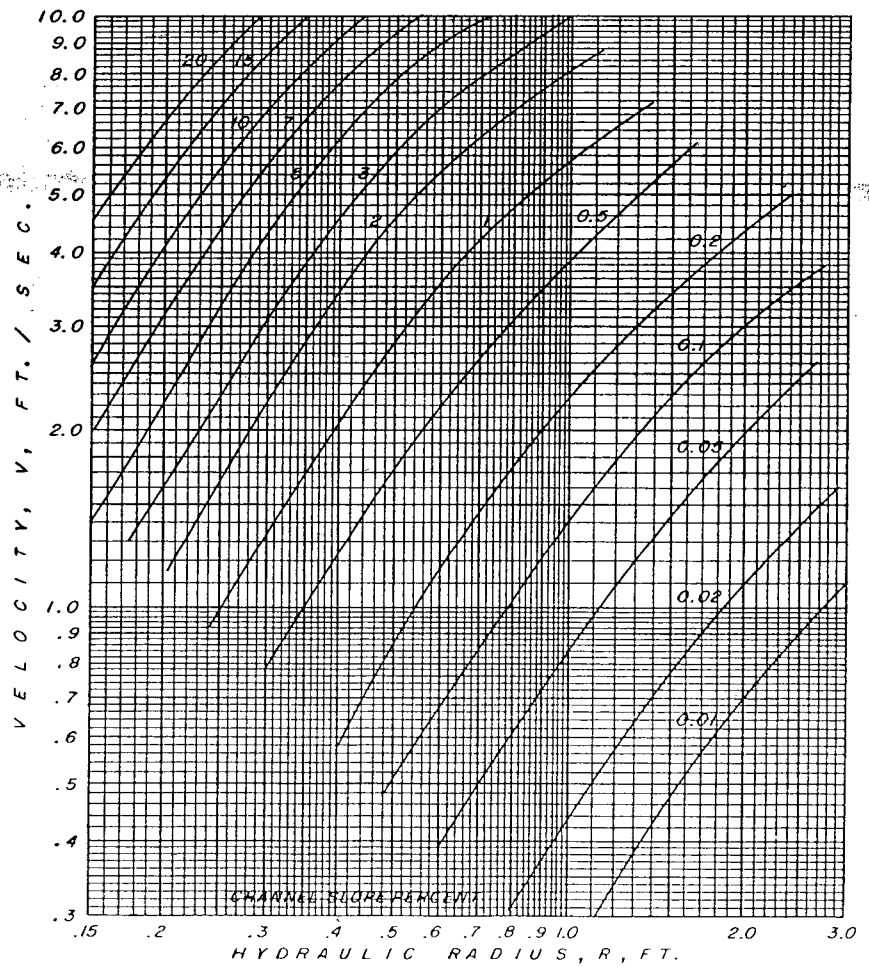
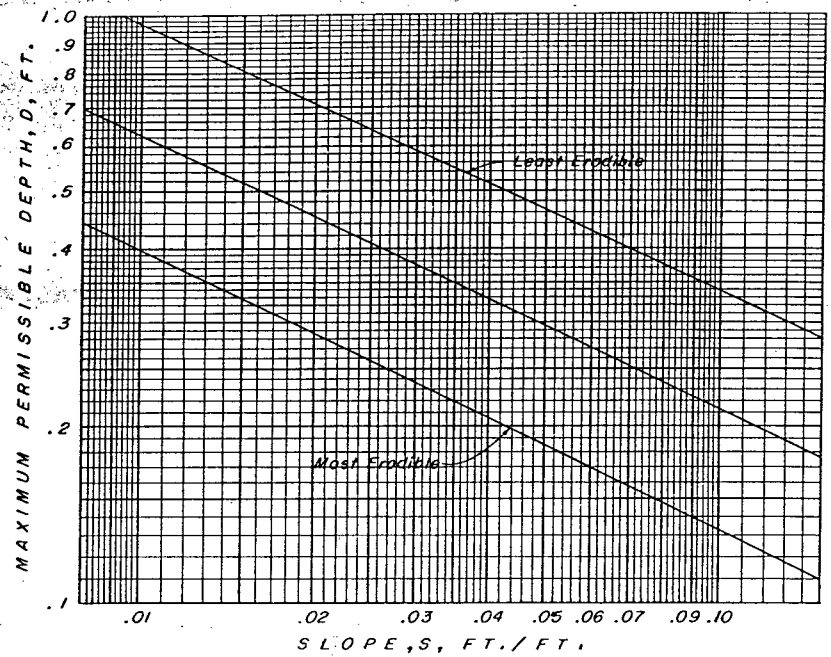


Figure 3D-4-1-1-E

# HYDRAULIC PROPERTIES OF TRAPEZOIDAL CHANNELS (AREA OF FLOW)

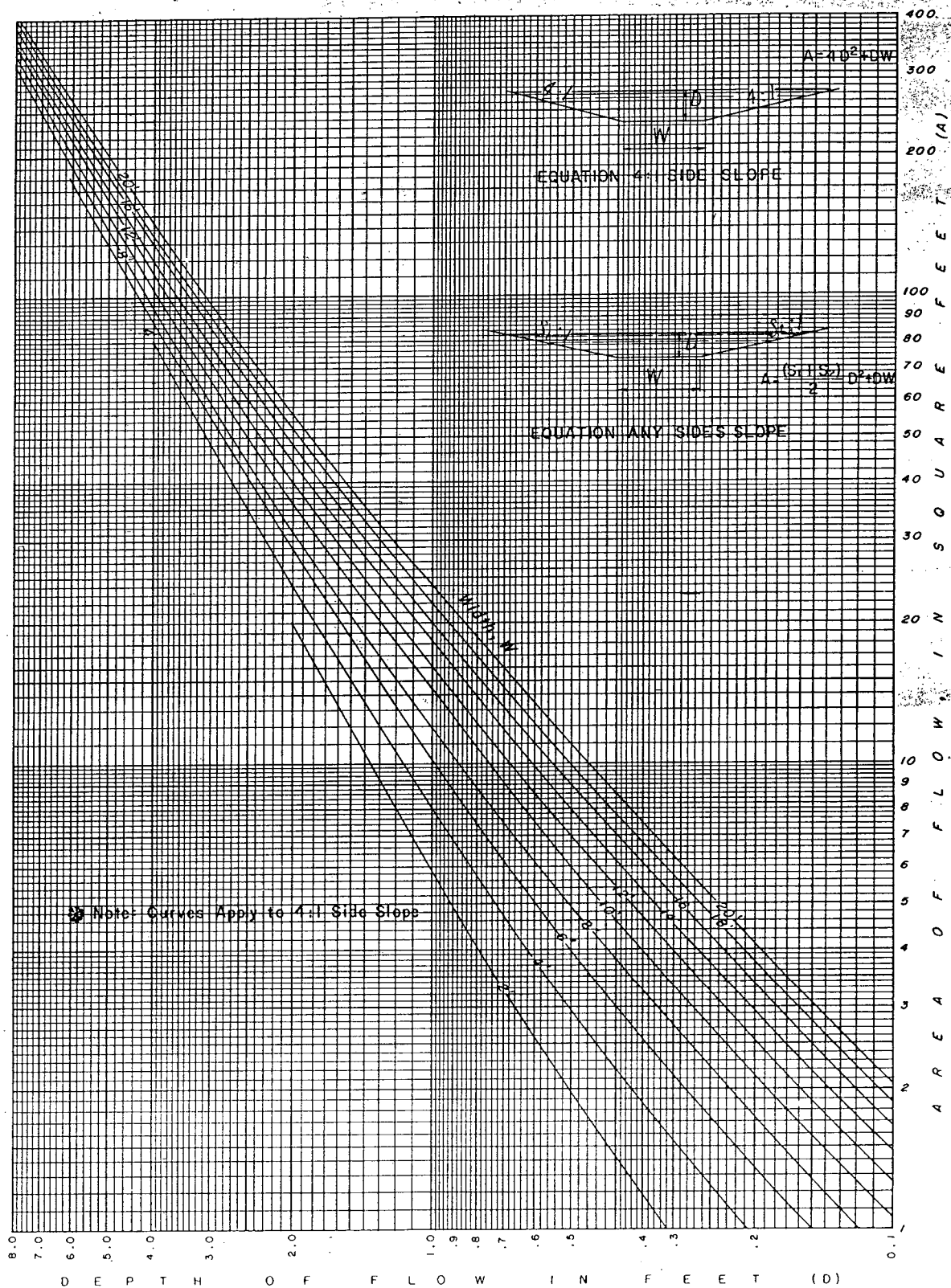


Figure 3D-4-1-1-3-A

# HYDRAULIC PROPERTIES OF TRAPEZOIDAL CHANNELS (HYDRAULIC RADIUS)

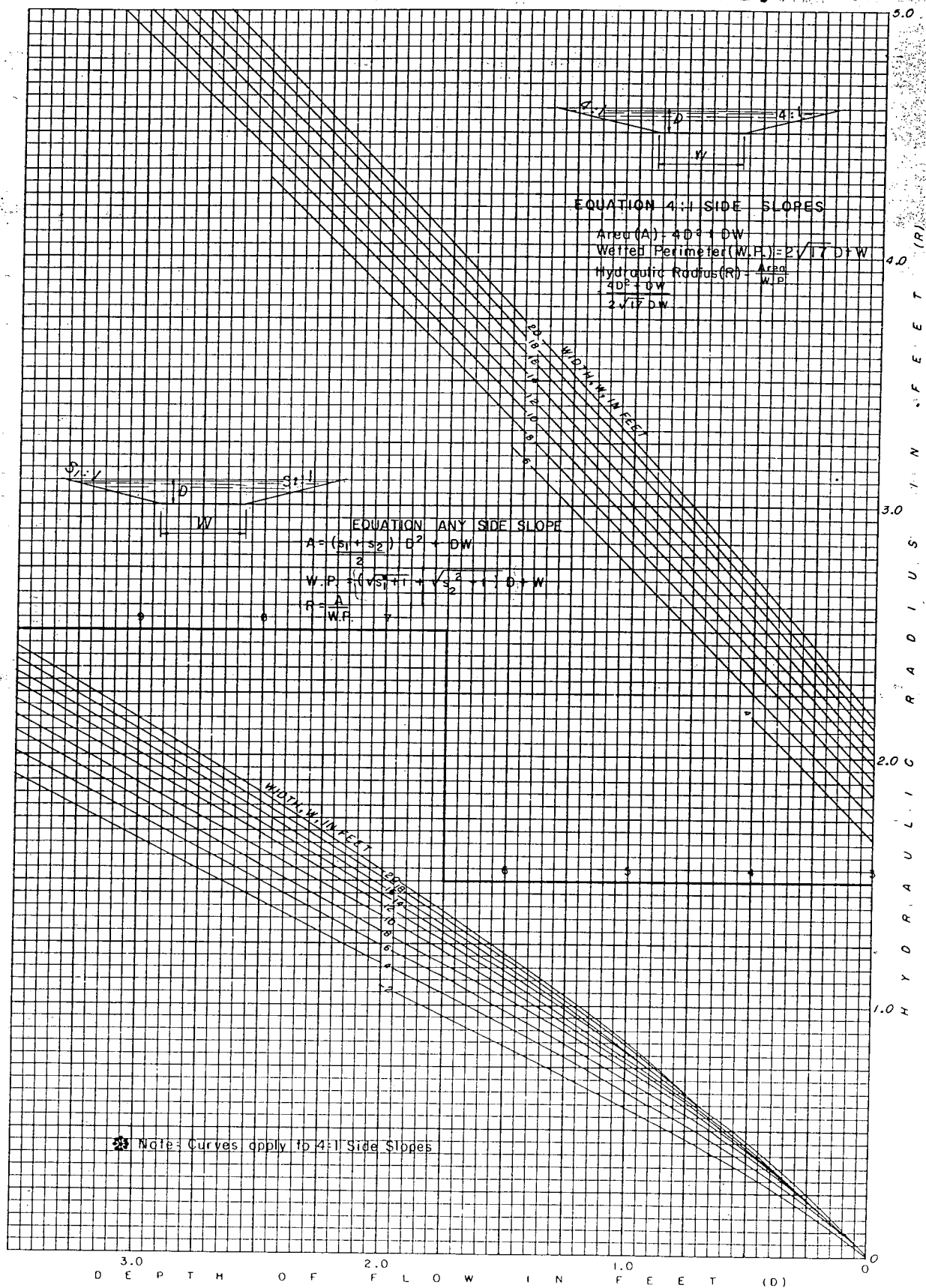


Figure 3D-4-1-1-3-B

NW CORNER  
NW 1/4-4-27-1W

29TH

70 AC ±

NE COR.  
NW 1/4 4-27-1W

1"=100'

TYLER

ASSUMED  
DA BOUNDARY (TYP.)

EXISTING SH ELTER BELT

MWB  
2/8/93

NW 1/4 SEC 4  
T87S R11W

SUPPLEMENTAL DRAINAGE  
REPORT  
FOREST LAKES/R.R. GTH, TH1874

TO STERLING FARMS  
40 AC.

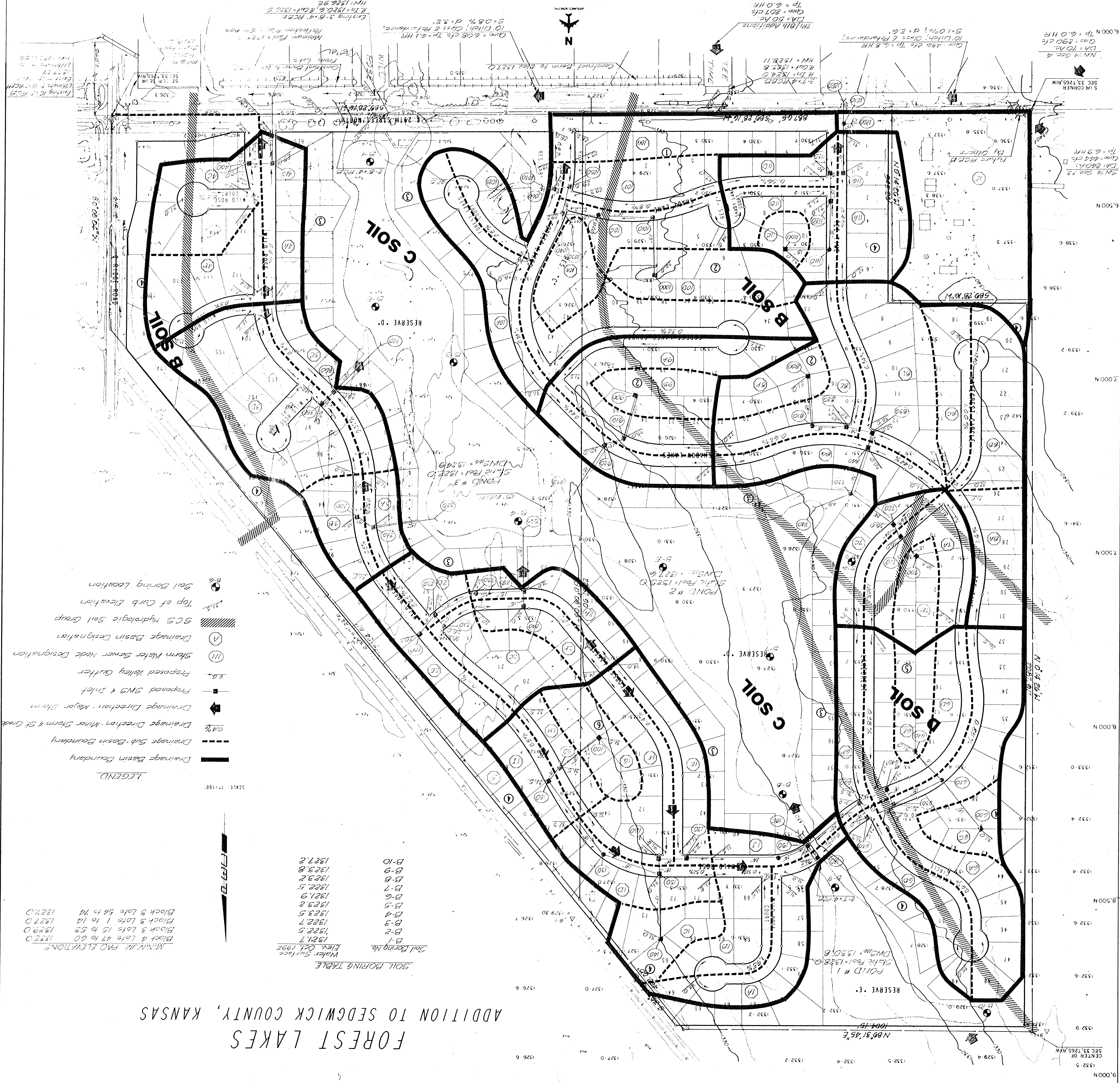
FOREST LAKES  
ADDITION TO SEDGWICK COUNTY, KANSAS

SOIL BORING TABLE

| Soil Boring No. | Water Surface Elev. Oct. 1992 |
|-----------------|-------------------------------|
| B-1             | 1321.7                        |
| B-2             | 1322.5                        |
| B-3             | 1322.7                        |
| B-4             | 1323.5                        |
| B-5             | 1323.2                        |
| B-6             | 1321.9                        |
| B-7             | 1322.5                        |
| B-8             | 1323.8                        |
| B-9             | 1323.8                        |
| B-10            | 1327.2                        |

MINIMUM PAO ELEVATIONS:  
Block 4 Lots 41 to 60 1323.0  
Block 3 Lots 15 to 53 1329.0  
Block 3 Lots 1 to 14 1327.0  
Block 3 Lots 54 to 74 1327.0

- LEGEND
- Drainage Basin Boundary
  - Drainage Sub-Basin Boundary
  - Drainage Direction - Minor Storm & St. Creek
  - Drainage Direction - Major Storm
  - Proposed SWS & Inlet
  - Proposed Valley Gutter
  - Storm Water Sewer Node Designation
  - Drainage Basin Designation
  - SCS Hydrologic Soil Group
  - Top of Curb Elevation
  - Soil Boring Location



PROFESSIONAL ENGINEERING CONSULTANTS, P.A.  
301 S. TORREY ST., WICHITA, KS 67202  
SURVEYING & ENGINEERING  
SEDCWICK COUNTY, KANSAS  
RE: DRAINAGE MAP OF LANDS LOCATED AT  
1/4 SECTION 33, T26S, R10E, S14

Professional Engineering Consultants, P.A.  
WICHITA, KANSAS  
ENGINEERS  
DESIGNED BY: M.P.  
DATE: 10/2/92  
SHEET: 1 OF 1

**DRAINAGE PLAN**

1. Supplemental to Drainage Study

BY: M.P.

DATE: 10/2/92