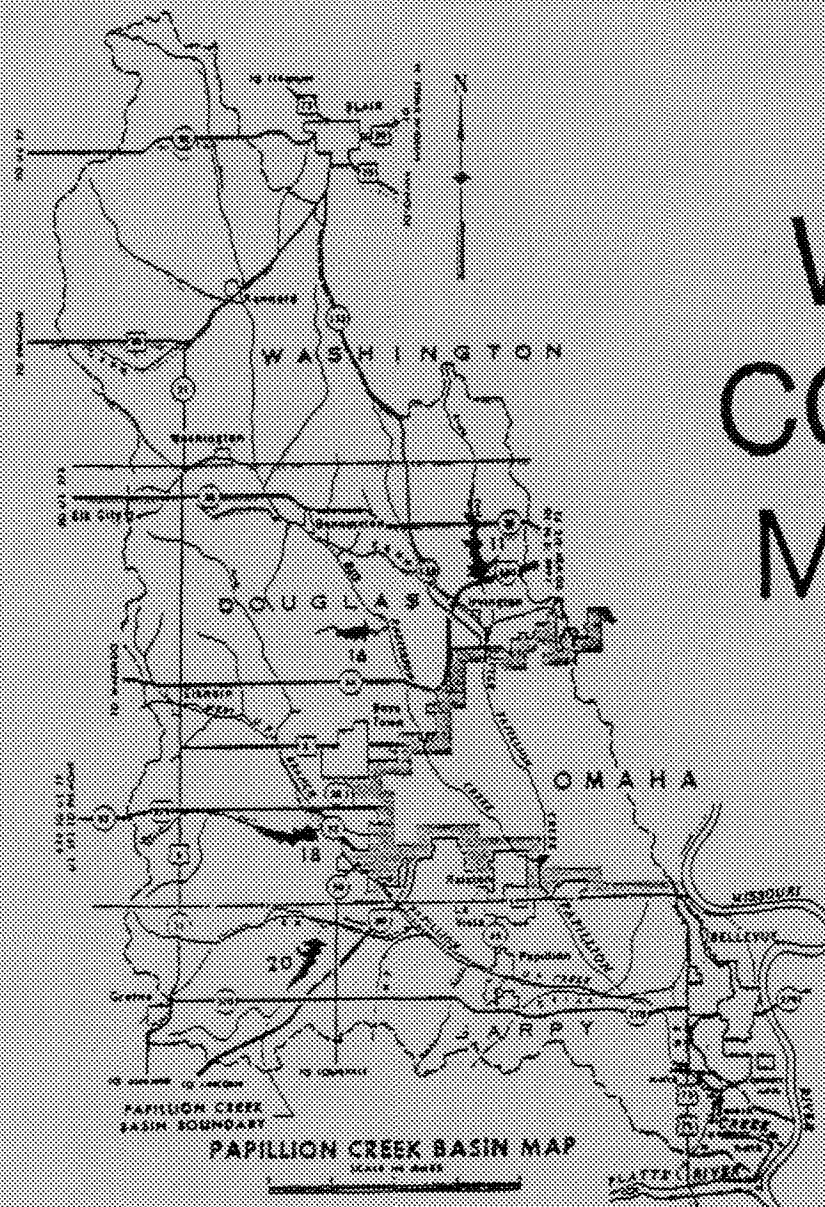


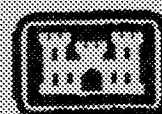
Papillion Creek and Tributaries

Dams No. 11, 16, 18 and 20

Nebraska



WATER CONTROL MANUAL



U.S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA

WATER CONTROL MANUAL
PAPILLION CREEK AND TRIBUTARIES
DAMS 11, 16, 18, AND 20
OMAHA NEBRASKA

Prepared for
U.S. Army Corps of Engineers
Omaha District
Omaha, Nebraska

Prepared by
Water Control Section
U.S. Army Corps of Engineers
Omaha District
Omaha, Nebraska

October 1998

WATER CONTROL MANUAL

Papillion Creek and Tributaries
Dams No. 11, 16, 18, and 20
Omaha, Nebraska

Table of Contents

<u>Paragraph</u>	<u>Item</u>	<u>Page</u>
	Pertinent Engineering Data - Dams	PD-1
	Pertinent Engineering Data - Gates	PD-2
<u>Section I - Introduction</u>		
1-01	Authority	I-1
1-02	Scope	I-1
<u>Section II - Basin and River Description</u>		
2-01	Basin Description	II-1
2-02	Climate	II-1
2-03	Population	II-2
2-04	Streamflow	II-3
2-05	Stage-Discharge Relationship	II-4
2-06	Travel Times	II-4
2-07	Channel Capacities	II-5
2-08	Flood History	II-5
2-09	Flood of June 2-3, 1943	II-6
2-10	Flood of August 2-3, 1959	II-6
2-11	Flood of June 20, 1960	II-6
2-12	Flood of June 16, 1964	II-6
2-13	Flood of September 6-7, 1965	II-7
2-14	Design Floods	II-7
2-15	Damsite 11 SPF	II-8
2-16	Damsite 16 SPF	II-8
2-17	Damsite 18 SPF	II-8
2-18	Damsite 20 SPF	II-8
<u>Section III - Water Resource Development</u>		
3-01	Longergan Lake	III-1
3-02	Longergan Lake Intake Structures	III-1
3-03	Candlewood Lake and Boys Town Lake	III-3
3-04	Other Federal Flood Control Projects	III-3
3-05	Papillion Creek Channel Cleanout	III-3
3-06	Flood Control Improvements	III-3
3-07	Water Rights	III-4
3-08	Irrigation	III-4
3-09	Recreation	III-4

Table of Contents (Continued)

<u>Paragraph</u>	<u>Item</u>	<u>Page</u>
<u>Section IV - Project History and Description</u>		
4-01	Project History	IV-1
4-02	Damsite 16 Construction	IV-1
4-03	Damsite 11 Construction	IV-1
4-04	Damsite 20 Construction	IV-1
4-05	Damsite 18 Construction	IV-2
4-06	Current Status	IV-2
4-07	Flood Plain Control	IV-2
4-08	Local Sponsor	IV-2
4-09	Project Description	IV-2
4-10	Damsite 11 - Glenn Cunningham Lake	IV-3
4-11	Damsite 16 - Standing Bear Lake	IV-5
4-12	Damsite 18 - Zorinsky Lake	IV-6
4-13	Damsite 20 - Wehrspann Lake	IV-8
<u>Section V - Organization for Water Control</u>		
5-01	General	V-1
5-02	Normal Period Organization	V-1
5-03	Flood Period Organization	V-2
5-04	Procedure for Low Level Gate Regulation	V-2
5-05	Procedure for Water Quality Releases	V-2
5-06	Regulation Order	V-3
5-07	Agencies Involved in Regulation	V-4
<u>Section VI - Collection and Distribution of Basic Hydrologic Data</u>		
6-01	General	VI-1
6-02	Stream, Reservoir and Precipitation Gaging Data	VI-1
6-03	Water Quality Collection	VI-1
6-04	Surveys for Sediment Deposition	VI-1
6-05	Evaporation Data	VI-3
6-06	Reports to Higher Authority	VI-3
<u>Section VII - Analyses and Forecasts Pertinent to Reservoir Regulation</u>		
7-01	Weather Forecasts	VII-1
7-02	Short Range Runoff Forecasts	VII-1
7-03	Pool Level Probability	VII-1
7-04	Release Probability	VII-1
7-05	Losses	VII-1
7-06	Reservoir Evaporation	VII-2

Table of Contents (Continued)

<u>Paragraph</u>	<u>Item</u>	<u>Page</u>
<u>Section VIII - Multipurpose Regulation</u>		
8-01	General	VIII-1
8-02	Recreation and Fish and Wildlife	VIII-1
8-03	Low Level Outlet	VIII-1
8-04	Service Outlet and Low Level Drain Rating Curves	VIII-1
8-05	Downstream Water Quality Control	VIII-2
8-06	Fish Kills From Gate Operation	VIII-2
8-07	Water Rights	VIII-2
8-08	Drought Contingency Plan	VIII-3
<u>Section IX - Flood Control Regulation</u>		
9-01	Objectives of Flood Control Regulation	IX-1
9-02	Method of Regulation	IX-1
9-03	Plan of Regulation	IX-1
9-04	Supplemental Releases	IX-1
9-05	Emergency Flood Control Regulation	IX-1
9-06	Reports of Reservoir Flood Operation	IX-2
<u>Section X - Examples of Flood Control Regulation</u>		
10-01	General	X-1
10-02	Design Routings for Damsite 11	X-1
10-03	Design Routings for Damsite 16	X-1
10-04	Design Routings for Damsite 18	X-1
10-05	Design Routings for Damsite 20	X-1

Plate Index

<u>Plate No.</u>	<u>Title</u>
1	Papillion Creek Drainage Area
2	Discharge Probability and Volume Probability Curves at Irvington, Nebraska
3	Papillion Creek Streamflow Travel Times
4	Flood Control Project - Little Papillion Creek
5	Flood Control Project - Lower Papillion Creek
6	Site 11 Embankment & Outlet Works (Embankment Plan)
7	Site 11 Embankment & Outlet Works (Outlet Works)
8	Site 11 Embankment & Outlet Works (Intake Structure)
9	Site 11 Service Outlet and Emergency Spillway Rating Curve
10	Site 11 Area Capacity Table
11	Site 11 Sedimentation Range Locations
12	Site 11 One Hour Unit Hydrographs
13	Site 11 Pool Elevation Probability Curve
14	Site 11 Reservoir Design Flood Routing
15	Site 11 Reservoir Draining Characteristics
16	Site 11 Spillway Design Flood Routing
17	Site 16 Embankment & Outlet Works (Embankment Plan)
18	Site 16 Embankment & Outlet Works (Outlet Works)
19	Site 16 Embankment & Outlet Works (Intake Structure)
20	Site 16 Service Outlet and Emergency Spillway Rating Curve
21	Site 16 Area Capacity Table
22	Site 16 Sedimentation Range Locations
23	Site 16 One Hour Unit Hydrographs
24	Site 16 Pool Elevation Probability Curve
25	Site 16 Reservoir Design Flood Routing
26	Site 16 Reservoir Draining Characteristics
27	Site 16 Spillway Design Flood Routing
28	Site 18 Embankment & Outlet Works (Embankment Plan)
29	Site 18 Embankment & Outlet Works (Outlet Works)
30	Site 18 Embankment & Outlet Works (Intake Structure)
31	Site 18 Service Outlet and Emergency Spillway Rating Curve
32	Site 18 Area Capacity Table
33	Site 18 Sedimentation Range Locations
34	Site 18 One Hour Unit Hydrographs
35	Site 18 Pool Elevation Probability Curve
36	Site 18 Reservoir Design Flood Routing
37	Site 18 Reservoir Draining Characteristics
38	Site 18 Spillway Design Flood Routing
39	Site 20 Embankment & Outlet Works (Embankment Plan)
40	Site 20 Embankment & Outlet Works (Outlet Works)
41	Site 20 Embankment & Outlet Works (Intake Structure)
42	Site 20 Service Outlet and Emergency Spillway Rating Curve
43	Site 20 Area Capacity Table
44	Site 20 Sedimentation Range Locations

Plate Index (Continued)

<u>Plate No.</u>	<u>Title</u>
45	Site 20 One Hour Unit Hydrographs
46	Site 20 Pool Elevation Probability Curve
47	Site 20 Reservoir Design Flood Routing
48	Site 20 Reservoir Draining Characteristics
49	Site 20 Spillway Design Flood Routing
50	Organization Chart Omaha District
51	Papillion Creek Basin Precipitation and Stream Gaging Stations
52	MRD Form 0168 (Monthly Reservoir Operation)

Table Index

<u>Table</u>	<u>Description</u>	<u>Page</u>
1	Climatological Data	II-2
2	Papillion Creek Drainage Basin Population Data	II-2
3	Monthly Discharges	II-3
4	Pertinent Stream Gaging Station Information	II-4
5	Papillion Creek Streamflow Travel Times	II-4
6	Levee and Channel Capacities	II-5
7	Papillion Creek Basin Flood Data	II-7
8	Lonergan Lake Pertinent Data	III-2
9	Stream and Reservoir Gaging Stations	VI-2
10	Papio Damsite Surveys	VI-3
11	Maximum Release Rates	VII-1

**SUMMARY OF ENGINEERING DATA — FEDERAL RESERVOIRS WITH AUTHORIZED FLOOD CONTROL
MISSOURI RIVER TRIBUTARIES — U.S. ENGINEER DISTRICT — OMAHA
PAPILLION CREEK BASIN — NEBRASKA**

ITEM NO.	SUBJECT	DAM NO. 11 (Glenn Cunningham Lake)	DAM NO. 16 (Standing Bear Lake)	DAM NO. 18 (Zorinsky Lake)	DAM NO. 20 (Wehrspann Lake)					
GENERAL										
1	Location of dam	93rd State Street	132nd and Fort Street	156th and "F" Street	156th and Giles Road					
2	River and mileage	Knight Creek —	Tributary Big Papio —	Boxelder Creek —	Trib. South Branch Papio —					
3	Drainage area (sq. mi.)	17.8	6	16.4	13.1					
4	Reservoir length in miles	2.5	1.0	1.5	1.5					
5	Location of Damtender	None	None	None	None					
6	Travel time to Missouri River	5-10 Hours	5-10 Hours	5-10 Hours	5-10 Hours					
7	Max. discharge of record	—	—	—	—					
8	Project cost (1)	\$11,800,000	\$4,500,000	\$20,656,000	\$14,934,000					
DAM AND EMBANKMENT										
9	Top of dam — ft. MSL	1152	1130.0	1143.5	1131					
10	Length of dam — ft.	1940	1460	1400	1810					
11	Height of dam — ft.	67	70	64	59					
12	Stream bed — ft. MSL	1085	1060	1079.5	1069					
13	Abutment formation	Lean clay loess	Lean clay loess	Lean clay loess	Lean clay loess					
14	Type of fill	Rolled earth	Rolled earth	Rolled earth	Rolled earth					
15	Fill quantity in cu. yds.	656,000	481,000	1,263,000	767,450					
16	Date of closure	5 Aug 1974	3 Oct 1972	7 Dec 1989	21 Sep 1982					
17	Date of initial fill	2 Sep 1977	24 Oct. 1977	—	26 May 1987					
SPILLWAY										
18	Discharge capacity — cfs (max. pool)	18,700	9,500	30,000	12,000					
19	Crest elev. — ft. MSL	1142	1121	1128.2	1120					
20	Width — ft.	700	250	400	600					
21	Gates, number, size, type	Ungated earth channel	Ungated earth channel	Ungated earth channel	Ungated earth channel					
RESERVOIR ELEV. AND AREA										
22	Maximum pool	1147	1170a.	1127	368a.	1138.2	860a.	1125.8	806a.	
23	Top of flood control pool	1142	991a.	1121	302a.	1128.2	594a.	1113.1	489a.	
24	Top of multipurpose pool	1121	377a.	1104	137a.	1110.0	253a.	1095.83	239a.	
								(See (2) footnote)		
STORAGE ZONES (Elev.-Capacity)										
25	Surcharge	1142-1147	5,405AF	1121-1127	2,010AF	1128.2-1138.2	7,225AF	1113.1-1125.8	8,128AF	
26	Flood control	1121-1142	13,899AF	1104-1121	3,720AF	1110.0-1128.2	7,585AF	1095.83-1113.1	6,119AF	
27	Multipurpose	1085-1121	3,262AF	1060-1104	1,500AF	1060.5-1110.0	3,470AF	1069-1095.83	2,682AF	
28	Gross storage (Excl. of surcharge)		17,161AF		5,220AF		11,055AF		8,801AF	
OUTLET WORKS										
29	Number and size — conduits	1 — RCP — 54" diameter	1 — RCP — 36" diameter	1 — RCP — 48" diameter	1 — RCP — 48" diameter					
30	Conduit length — ft.	672	736	768	656					
31	Discharge capacity of conduit — CFS (at top of F.C. Pool)	461	179	360	337					
32	Gated outlets (No. — size — invert elev. of intake in ft. MSL)	1 — 30" diameter	1100	1 — 30" diameter	1080.0	1 — 30" diameter	1090.0	1 — 30" diameter	1077.0	
				1 — 6" diameter	1104.25	1 — 6" diameter	1090.0	1 — 6" diameter	1090.0	
33	Discharge capacity of gated outlets — CFS (at base of F.C. Pool)	90	92	85	92					
34	Ungated outlets (No. — size — invert elev. — ft. MSL)	2 — 2.0'x4.0'	1121	2 — 1.0'x2.5'	1104.0	2 — 1.5'x3.5'	1110.0	2 — 1.25'x3.5'	1095.83	
		2 — 2.5'x9.0'	1127.5	2 — 2.0'x6.0'	1109.0	2 — 3.15'x8.0'	1117.6	2 — 3.67'x8.0'	1103.4	
POWER INSTALLATION										
35		None	None	None	None					

(1) Cost as of 5-3-88
(2) Based on a survey of July 1987 the elevation of the overflow lip was changed from 1096.0 ft. MSL to 1095.83 ft. MSL.

Pertinent Data
Papillion Creek Dams
Low Level Gate Data

<u>Dam Site</u>	<u>Crank Turns per Inch</u>	<u>Gate Size</u>	<u>Discharge Capacity (b) C.F.S.</u>	<u>Lift Type Hoist</u>
11	8-24 (a)	30"W x 30"H	90	Waterman 3EP - 6:1
16	8	30"W x 30"H	92	Armco CPE - 4
18	8-24 (a)	30"W x 30"H	85	Waterman 3EP - 6:1
		6" Diameter	2.4	Waterman 2P
20	8-24 (a)	30"W x 30"H	92	Waterman 3EP - 6:1
		6" Diameter	2.4	Waterman 2P

(a) High and low speed gears available.

Note: At Damsites 18 and 20, the gear housing of the hoist is stamped with 4:1 and 12:1. This is a manufacturer's error. The lift is actually 2:1 and 6:1. The ratio indicates the number of turns on the crank to raise the lift stem one thread. The stem is threaded four threads per inch. Therefore, it takes 8 high speed cranks or 24 low speed cranks to raise the gates one inch.

(b) Capacity at Multipurpose Pool Level with full gate opening.

Water Control Manual
for Dams and Lakes of the
Papillion Creek and Tributaries
Flood Control Project

Section I - Introduction

1-01. Authority. This manual has been prepared in compliance with instructions contained in ER-1110-2-240 (8 October 1982), and covers the pertinent topics of information specified in Chapter 6 of EM-1110-2-3600 (10 October 1961).

1-02. Scope. The Papillion Creek and Tributaries Lakes Project, Nebraska, as authorized by the Flood Control Act of 1968, consisted of 21 dams and reservoirs for flood control, recreation, fish and wildlife enhancement, and water quality. This project is located in the vicinity of Omaha, Nebraska. Presently, only four of the dams and reservoirs have been built. They are dam numbers or sites 11, 16, 18, and 20. Because of significant changes following project authorization, all the other proposed dams were reevaluated and determined to either be economically infeasible and/or not meet the benefit/cost requirements set forth in Section 9 of Public Law 89-72. A channel improvement project from Center Street to "L" Street has been recommended for construction in lieu of the remaining authorized dams. This manual covers the factors pertinent to the water control of the four existing dams and lakes. This manual is subject to future revision and updating as circumstances warrant. A Papillion Creek drainage area map is shown on Plate 1.

Section II - Basin and River Description

2-01. Basin Description. Papillion Creek is located in the eastern portion of Nebraska. The basin drainage area is 402 square miles, with a length of about 41 miles and a maximum width of 17 miles. Three main tributaries join to form the main Papillion Creek: the Little Papillion Creek with a drainage area of 62 square miles, the Big Papillion Creek with a 158 square mile drainage area, and the West Branch Tributary with a drainage area of 138 square miles. Topography throughout the basin is moderate to steeply sloping hill land, with small tributary slopes averaging between 50 and 200 feet per mile.

2-02. Climate. The climate of the Papillion Creek basin is classified as moist subhumid. It is typical of the Great Plains region, with warm summers and cold, dry winters. Rapid changes in weather are characteristic of the area, with extreme variations in temperature, strong and gusty winds for short periods, and intense thunderstorm rainfall. The average annual temperature is 51 degrees Fahrenheit, with extremes ranging from 114 degrees Fahrenheit in July to minus 32 degrees Fahrenheit in January. Freezing temperatures normally can be expected from mid-October to the latter part of April. Average annual precipitation in the basin is about 28 inches, with about 75 percent of this occurring during the six month period from April through September. The greatest annual precipitation recorded at the Omaha Eppley Airfield meteorological station was 48.92 inches in 1883 and the least annual precipitation was 14.90 inches in 1934. Snowfall averages about 29 inches per season, with extremes ranging from less than ten inches to more than 60 inches per season. Temperature and precipitation records for Omaha are summarized in Table 1.

Table 1

Climatological Data
Omaha, Nebraska
Eppley Airfield
(Period of Record: 1871-1989)

Month	Temperature			Precipitation				
	Record Highest	Mean	Record Lowest	Maximum Month	Mean Total	Minimum Month	Max in 24 Hrs.	Mean Snowfall
Jan	69	20	-32	3.70	.8	.01	1.52	8
Feb	78	27	-26	3.09	.9	.03	2.24	7
Mar	91	37	-16	5.96	1.9	T	1.67	7
Apr	94	52	5	6.45	2.9	.23	2.56	1
May	103	63	25	11.29	4.3	.55	3.58	T
Jun	107	73	38	12.70	4.1	.25	5.02	0
Jul	114	78	44	10.35	3.6	.39	4.35	0
Aug	111	75	43	12.50	4.1	.18	7.03	0
Sep	104	66	25	13.75	3.5	.24	6.80	0
Oct	96	55	8	5.86	2.1	T	3.73	T
Nov	80	40	-14	6.24	1.3	.03	2.53	2
Dec	72	27	-21	5.42	.8	T	3.03	6

2-03. Population. Table 2 illustrates the population growth in the Omaha and Papillion Creek basin. The increase in population of Douglas County represents the suburban westward expansion of Omaha. The increase population of Sarpy County largely represents the southward suburban expansion of Omaha. These expansions are mainly within the Papillion Creek basin. The northern part of the basin is located in the rural area of Washington County. The 1988 figures are Census Bureau estimates.

Table 2
Papillion Creek Drainage Basin Population Data

Year	Omaha	Douglas County	Sarpy County	Washington County
1890	140,452			
1900	102,555			
1910	124,096			
1920	191,601			
1930	214,006	281,020	15,693	11,511
1940	223,844	247,562	10,835	11,578
1950	251,117	232,982	10,402	12,095
1960	301,598	343,490	31,281	12,103
1970	347,328	389,455	63,696	13,310
1980	313,911	397,038	86,015	15,508
1988	353,170	419,400	98,200	16,000

2-04. Streamflow. Streamflow in the Papillion Creek basin follows a characteristic pattern. Flows are generally low except for brief periods of rise caused by runoff from rainfall events. A snowpack over the basin in early spring can produce a significant rise in flow as a result of snowmelt runoff. During the winter months the stream is generally frozen over. Table 3 lists monthly average flow on the Little Papillion Creek at Irvington, the main Papillion Creek near Fort Crook, the Big Papillion Creek at 125th Street and Fort Street, and the West Branch Creek near Papillion. Discharge data is not available after 1977. Gage-heights are recorded at the four stations; however, rating curves have not been updated since 1977.

Table 3
Average Monthly Discharges in C.F.S.
Papillion Creek Basin

Month	Little Papio Cr @ Irvington (1950-1974)	Papillion Cr @ Ft. Crook (1958-69 & 1972-77)	Big Papio Cr 125th & Fort (1969-1977)	West Branch @ Papillion (1966-1977)
	25 Years	18 Years	9 Years	12 Years
January	5	81	19	18
February	8	135	34	32
March	14	209	56	37
April	10	183	36	36
May	16	250	50	50
June	21	348	38	35
July	14	175	28	28
August	15	218	27	32
September	9	183	23	24
October	6	117	20	24
November	6	97	20	20
December	5	77	20	16

Table 4 lists pertinent stream gaging information. An annual peak discharge and volume probability curve for the Little Papillion Creek at Irvington are shown on Plate 2. These curves are for natural conditions and do not reflect the effects of Dam 11. Flooding can occur quite rapidly. The hilly terrain consists of numerous small tributary streams and gulches, and produces rapid concentrations of runoff, which cause quick rises in stream stages. In recent years increasing area of impervious terrain, as a result of urban development, have increased both the amount of runoff and the rapidity of concentration.

Table 4
 Pertinent Stream Gaging Station Information
 Papillion Creek
 (Record of 1977)

<u>Station</u>	<u>Drainage Area (sq. mi.)</u>	<u>Yrs of Record</u>	<u>Discharge (cfs)</u>		<u>Date</u>
			<u>Ave.</u>	<u>Peak</u>	
Little Papillion Cr at Irvington	32	25	11	15,300	20 Jun 60
Big Papillion Cr at 125th & Fort	126	9	31	6,640	2 Jul 70
West Papillion Cr near Papillion	120	12	29	40,800	17 Jun 64
Papillion Cr near Fort Crook	384	18	173	32,300	17 Jun 64

2-05. Stage-Discharge Relationship. Open water rating curves were tabulated for the Little Papillion Creek at Irvington and AKSARBEN Field, the West Branch Tributary near Papillion and the Big Papillion Creek at 125th and Fort Streets, 80th and "F" Streets, and near Fort Crook. The rating curves were discontinued after 1977 due to manpower and funding limitations.

2-06. Travel Time. Travel times for near half bankfull streamflow in the Papillion Creek basin are given in Table 5 and are presented in Plate 3. Streamflow travel times are estimated at approximately four miles per hour. At near bankfull streamflow, the travel time will be reduced.

Table 5
 Papillion Creek Streamflow Travel Times

<u>Reach</u>	<u>Miles</u>	<u>Time in Hours</u>
125th & Fort St gage to mouth of Papio	18	4.5
Irvington stream gage to AKSARBEN gage	4.5	1.1
Irvington stream gage to mouth of Little Papio	8.2	2
Irvington stream gage to mouth of Papio	17	4.25
Papillion stream gage to mouth of West Branch	7.5	1.9
Papillion stream gage to mouth of Papio	11	2.75

2-07. Channel Capacities. Estimated channel capacities in the Papillion Creek basin are shown in Table 6. As noted in the table, much of the channel has been improved. Capacities listed in Table 6 may not reflect recent channel improvements.

Table 6
Levee and Channel Capacities
Papillion Creek

<u>Stream</u>	<u>Reach</u>	<u>Estimated Capacity in C.F.S.</u>	
Little Papio	Irvington Gage - nr Maple St.	4,500	<u>/1</u>
Little Papio	Maple St. - Cass St.	11,000	<u>/1</u>
Little Papio	Cass St. - Cole Cr.	12,000	<u>/1</u>
Little Papio	Cole Cr. - Elm Cr.	16,000	<u>/1</u>
Little Papio	Elm Cr. - Saddle Cr.	18,000	<u>/1</u>
Little Papio	Saddle Cr. - Mouth	20,000	<u>/1</u>
Big Papio	Fort St. - "L" St.	13,000	
Big Papio	"L" St. - Little Papio confluence	15,600	<u>/2</u>
Papillion	Little Papio - West Branch	30,000	<u>/3</u>
Papillion	West Branch - Mouth	36,000	<u>/4</u>
West Branch	Millard - Papillion	15,000	
West Branch	Papillion	14,000	
West Branch	Papillion - Mouth	15,000	

/1 Capacities (generally the 100-year event) of the Corps' channel improvement project completed in January 1970.

/2 Capacity of Papio Natural Resources District levees and channel improvement completed in 1984.

/3 Capacity of Papio Natural Resources District levees and channel improvement (without freeboard) essentially completed in 1977 except for modification of bridges and one small area.

/4 Capacity of Corps R-613 channel improvement and levee system completed in 1971 and Papio Natural Resources District channel improvement and levee system (without freeboard) essentially completed in 1977 except for some minor levee tie backs.

2-08. Flood History. Prior to urban development in the Papillion Creek basin, flood damages were not sufficient to cause careful recording of flood events. As a result, records of flooding are of a somewhat fragmentary nature prior to the installation of the initial Corps gaging station at Fort Crook in 1946. Major floods occurred June 3, 1943, June 20, 1960 and September 7, 1965. In addition, moderate floods or bankfull stages are recorded for

August 1932, July 1944, June 1946, June 1947, August 1950, June 1951, May 1957, and August 1959. Some of the floods are described below. A summary of available discharge information of the floods are given in Table 7.

2-09. Flood of June 2-3, 1943. During the night of June 2, approximately 9 to 10 inches of rain fell in the vicinity of Irvington. Flooding began in the upper reaches of the Little Papillion Creek about 12:45 a.m. and by morning the stream was back in its banks. Flooding occurred throughout the length of this Creek with a maximum width of approximately 3,600 feet at the junction of the Little and Big Papillion Creeks. Water averaged about 3 to 4 feet deep on the flood plain. The estimated peak discharge on the Little Papillion Creek at Irvington was 12,500 c.f.s. and at the mouth was 9,000 c.f.s. Total damages within the basin were estimated at \$200,000 and were mostly agricultural.

2-10. Flood of August 2-3, 1959. Thunderstorms that caused this flood stalled in eastern Nebraska producing torrential rains that measured 12 inches in some places. In the Papillion Creek basin, 6.4 inches was reported at Bennington. Omaha Eppley Airfield reported 3.35 inches. Parts of the western sections of Omaha received more than six inches. Flooding began at Irvington around 9:00 a.m. when water flowed over a bridge. Hardest hit was a one-square mile area located near the junction of the Little and Big Papillion Creeks and the area around Fort Crook. Water flowed five feet deep on 66th Street for two blocks south of "Q" Street. Six business establishments were flooded Sunday morning in the town of Papillion. The motel area west of the Big Papillion Creek on Dodge Street was also hit hard. At Fort Crook a recently constructed levee broke, flooding a farm area. Some peak discharges during this flood were 5,900 c.f.s. at Irvington on the Little Papillion Creek, 22,500 c.f.s. on the West Branch near Papillion, 10,900 c.f.s. at 80th and "F" Streets on the Big Papillion and 14,600 c.f.s. at Fort Crook on the Papillion Creek. Total damages within the basin were estimated at \$1,090,000.

2-11. Flood of June 20, 1960. Local heavy rains fell in the vicinity of Omaha on the 20th of June. North Omaha Weather Station reported 4.32 inches, of which 3.70 inches fell between the hours of 3:00 and 5:00 a.m. on the 20th. Omaha Eppley Airfield reported 2.42 inches. The Little Papillion Creek crested at "L" Street at 9:00 a.m. and was back in its banks by 2:30 p.m. Some peak discharges during this flood were 15,300 c.f.s. at Irvington on the Little Papillion Creek, 12,000 c.f.s. near Papillion on the West Branch, 9,500 c.f.s. at 80th and "F" Streets on the Big Papillion and 9,200 c.f.s. at Fort Crook on Papillion Creek. Total damages within the basin were estimated at \$671,000.

2-12. Flood of June 16, 1964. Thunderstorms which formed along the northern border of Nebraska about noon on the 16th of June moved southeastward to Sarpy County by 8:00 p.m. Heavy rains occurred as the storm cells moved across the Papillion Creek basin. Rainfall of 8.44 inches was measured near Papillion, of which 7.50

inches fell between 7:00 p.m. and 8:00 p.m. Rainfall amounts of 7 to 8 inches were also estimated in the vicinity of Washington. Boys Town reported 4.42 inches. The greatest flood of record resulted on the Papillion, Big Papillion and West Branch Creeks and all the main tributaries except the Little Papillion Creek. Some peak discharges during the flood were 2,900 c.f.s. at Irvington on the Little Papillion Creek, 40,800 c.f.s. near Papillion on the West Branch, 15,500 c.f.s. at 80th and "F" Streets on the Big Papillion and 32,300 c.f.s. at Fort Crook on the Papillion Creek. Total damages within the basin were estimated at \$4,962,000. Three human lives were lost due to this flood.

2-13. Flood of September 6-7, 1965. During the late evening of June 6th and the early morning of the 7th, intense rain fell over the Papillion Creek basin. Bennington reported six inches of rain in a little over two hours, with a storm total of 8.90 inches. The North Omaha Weather Station reported 7.84 inches. Eppley Airfield reported 6.45 inches of which 3.13 inches fell in one hour and 5.18 inches in three hours. Waterloo reported 6.71 inches. The Little Papillion Creek crested between 5:00 a.m. and 7:00 a.m. and dropped below flood stage at "L" Street by noon. Some peak discharges were 6,500 c.f.s. at Irvington on the Little Papillion Creek, 20,400 c.f.s. near Papillion on the West Branch, 15,500 c.f.s. at 80th and "F" Streets on the Big Papillion Creek and 15,600 c.f.s. at Fort Crook on the Papillion Creek. Total damage within the basin were estimated at \$529,000.

Table 7
Papillion Creek Basin Flood Data
Peak Discharges in C.F.S.

Date	Little Papillion Irvington	Papillion Cass St	West Branch @ Papillion	Big Papillion @ 80th & F St.	Papillion @ Ft Crook
29 Jul 48	--	2,900	25,500	--	13,900
12 Jul 50	3,700	3,600	15,500	--	10,600
2 Aug 59	5,900	4,500	22,500	10,900	14,600
20 Jun 60	15,300	10,000	12,000	9,500	9,200
May 64	3,600	3,900	19,000	9,500	17,100
Jun 64	2,900	2,500	40,800	15,500	32,300
Sep 65	6,400	--	20,400	15,500	15,600
12 May 66	3,700	--	--	--	9,250
21 Jun 67	--	--	--	--	15,200
17 Jul 69	--	--	4,500	--	10,300
2 Aug 70	3,400	--	--	--	--
5 May 72	600	--	13,900	--	17,200

2-14. Design Floods. The Standard Project Flood (SPF) was selected as the Reservoir Design Flood for all the Papillion Creek Dams. The spillways at these dams were designed to pass a routed Probable Maximum Flood (PMF). Design routings for each of the Papio Dam sites are discussed in Section X.

2-15. Damsite 11 SPF. For Site 11, hydrologic analyses project that the Standard Project Flood (SPF) will result from 15.7 inches of rainfall during a 96-hour period. The approximate runoff was determined as 9.2 inches. The estimated peak discharge for this flood is 25,900 c.f.s. and the total volume is approximately 9,205 acre-feet. For Site 11, the Probable Maximum Flood (PMF) will result from 24.3 inches of rainfall during a 24-hour period. The runoff was determined as 20.0 inches. The estimated peak discharge for this flood is 62,500 c.f.s. and the total volume is approximately 19,330 acre-feet.

2-16. Damsite 16 SPF. For Site 16, hydrologic analyses project that the Standard Project Flood (SPF) will result from 15.8 inches of rainfall during a 96-hour period. The approximate runoff was determined as 9.3 inches. The estimated peak discharge for this flood is 10,700 c.f.s. and the total volume is approximately 3,110 acre-feet. For Site 16, the PMF will result from 24.9 inches of rainfall during a 24-hour period. The approximate runoff was determined as 20.4 inches. The estimated peak discharge for this flood is 25,300 c.f.s. and the total volume is approximately 6,570 acre-feet.

2-17. Damsite 18 SPF. For Site 18, hydrologic analyses project the Standard Project Flood (SPF) will result from 15.7 inches of rainfall during a 96-hour period. The approximate runoff was determined as 9.2 inches. The estimated peak discharge for this flood is 25,000 c.f.s. and the total volume is approximately 8,380 acre-feet. For Site 18, the PMF will result from 25.6 inches of rainfall during a 24-hour period. The approximate runoff was determined as 21.7 inches. The estimated peak discharge for this flood is 71,000 c.f.s. and the total volume is approximately 19,000 acre-feet.

2-18. Damsite 20 SPF. For Site 20, hydrologic analyses project the Standard Project Flood (SPF) will result from 15.8 inches of rainfall during a 96-hour period. The approximate runoff was determined as 9.3 inches. The estimated peak discharge for this flood is 20,300 c.f.s. and the total volume is 6,520 acre-feet. For Site 20, the PMF will result from 25.60 inches of rainfall during a 24-hour period. The approximate runoff was determined as 21.7 inches. The estimated peak discharge for this flood is 58,700 c.f.s. and the total volume is approximately 15,100 acre-feet.

Section III - Water Resource Development

3-01. Lonergan Lake. Lonergan Lake, also known as Coventry Lake, is the largest of the numerous small lakes, excluding the four reservoirs, in the Papillion Creek basin. During heavy runoff periods most of the dams of the lakes are uncontrolled or too small to have a significant effect on streamflow. Lonergan Lake is located on a tributary of Knight Creek upstream of Damsite 11. The lake was originally planned for private residential and commercial development. Construction of the dam was completed in 1968. The development failed to materialize and the project reverted to the U.S. Department of Housing and Urban Development (HUD) which provided the mortgage insurance under Title X of the National Housing Act. HUD planned to sell the 658 acres of land and lake area. In 1977, HUD was instructed to develop an Environmental Impact Statement postponing the sale. On December 13, 1978, HUD sold the lake and land area to the Ted Reeder Construction Company, a real estate developer. The development failed and the mortgage defaulted. HUD resold the 658 acres of land and lake to ConAgra in December 1987. As of January 1991, the land and lake area is still owned by ConAgra. Lonergan Lake is shown on Plate 1.

3-02. Lonergan Lake Intake Structures. The Lonergan Lake dam contains two intake structures in the outlet works. These intakes are a spillway and low level structure. The intakes discharge into the same conduit and stilling basin. The spillway is utilized to discharge flood waters. The spillway intake structure is a reinforced concrete (R.C.) drop inlet type and consists of a 30-foot overflow weir (crest elevation 1206.04 feet above m.s.l.) and contains a 4 foot x 4 foot manually operated sluice gate opening (invert elevation 1196.04 feet above m.s.l.) for lowering of the reservoir level to facilitate reservoir bank maintenance. A 349-foot long 72-inch corrugated metal pipe (c.m.p.) connects this drop inlet structure to the 4 foot x 7 foot R.C. box outlet through a 130-foot long, 78-inch diameter c.m.p., at elevation 1173.04 feet above m.s.l. The double chambered intake tower structure is gated with an electrically (and manually) operated sluice gate and bulkhead gate. An electrically operated automatic gate opening control is provided for emergency discharges when the reservoir rises to elevation 1209.04 feet above m.s.l. The gate closes when the water level drops to elevation 1206.04 feet above m.s.l. The low level intake structure is connected to the 4 foot x 7 foot R.C. box outlet conduit. The conduit is approximately 1,100 feet long. Approximately 385 feet from the intake end of this box conduit, flow from the 72-inch spillway conduit connects at a junction structure. Pertinent data on this project is given in Table 8.

Table 8

Lonergan Lake (Lake Coventry)
Pertinent Data

A. Embankment

Type	Rolled Earth
Crest Length, feet	1,320
Crest Width, feet	25.0
Crest Elevation, ft above msl	1214.04
Height, feet	72.0
Volume of Fill, c.y.	553,000

B. Spillway

Type	Drop Structure & Conduit
Location	Left Abutment
Crest Elevation, ft above msl	1206.04
Crest Width, feet	30.0
Conduit Size & Type	72" Dia. c.m.p.
Conduit Length, feet	349.0
Discharge Capacity at El. 1210.88 ft above msl	487 c.f.s.
Gates Type & Size	Sluice Rising stem, 4 foot x 4 foot, manually operated

C. Outlet Works

Low Level Inlet Type	78" Dia. c.m.p.
Low Level Inlet Elevation, feet above msl	1173.04
Low Level Conduit Length, feet	130.0
Conduit Type	Reinforced Concrete Box
Conduit Length, feet	1,094
Conduit Size	4' wide x 7' high
Outlet Invert Elevation, feet above msl	1133.54
Stilling Basin Type	Impact
Discharge Capacity at El. 1210.88 ft above msl	668 c.f.s.

D. Reservoir

<u>Type of Storage</u>	<u>Storage Volume</u> (acre-feet)	<u>Elevation</u> (ft above msl)	<u>Surface Area</u> (acres)
Recreation	2,020	1206.04	116.0
Recreation plus Surcharge	2,620	1210.88	132.0

E. Drainage Area

Acres 550

3-03. Candlewood Lake and Boys Town Lake. The next largest non-Corps lake in the Papillion Creek basin is Candlewood Lake. It was originally planned as Site 17 of the Papillion Creek Project. Candlewood Lake is located on a tributary to the Big Papillion Creek in Douglas County. It was built for recreation and aesthetic purposes, for the Candlewood housing addition, just west of the Omaha city limits, by Sanitary and Improvement District No. 236. At the normal recreation pool level the storage capacity is 420 acre-feet. In addition, a small dam located at and owned by Boys Town has a storage capacity of approximately 50 acre-feet. Candlewood Lake is shown on Plate 1.

3-04. Other Federal Flood Control Projects. Besides the four flood control dams mentioned in this report, two other federal flood control projects have been constructed by the Corps within the Papillion Creek basin. One is a channel improvement and levee project on the Little Papillion Creek. Construction of the project was initiated in September 1965 and completed in January 1973. This project extends from the mouth of the Little Papillion Creek upstream near Maple Street. The other is the Missouri River Levee Unit R-613. This unit enlarged the Papillion Creek channel and levee system from the confluence of the Papillion Creek/Missouri River upstream for a distance of approximately four miles. The levee system for this project was tied to high ground at a point just upstream from Highway 73-75. The primary purpose of the R-613 levee was to protect the military installation at Offutt Air Force Base, in addition to some industrial and agricultural land located along the levee system. Construction of this project was initiated in December 1969 and completed in August 1971. Channel capacities of these two projects are given in Table 6. These projects are shown on Plates 4 and 5, respectively.

3-05. Papillion Creek Channel Cleanout. In 1964, (prior to construction of the R-613 levee) following the June flood, a channel snagging and clearing and cleanout project was initiated on the lower three miles of the main Papillion Creek. The project was accomplished under authority of Section 208 of the 1954 Flood Control Act.

3-06. Flood Control Improvements. Over the years other levees and channel improvements have been made by local interests to improve flood control. Since 1972 most of the improvements have been made by the Papio Natural Resources District, the year the District became operational. The authority to form this and 23 other districts throughout the state of Nebraska was provided by the Nebraska state legislature in 1969. The state legislature provided a taxing power of up to one mill (\$.001) for each district. The Papio Natural Resources district replaced the Sarpy, Douglas and Washington County Soil and Water conservation District, and the Papio Watershed Advisory Board, none of which had individual taxing power. The natural resources districts were also given adequate authority to become local sponsors and to meet the local assurances

on all projects at the local, state or Federal level. As of 1986, the Papio Natural Resources District operates and maintains approximately 35 miles of levees and channel improvements in the lower reaches of the Papillion Creek watershed.

3-07. Water Rights. Nebraska state water right priorities operate on a first-in-time first-in-right basis. If necessary, water rights for the Papillion Creek basin will be policed out of the State Department of Water Resources office in Lincoln.

3-08. Irrigation. In 1984, 11 parties were registered with the State of Nebraska to divert streamflow from the Papillion Creek basin for irrigation; seven located in Washington County, two in Douglas County and two in Sarpy County. These irrigators have been granted rights to pump a total of approximately 10.5 c.f.s. from the streamflow.

3-09. Recreation. The demand for water based recreation near the City of Omaha is substantial. Existing recreation areas offering water oriented recreation in the metropolitan area are heavily used. The facilities have been overtaxed at time of peak use. The Papio lakes provide opportunities for a spectrum of recreational activities.

Section IV - Project History and Description

4-01. Project History. Early local efforts to increase flood protection by channel improvements and spoil bank levee construction were generally unsuccessful. In 1961, the Corps of Engineers completed a Survey Report on Flood Control for Papillion Creek and Tributaries. The report recommended the Little Papillion Creek channel improvement and levee project. Construction of the project started in September 1965 and was completed in January 1973. The June 17, 1964 flood renewed interest in the development of a basin flood control plan. In 1967 the Corps completed a new evaluation review report on flood control in the basin. The plan of improvement in this report was coordinated with the Soil Conservation Service and was developed in cooperation with the Papillion Watershed Advisory Board. The plan recommended 21 reservoirs for flood control, water quality control, recreation and fish and wildlife enhancement. The plan and project was authorized by the Flood Control Act of 1968 (P.L. 90-483, 90th Congress, 2nd Session) substantially in accordance with the recommendations of the Chief of Engineers in House Document No. 1349, 90th Congress at an estimated cost of \$26,800,000.

4-02. Damsite 16 Construction. Construction of the first dam, Site 16, was initiated in mid-1972. The dam was closed October 3, 1972. Storage of water began on August, 1973 when the low level gate was closed. Construction was essentially completed in the fall of 1973. The site was opened to the public for recreation usage in June 1976. The initial fill of the recreation pool was achieved October 24, 1977.

4-03. Damsite 11 Construction. Construction of the second dam, Site 11, was started in mid-1973. The dam was closed August 5, 1974. Storage of water began November 12, 1975 when the low level gate was closed. Construction was essentially completed early in 1975. The site was opened to the public for recreation usage in January, 1977. Initial fill of the recreation pool was achieved September 2, 1977. The City of Omaha took over operation and maintenance of recreational facilities in January, 1978. In 1979, additional construction was completed on the embankment due to larger than anticipated settlement in the embankment. This work was contracted to raise the crest in the center of the dam approximately 3 feet to a maximum elevation of 1154 feet above m.s.l., two feet higher than the originally designed crest elevation. It was estimated that the crest elevation would stabilize at the design elevation of 1152 feet above m.s.l.

4-04. Damsite 20 Construction. Construction of the third dam, Site 20, was initiated July 24, 1981. The dam was closed September 21, 1982. Construction was essentially complete in the fall of 1983. Storage of water began March 1, 1985 when the low level outlet was closed. Initial fill of the recreation pool was achieved May 26, 1987.

4-05. Damsite 18 Construction. Construction of the fourth dam, Site 18, began April 21, 1983. The dam was closed July 15, 1984. The embankment was completed in November, 1984. Construction was essentially complete in 1985. Potential water quality problems delayed the closure. Pollutants from two upstream Sanitation Improvement Districts (SID) had discharged on occasion to a tributary inflow. The water quality problem was corrected by constructing a diversion pipeline to the Elkhorn River in the Fall of 1989. The low level gate was closed December 7, 1989. The reservoir is currently filling to the recreation pool level.

4-06. Current Status. A reevaluation of the authorized system of dams was initiated in December 1981. The study concluded that none of the originally planned and remaining unconstructed dams be constructed because they were either economically infeasible or did not meet the cost/benefit requirements set forth in Public Law 89-72, the Federal Water Project Recreation Act. The final report dated March 1985 (revised October 1985) was submitted to Congress in June 1986. The report recommended construction of a channel improvement project on the Big Papillion Creek from Center to "L" Streets in Omaha. The report also recommended that the remaining unconstructed dams be deauthorized. The 1986 Water Resource Development Act officially deauthorized construction of the remaining dams.

4-07. Flood Plain Control. The project document required that local interests furnish assurances that they would accept or share certain responsibilities. One of the responsibilities was to maintain the creek channel below the damsites free of obstruction and capable to accommodate reservoir releases. Exhibit I contains resolutions passed by the Douglas County Board of Commissioners on September 14, 1971; the City of Omaha on September 28, 1971; the Sarpy County Board of Commissioners on September 1, 1971 and by the Papio Natural Resources District in February, 1974. These resolutions include a statement concerning their responsibilities of maintaining the downstream channel capacities. In 1973, the City of Omaha zoned the flood plains of the Papillion Creek basin. The zoning restricts development within the 100-year flood plain in accordance with Public Law 93-234 which established the National Flood Insurance Program.

4-08. Local Sponsor. The City of Omaha is the local sponsor of recreation under Public Law 89-72 at Sites 11, 16, and 18. The Papio Natural Resources District is the sponsor at Site 20. The sponsor is required to (1) administer land and water areas for recreation, (2) pay or contribute in kind, or repay (which may be through user fees) with interest, one-half of the separable cost allocated to recreation, and (3) bear all costs of operation, maintenance and replacement of recreation facilities.

4-09. Project Description. The project, as built, consists of four dams and lakes: Damsite 11, Glenn Cunningham Lake; Damsite 16, Standing Bear Lake; Damsite 18, Zorinsky Lake; and Damsite 20, Wehrspann Lake. Their locations are presented in Plate 1.

Pertinent data is summarized on PD-1.

4-10. Damsite 11 - Glenn Cunningham Lake

a. Project Structures. The rolled earthfill dam is approximately 1,940 feet long. The upstream face is protected with riprap material to prevent wave erosion. The crest of the dam is 15 feet in width, surfaced with a 4-inch layer of crushed rock to prevent erosion and to provide a suitable surface for maintenance and other possible emergency use. The crest of the dam was constructed to an elevation of 1152 feet above m.s.l., 67 feet above the flood plain. An ungated grassed spillway is located in the left abutment of the dam. The spillway crest elevation is at 1142 feet above m.s.l. The outlet works is located right of the midpoint of the length of the dam and is ungated. A low level gated outlet is provided near the bottom of the inlet tower to permit draining of the pool below the multipurpose pool elevation in the event the drawdown becomes desirable. The inlet tower is connected to a 4.5-foot concrete pipe conduit which extends beneath the dam into a stilling basin. A ten-foot perforated drain pipe directs excess groundwater, originating in the west abutment, into a manhole and the outlet conduit near the downstream toe of the embankment. The embankment and outlet works are illustrated on Plates 6, 7, and 8. Outlet ratings are shown on Plate 9. Information relative to fine gate regulation is presented on PD-1 and PD-2.

b. Reservoir. The lake at the top of the multipurpose pool, elevation 1121.0 feet above m.s.l., has a surface area of approximately 377 acres, a shoreline of approximately five miles, an approximate 2.4 mile main body length, and a main body width of approximately 2,100 feet. Storage allocations of the reservoir are presented in PD-1. The area-capacity table for Damsite 11 is presented on Plate 10.

c. Sediment. The sediment storage allocation for Damsite 11 was based on a varying sedimentation rate. Average annual yields of 3,500 tons per square mile during present land use, 14,000 tons per square mile during a ten-year urbanization period, gradually reducing to 1,200 tons per square mile during the following years were assumed. The estimated 100-year sediment deposition for Site 11 is 3,910 acre-feet in the multipurpose pool and 640 acre-feet in the lower portion of the flood control channel. A sedimentation area-capacity study completed in November 1988 by the River and Reservoir Engineering Section reported that between the years of 1976 to 1987 Site 11 storage capacities below the flood control and multipurpose pool levels were found to have decreased by 560 and 443 acre-feet per year, respectively. Averaged over the 11-year period, the combined depletion rate of the flood control and multipurpose pools is 50.9 acre-feet per year compared to the estimated 39.10 acre-feet per year. The measured rate of 50.9 acre-feet per year was considered not out of line considering: (1) the occurrences of above normal rainfall during several years from 1976 and 1987, (2) the higher rates of sediment inflow expected during such conditions, and (3) the increased rates of sediment

inflow that should be resulting from urbanization within the basin. Sedimentation survey ranges are shown on Plate 11.

d. Water Quality. Glenn Cunningham is classified as eutrophic based on nutrient concentrations (inorganic nitrogen and phosphorus) which result from natural conditions and agricultural practices within the watershed. Algal blooms usually occur annually when hot, calm conditions occur. Several algal blooms occurring within Glenn Cunningham Lake affect both fish and wildlife enhancement and recreation project purposes. Floating masses of algae result in odor problems and unaesthetic conditions. Blue-green algae produce toxins and when concentrated by wind-wave action, can be lethal to both warm and cold blooded organisms if ingested in sufficient quantity. Swimming is not allowed at Glen Cunningham Lake. However, many recreators do wade and an irritating rash may occur if the skin is exposed to the toxins. One case of a toxin adversely affecting a human has been reported.

e. Real Estate. The guide control line for Glenn Cunningham Lake has been established as contour elevation 1147 feet above m.s.l., being the maximum pool level or 300 feet horizontal from top of the multipurpose pool at elevation 1121.0 feet above m.s.l., whichever is greater. Flowage easements cover only lands below 1147.0 feet above m.s.l. The area acquired by fee was 1462.37 acres. Flowage easements were acquired on 66.16 acres.

f. Relocation. State Highway 36 located across the upper end of the reservoir was raised from a low road surface elevation of 1123.3 feet to 1135.9 feet above m.s.l., the Standard Project Flood pool level. Elevation 1135.9 feet above m.s.l. was selected because part of this road embankment will serve as the north side of the protective levee described below. This road segment, which included a bridge crossing, was rebuilt to provide four lanes of traffic. Also located near or within the upper reservoir area are four large ground petroleum storage tanks and associated storage and office buildings owned by the National Cooperation Refinery Association of McPherson, Kansas. The base of one storage tank and the storage and office buildings are located below the top of the reservoir flood control zone. Also, in this area is a petroleum pumping station and facilities owned by the Williams Brothers Pipeline Company of Tulsa, Oklahoma. The pump building and associated structures are located near elevation 1123 feet above m.s.l. Pipelines to these facilities were relocated. However, in lieu of relocating the main structures owned by the two companies, a levee was built around the property for protect the lake from fuel spills from leaking and/or ruptured tanks. Two pumps were installed on the land side of the levee for dewatering purposes. The top of the levee is at elevation 1135.9 feet above m.s.l. Other relocations included moving telephone, electric power and gas lines.

g. Recreation. Recreational facilities at Glen Cunningham Lake include two double land boat ramps, a campground, hiking/biking trails, and numerous picnic areas. Motor powered

boats are limited to "no wake". In 1990, 2.9 million visitor hours of use were reported. The area is managed by the City of Omaha under a park and recreation lease.

4-11. Damsite 16 - Standing Bear Lake

a. Project Structures. The rolled earthfill dam is approximately 1,460 feet long. The upstream face is protected with a bank of riprap material to prevent wave erosion. The crest of the dam is 15 feet in width and surfaced with a 4-inch thick course of crushed rock to prevent rutting and to provide a passable surface for maintenance and possible emergency use. The crest of the dam is constructed to an elevation of 1130 feet above m.s.l., 70 feet above the creekbed. An ungated turfed spillway is located in the right abutment of the dam. The spillway crest elevation is at 1121 feet above m.s.l. The outlet works is located near the midpoint of the length of the dam and is ungated. The invert elevation is 1104 feet above m.s.l. A low level gated outlet is provided near the bottom of the inlet tower to permit draining of the pool below the multipurpose pool elevation. The tower is connected to a 3.0 foot diameter concrete pipe which runs through the dam into a stilling basin. The embankment and outlet works are illustrated on Plates 17, 18, and 19. Outlet rating curves are presented on Plate 20. See PD-1 and PD-2 for information relative to fine gate regulation.

b. Reservoir. The lake at the top of the multipurpose pool, elevation 1104.0 above m.s.l. has a surface area of approximately 126 acres, a shoreline of five miles, a main body length of 4,700 feet, and main body width of approximately 1,000 feet. Storage allocations of the reservoirs are given in PD-1. Area-Capacity tables are presented on Plate 21.

c. Sediment. The sediment storage allocation for Damsite 16 was based on a varying sedimentation rate. Average annual yields of 3,500 tons per square mile during present land use, 17,500 tons per square mile during a 10-year urbanization period, gradually reducing to 1,000 tons per square mile during the following years were assumed. The estimated 100-year sediment deposition is 1,550 acre-feet. Of this total, 1,320 acre-feet is expected to accumulate in the multipurpose storage zone and 230 acre-feet in the flood control zone. Sedimentation survey ranges are shown on Plate 22.

d. Water Quality. Standing Bear Lake is classified as eutrophic based on nutrient concentrations (inorganic nitrogen and phosphorus) which result from natural conditions and agricultural practices within the watershed. Algal blooms usually occur annually during hot, calm weather conditions. Several algal blooms occurring within Standing Bear Lake affect both fish and wildlife enhancement and recreation project purposes. Floating masses of algal result in odor problems and unaesthetic conditions. Blue-green algae produce toxins and when concentrated by wind-wave action, can be lethal to both warm and cold blooded organisms if ingested in sufficient quantity. Swimming is not allowed at

Standing Bear Lake. However, many recreators do wade and an irritating rash may occur if the skin is exposed to the toxins. No reports of human contact with algal toxins have occurred.

e. Real Estate. The guide control line was established as contour elevation 1121 feet above m.s.l., being the elevation required for the vertical freeboard allowance from the top elevation of controlled storage (standard project flood pool) at elevation 1117.0 feet above m.s.l., or 300 feet horizontal from the multipurpose pool at elevation 1104 feet above m.s.l., whichever is greater. The area acquired by fee was 531.35 acres. Flowage easements were acquired on 6.42 acres.

f. Relocation. Construction of Site 16 required the relocation of telephone and electric power lines and the raising of 144th Street along the upper reaches of the lake to elevation 1113.0 feet above m.s.l., the 100-year pool plus three feet of freeboard for wave action. The road culverts on 144th and Ida Streets were raised to an invert elevation of 1100.0 feet. Since the Flower Hill Cemetery was strongly opposed to relocation, an impervious levee was built to an elevation of 1117.0 feet above m.s.l. to protect the cemetery.

g. Pumping Plant at Flower Hill Cemetery. A pumping station was installed at the Flower Hill Cemetery to pump surface water runoff and underground seepage into the lake. The two pumps for surface water runoff are vertical, propellor-type pumps. The first sump pump starts pumping automatically whenever the sump water level rises to 6.25 feet, thereby actuating the float level switch. It stops pumping when the water level is lowered to 3.25 feet. The second pump activates if the water rises to 6.75 feet. The two pumps for underground seepage are submersible and have attached water level sensors which turn the pumps on when water rises to the appropriate level, and turn the pumps off when the water level drops to 3 inches. Water for these pumps is collected by a drainage pipe, 180 feet long, buried 8 to 11 feet below ground, 5 feet east of the chain link fence. The pumps discharge through check valves into a 2-inch diameter pipe which carries the water over the levee. The fence, pumping station, and drainage system are maintained by the Flower Hill Cemetery Association.

h. Recreation. Recreation development at Standing Bear Lake includes a boat ramp, hiking/biking trails, picnic facilities and a model airplane field. Power boating is restricted to electric trolling motors only. In 1990, 2 million visitor hours of use were reported. The area is managed by the City of Omaha.

4-12. Damsite 18 - Zorinsky Lake

a. Project Structures. The rolled earthfill dam is approximately 1,400 feet long. The upstream face is protected by riprap to prevent wave erosion. The crest of the dam is 15 feet in width and surfaced with a 6-inch thick course of crushed rock to prevent rutting and to provide a passable surface for maintenance

and possible emergency use. The crest of the dam is constructed to an elevation of 1143.5 feet above m.s.l., 64 feet above the flood plain. An ungated turf spillway is located in the right abutment of the dam. The spillway crest elevation is at 1128.2 feet above m.s.l. The outlet works is located near the left abutment of the length of the dam and is ungated. The invert elevation is 1110 feet above m.s.l. Two low-level gated outlets are provided near the bottom of the inlet tower to permit draining of the pool below the multipurpose pool elevation. A gated mid-level intake is provided at 1104.25 feet above m.s.l., and a gated low level intake is provided at 1090 feet above m.s.l. The tower is connected to a 4-foot diameter concrete pipe which runs through the dam into a stilling basin. The embankment and outlet works are illustrated on Plates 28, 29, and 30. Outlet ratings are shown on Plate 31. Information relative to fine gate regulation is presented on PD-1 and PD-2.

b. Reservoir. The lake at the top of the multipurpose pool, elevation 1110.0 feet above m.s.l. has a surface area of approximately 253 acres, a shoreline of 5.5 miles, a main body length of 7,400 feet, and main body width of approximately 3,000 feet. Storage allocations for the reservoir are given in PD-1. Area-capacity tables are given on Plate 32.

c. Sediment. The sediment storage allocation for Damsite 18 was based on a varying sedimentation rate. An average annual yields of 3,500 tons per square mile during present land use, 35,000 tons per square mile during a 10-year urbanization period, gradually reducing to 1,000 tons per square mile during the following years were assumed. The estimated 100-year sediment deposition is 3,225 acre-feet. Of this total, 2,785 acre-feet is expected to accumulate in the multipurpose storage zone and 470 acre-feet in the flood control zone. Sedimentation survey ranges are shown on Plate 33.

d. Water Quality. Zorinsky Lake has not yet filled. However, based on preimpoundment nutrient load estimates (inorganic nitrogen and phosphorus), the lake will be classified as eutrophic. Zorinsky Lake is expected to act similarly to the other Papillion Creek lakes where increased turbidity levels will result from wind and high inflows. Algal blooms are expected to occur when hot, calm conditions occur. Pesticide levels may reach problem levels during spring runoff but are not expected to adversely affect fishing or consumption of fish. Several algal blooms will occur within Zorinsky Lake and will affect both fish and wildlife enhancement and recreation project purposes. Floating masses of algae will result in odor problems and unaesthetic conditions. blue-green algae will produce toxins and when concentrated by wind-wave action, will be lethal to both warm and cold blooded organisms if ingested in sufficient quantity. Swimming will not be allowed at Zorinsky Lake. It is not expected that anoxic conditions will develop during such periods sufficient for a major fish kill.

e. Real Estate. The guide control line was established as contour elevation 1128.2 feet above m.s.l., being the elevation required for the vertical freeboard allowance from the top of controlled storage (standard project flood pool) at elevation 1128.2 feet above m.s.l., or 300 feet horizontal from multipurpose pool at elevation 1110 feet above m.s.l., whichever is greater. The area acquired by fee was 1000.66 acres. Flowage easements were acquired on 0.72 acres.

f. Relocations. Construction of Site 18 required abandoning approximately 1.4 miles of "F" Street. A section of 156th Street was relocated around the earthen spillway. A section of 168th Street was raised to an elevation of 1121 feet above m.s.l. since it was located within the pool area. The existing bridge was removed and a new one was installed. Relocation of existing telephone, electric and gas transmission lines was also performed.

g. Recreation. Recreation facility development at Zorinsky Lake are under construction as of January 1991. Facilities include a boat ramp, handicap fishing pier, hiking/biking trails, picnic area, horseback riding, and softball, soccer and football fields. Some facilities will be available for public use in 1991. All recreation development is scheduled for completion in 1992. The area will be managed by the City of Omaha.

4-13. Damsite 20 - Wehrspann Lake

a. Project Structures. The rolled earthfill dam is approximately 1,810 feet long. The upstream face is protected with riprap to prevent wave erosion. The crest of the dam is 15 feet in width and surfaced with a 6-inch thick course of crushed rock to prevent rutting and to provide a passable surface for maintenance and possible emergency use. The crest of the dam is constructed to an elevation of 1131 feet above m.s.l., 59 feet above the creekbed. An ungated turfed spillway is located in the right abutment of the dam. The spillway crest elevation is at 1120 feet above m.s.l. The outlet works is located near the right abutment of the length of the dam and is ungated. The invert elevation is 1096 feet m.s.l. Two low level gated outlets are provided near the bottom of the inlet tower to permit draining of the pool below the multipurpose pool elevation. A gated mid-level intake is provided at 1090 feet above m.s.l., and a gated low level intake is provided at 1077 feet m.s.l. The tower is connected to a 4 foot diameter concrete pipe which runs through the dam into a stilling basin. The embankment and outlet works are illustrated on Plate 39, 40, and 41. Outlet ratings are shown on Plate 42. Information relative to fine gate regulation is presented in PD-1 and PD-2.

b. Reservoir. The lake at the top of the multipurpose pool, elevation 1096 feet above m.s.l. has a surface area of approximately 241 acres, a shoreline of five miles, a main body length of 7,920 feet, and a main body width of approximately 1,000 feet. Storage allocations of the reservoirs are given in PD-1. Area-capacity tables are shown on Plate 43.

c. Sediment. The sediment storage allocation for Damsite 20 was based on a varying sedimentation rate. Average annual yields of 3,500 tons per square mile during present land use, 17,500 tons per square mile during a 10-year urbanization period, gradually reducing to 1,000 tons per square mile during the following years were assumed. The estimated 100-year sediment deposition is 2,480 acre-feet. Of this total, 2,140 acre-feet is expected to accumulate in the multipurpose storage zone and 340 acre-feet in the flood control zone. Sedimentation survey ranges are shown on Plate 44.

d. Water Quality. Wehrspann Lake is classified as eutrophic based on nutrient concentrations (inorganic nitrogen and phosphorus) which result from natural conditions and agricultural practices within the watershed. Increased turbidity levels after periods of high inflow reduces the amount of available light and inhibits the increase of algal populations. Algal blooms usually occur annually when hot calm conditions occur. Several algal blooms within Wehrspann Lake affect both fish and wildlife enhancement and recreation project purposes. Floating masses of algae result in odor problems and unaesthetic conditions. Blue-green algae produce toxins and when concentrated by wind-wave action, can be lethal to both warm and cold blooded organisms if ingested in sufficient quantity. Swimming is not allowed at Wehrspann Lake. However, recreators do wade and an irritating rash may occur if the skin is exposed to the toxins. No reports of human contact with algal toxins have occurred at Wehrspann Lake.

e. Real Estate. The guide control line was established as contour elevation 1120 feet above m.s.l., being the elevation required for the vertical freeboard allowance from the top elevation of controlled storage or standard project flood pool at elevation 1113.5 feet above m.s.l., or 300 feet horizontal from multipurpose pool at elevation 1096 feet above m.s.l., whichever is greater. The area acquired by fee was 1184.76 acres. Flowage easements were acquired for 2.09 acres.

f. Relocations. Construction of Site 20 required the relocation of telephone and electric power lines, gas lines and two existing sewage stabilization lagoons. Parts of 156th Street and Road "A" were abandoned. A bridge on 156th Street was removed and a concrete box culvert was installed. The road was raised to 1106.0 feet above m.s.l. A connection road, approximately 1600 feet in length was installed between Road "A" and 156th Street. A 36-inch culvert was installed in this connecting road.

g. Recreation. Chalco Hills Recreation Area at Wehrspann Lake includes picnic areas, a boat ramp, a handicap fishing pier, a seven mile hiking/biking trail, a nature study area and soccer fields. Approximately 3.7 million visitor hours of use were reported in 1990. The area is managed by the Papio-Missouri Natural Resources District.

Section V - Organization for Water Control

5-01. General. Engineering Regulation 1110-2-1400, dated 24 April 1970, assigns Corps of Engineers water control responsibilities in the Missouri River basin to the Missouri River Division Engineer. This Engineering Regulation also permits delegation of certain water control responsibilities to the District Engineer, in whose area the project is located. The responsibilities for assembly and interpretation of data affecting current water control, for carrying out regulation of the reservoirs according to plans agreed to in advance and accounting of water in the reservoirs have been delegated to the Omaha District Engineer. The Division Engineer, through the Missouri River Division Reservoir Control Center (RCC), monitors and reviews the regulation activities performed by the District. The responsibility for the regulation and all associated activities within the District is assigned to the Water Control Section of the Hydrologic Engineering Branch in the Engineering Division.

5-02. Normal Period Organization. An organization chart of the Omaha District is given on Plate 50. The operation of the Papillion Creek Dams and Reservoirs involves four units of the Omaha District.

a. Water Control Section, Engineering Division. This section is responsible for matters pertaining to the regulation of the reservoirs. It is responsible for acquiring and validating meteorologic and hydrologic data necessary for regulation of the projects. The section also makes advance estimates of streamflow from snow cover and rainfall reports for regulation purposes and alerts field operating personnel of potential flood occurrences. The preparation and submission of the required reservoir regulation reports to higher authority is also the duty of this group. The scheduling of releases for water quality improvement, water right compliance, or to lower pools for maintenance are also accomplished by this section.

b. Operations Division. The Operations Division plans and directs the maintenance of the projects. They establish the standards of maintenance and staff the necessary operating personnel.

c. Missouri River Project Engineer, Missouri River Project Office. The Project Engineer is responsible for performing those functions of operation and maintenance and regulation requested by the Operations Division and the Water Control Section. The Project Engineer will delegate his personnel to perform the functions requested. Standing instructions to field personnel for flood control regulation of the Papillion Creek dams and lakes are presented in Exhibit II of this manual.

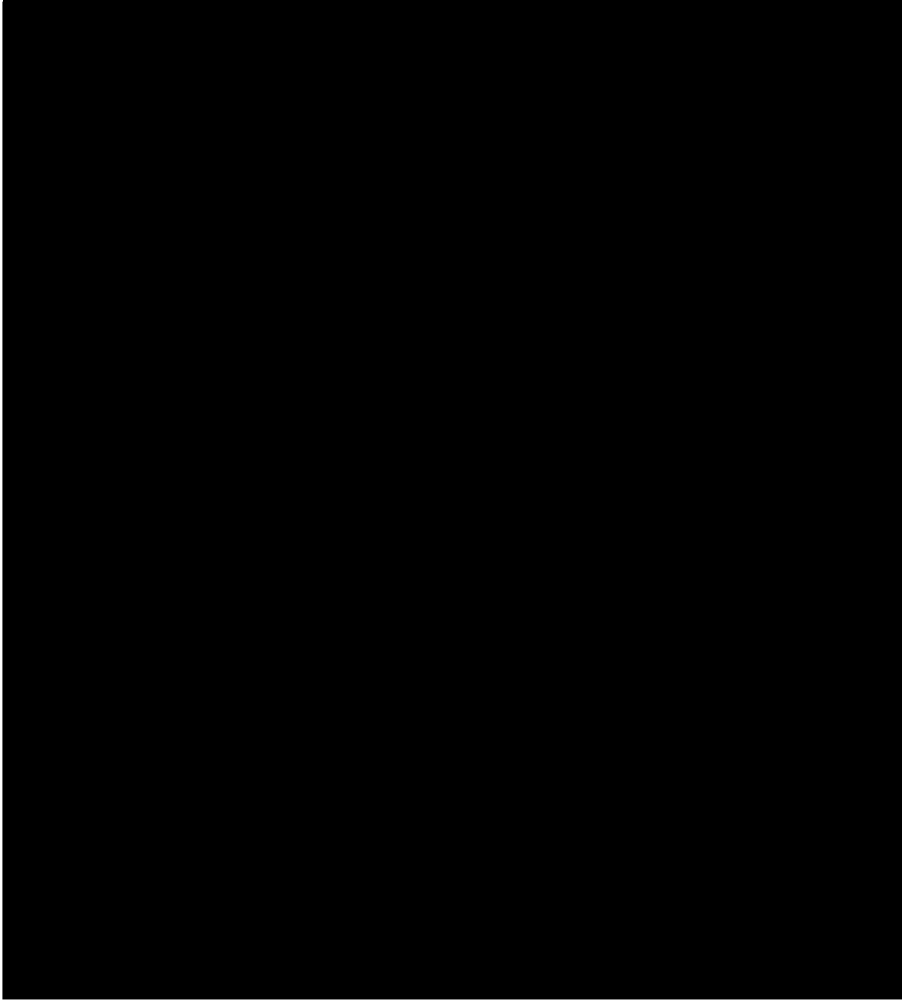
5-03. Flood Period Organization. The normal organization of the Omaha District is modified during a flood period to manage the additional duties made necessary by the flood emergency. The duties in regard to the Papillion Creek project include: (1) to collect and disseminate flood information; (2) to protect Corps of Engineers' property and works; and (3) to obtain high water marks, rainfall bucket surveys and in an extreme emergency, to assist in relief and rescue work. These activities take precedence over normal work and are performed by those employees of the District and the Missouri River Project Office who have been trained for specific emergency duties. The normal functions of the District and Project Manager are performed as vigorously as practical by those units of the normal organization which are not required for flood duties.

5-04. Procedure for Low Level Gate Regulation. Gated releases may be required to (1) lower the pool level prior to fish kills, embankment or outlet works inspection and repair, (2) improve water quality, (3) expedite flood storage evacuation, and (4) meet water rights. The Water Control Section will notify the State Department of Water Resources, the reservoir water right holder (Douglas County for Dams 11 and 16 or the Corps for Dams 18 and 20) and the local recreation sponsor (City of Omaha for Dams 11, 16, and 18 or the Papio Natural Resources District for Dam 20), of any planned gated release before it is made from the reservoir. The organization procedure to obtain a water right release is for the owner of a valid water right permit to contact the Director of the State Department of Water Resources in Lincoln, Nebraska. The Department of Water Resources will then contact the Water Control Section to make the necessary release. The Water Control Section will compute the number of crank turns necessary to make the designated release and notify the Missouri River Project Office. The Missouri River Project Office will arrange for the field personnel to make the gate setting.

5-05. Procedure for Water Quality Releases. At Glenn Cunningham Lake, Damsite 11, a three cubic foot per second (c.f.s.) discharge for low flow augmentation is required to improve downstream water quality. Discharge would be required only from March through November and would be made from the gated low level outlet. At Zorinsky Lake, Damsite 18, storage space has been allocated to provide releases of 1.0 c.f.s. containing a dissolved oxygen concentration of at least 5.0 ppm during March through November. At Wehrspann Lake, Damsite 20, water quality releases are intended to provide a high dissolved oxygen level for downstream biota during the March to November time period. To date, water quality releases have not been necessary since seepage from Damsites 11, 18, and 20 and tributary inflows provide the recommended flows (Preliminary Reservoir Regulation Manual for Papillion Creek and Tributary Dams Numbers 11 and 16; Nebraska, Preimpoundment Water Quality Report, Damsite 18, August 1983; Papillion Creek, Damsite 20 Memo from CEMRO-ED-HC to CEMRO-ED-A, 11 Dec 1986). Releases for low flow augmentation are not required at Damsite 16. If water quality sampling indicates, releases will be made to improve reservoir water quality.

5-06. Regulation Order. The Water Control Section will normally issue regulation orders directly to the Project Engineer. All requests for project releases will be referred to the Water Control Section for approval and issuance of orders. All verbal orders will be confirmed in writing as soon as possible. A copy of all orders issued will be furnished to the MRD Reservoir Control Center. The written order will contain a brief statement giving the background and reason for issuance of the order.

5-07. Agencies Involved in Regulation.



Section VI - Collection and Distribution of Basic Hydrologic Data

6-01. General. A system of stream and precipitation gages that are operated and maintained by the Corps of Engineers and the National Weather Service exists within the Papillion Creek basin. Rainfall reports are obtained both from contract observers by mail and telephone, and by automatic reporting tipping bucket rain gages via satellite. Meteorological and hydrological data are obtained by the Water Control Section via computer terminals, from the National Weather Service, and from the Missouri River Automated Data System (MRADS) database. Some stream stage data are obtained by telephone from gages equipped with telemarks that are maintained by the Water Control Section. The Papio Natural Resources District (NRD) maintains a system of rainfall observers for their own use which report to them monthly. The NRD also maintains staff gages at various streamflow locations within the basin.

6-02. Stream, Reservoir and Precipitation Gaging Data. Stream, reservoir, and precipitation gaging stations located in the Papillion Creek basin are listed in Tables 9 and 10 and shown in Plate 51.

6-03. Water Quality Collection. The Water Quality Unit samples the Papio reservoirs, inflows, and releases six times per year: once during the winter, once during the fall, and four times during the growing season. Each time physical measurements are taken for water temperature, conductivity, dissolved oxygen and pH. In addition, samples are taken for various metals (e.g. mercury, iron, manganese), nutrients (e.g. ammonia, nitrate, phosphorus), suspended solids, alkalinity, color, hardness, turbidity, and pesticides.

6-04. Surveys for Sediment Deposition. Table 11 presents the completed and scheduled surveys of the Papio lakes. These surveys are utilized in determination of the reservoir sediment deposition and area capacity analyses.

Table 9
Stream and Reservoir Gaging Stations
Papillion Creek Basin

<u>Stream</u>	<u>Station</u>	<u>Area (sq. mi.)</u>	<u>Type*</u>	<u>Telemark Number</u>
Trib. Big Papio	Damsite 16	6.0	R,S,A	496-2155
Big Papio	125th & Fort	126.0	R,W,A	493-1989
Big Papio	80th & "F"	153.0	W	--
Box Elder Cr.	Damsite 18	16.4	R,S,A	--
Knight Cr.	Damsite 11	17.8	R,S,A	572-1090
Little Papio	Irvington	32.0	R,W,A	571-2421
Little Papio	88th & Maple	--	S	--
Little Papio	Peony Park	39.0	W	--
Little Papio	AK-SAR-BEN	--	R,W	--
Little Papio	64th & "L"	--	S	--
Trib. South Branch	Damsite 20	--	R,S,A	--
West Branch	Papillion	13.1	R,W	339-3133
Papillion	Fort Crook	384.0	R,W,A	291-7746

* Gage type abbreviations

R - Bubbler - manometer with recorder

S - Staff

W - Wire weight

A - Automatic reporting satellite Data Collection Platform (DCP)

Note: All of the above-mentioned gages are owned and maintained by the Corps of Engineers. Gage station locations are shown on Plate 1.

Table 10
Papio Damsite Surveys

<u>Year</u>	<u>Damsite 11</u>	<u>Damsite 16</u>	<u>Damsite 18</u>	<u>Damsite 20</u>
1976	X	X		
1983	X			
1984		X		X
1985			X	
1987	X			
1989		X		
1992			S	S
1997	S		S	
1998				S
1999		S		
2002				S
2007	S		S	
2009		S		

X - Completed survey
S - Scheduled survey

6-05. Evaporation Data. Lake evaporation is determined from the evaporation pan located at the National Weather Service office. The office is approximately two miles northeast of Damsite 11.

6-06. Reports to Higher Authority. A monthly report (MRD 0168) is prepared and forwarded to the Reservoir Control Center, Missouri River Division for each Papillion Creek project. The monthly reports are prepared by the Water Control Section by use of a computer and software program. The program input data are daily pool elevations at 2400 hours, daily gated outflows, total month pan evaporation and precipitation. The program output consists of a tabular printout of daily pool elevations, outflow, inflow, total mean inflow, total mean outflow, month end storage, and monthly storage change (see Plate 52). In addition, a graphical summary indicating pool elevation for the past year and prior ten years with an explanation of the last year's operation is prepared and forwarded to MRD to be included in the annual report on Reservoir Regulation Activities as requested by the Office of Chief of Engineers.

Section VII - Analyses and Forecasts Pertinent
To Reservoir Regulation

7-01. Weather Forecasts. General weather forecasts developed by the National Weather Service consists of daily forecasts of weather conditions during the next 48 hours, furnished every six hours. A 3-day extended outlook of weather conditions is furnished once daily and a 30-day forecast of weather conditions is furnished on the 1st and 15th day of each month. These forecasts together with the various weather maps and real-time radar and NWS 6-hour weather analysis are used by the Water Control Section for advance alerting of impending heavy rainfall, runoff or flooding situations.

7-02. Short-Range Runoff Forecasts. Water Control engineers estimate inflow into the Papillion Creek reservoirs during flooding periods. Real-time flood forecasting models utilizing unit hydrograph options in the HEC-1 flood hydrograph package are under development for each Papillion Creek damsite. The basic model requires real-time data such as pool elevation, rainfall intensities and infiltration rates. The unit hydrographs for Damsites 11, 16, 18, and 20 are shown on Plates 12, 23, 34, and 45, respectively.

7-03. Pool Level Probability. Pool elevation probability curves for the Papio reservoirs are presented on Plates 13, 24, 35, and 46.

7-04. Release Probability. Maximum release rates for selected frequency events are presented in Table 12.

Table 11
Maximum Release Rates in CFS
Papillion Creek Dams

<u>Event</u>	<u>Dam 11</u>	<u>Dam 16</u>	<u>Dam 18</u>	<u>Dam 20</u>
1 Year	92	25	10	15
2 Year	104	36	30	47
10 Year	194	51	120	87
50 Year	354	75	160	113
100 Year	358	120	180	123
SPF	360	156	180	123

7-05. Losses. The losses used in the design flood computations for the Papillion Creek Damsites 11, 16, 18, and 20 were selected giving consideration to the development of the area by the year 2020. In the areas that are projected to remain in agricultural usage by 2020, the losses are assumed to be 3.00 inches initially and an infiltration rate of 0.30 inches per hour. For the areas where urbanization is projected, the above losses will also be used for the 75 percent portion of the urbanized area estimated to re-

main in grass or a comparable pervious cover. For the 25 percent portion of the urbanized area estimated to become impervious (e.g. streets, rooftops, parking areas), it is assumed that 100 percent of the design storm rainfall will be runoff.

7-06. Reservoir Evaporation. Pan evaporation observations indicate the annual evaporation from the Papillion Creek reservoirs to be 41 inches.

Section VIII - Multipurpose Regulation

8-01. General. Public Law 90-483 stated that, "the project for flood protection and other purposes in the Papillion Creek Basin, Nebraska, is hereby authorized substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 349, Ninetieth Congress ...". The Chief of Engineers recommended a system of 21 dams and reservoirs to serve the purposes of flood control, recreation, fish and wild life enhancement, and water quality control.

8-02. Recreation and Fish and Wildlife. A multipurpose pool is provided in each reservoir to serve recreation and fish and wildlife purposes. Since the top of the multipurpose pool is also the crest of the ungated drop inlet weir, no specific regulation of water levels is anticipated. Regulation will normally be automatic in that incoming water will flow via gravity through the drop inlet type outlet. The ability to maintain a sufficient multipurpose pool for recreation and fish and wildlife purposes will be mainly dependent upon inflow. There should be no difficulty in maintaining a full multipurpose pool behind the dams during periods of normal precipitation and inflow. However, serious depletion of the multipurpose pools may occur during prolonged drought periods. The Nebraska Game and Parks Commission is in charge of fishery management at all Papio damsites. They have not requested and do not anticipate requesting a pool level drawdown at any of the Papio lakes to enhance fishery habitat.

8-03. Low Level Outlet. A low level outlet is installed at each dam to permit draining of the multipurpose pools in approximately a one month time period, if necessary. This outlet may also be used to hasten the evacuation of flood storage so as to avoid damage to grasses and recreational facilities (reference DM MPC-15, Section IV, paragraph 4; DM MPC-14, Section IV, paragraph 1-d; DM MPC-39, Section IV, paragraph 4; and DM MPC-37, Section IV, paragraph 4). The low level opening may also be used for providing low flow augmentation releases for water quality purposes, lowering the pool to permit dry inspection and repair of the outlet conduit, and making water rights releases.

8-04. Service Outlet and Low Level Drain Rating Curves. For the service outlet rating curves, three pressure flow curves were calculated. The curves represent calculations for rough pipe flow, smooth pipe flow, and a probable operational curve. The rough pipe flow rating curve was based on a resistance coefficient from the Colebrook-White equations for an equivalent pipe roughness height of $ks=0.002$ for rough pipe flow conditions. The rough pipe flow condition was used in determining the capacity of the service outlet. The smooth pipe flow rating curve was based on smooth flow conditions and was used in designing the outlet works energy dissipater. The probable operational curve was calculated based on the average

of the rough pipe flow and smooth pipe flow resistance coefficient. The average roughness curve should be a closer approximation of an operational rating curve for day to day operation and conditions. For the low level drain, only the rough pipe flow condition was calculated. The outlet rating curves for Dams 11, 16, 18 and 20 are presented on Plates 9, 20, 31 and 42, respectively.

8-05. Water Quality Control.

a. Downstream Water Quality Control. It was stated in House Document No. 349, 90th Congress; "Studies by the Federal Water Pollution Control Administration indicated that a need exists for water quality storage within the Papillion Creek basin". The plan of development for water quality control in this document stated that "Eight of the proposed (21) reservoirs would collectively have sufficient storage to provide the 3 c.f.s. water quality flow requested by the Federal Water Pollution Control Administration on Big Papillion Creek, Little Papillion Creek, and West Branch, respectively". Based on the costs of an alternative groundwater pumping project, this storage was estimated to have an annual value of \$10,700. Damsites 11, 18, and 20 were included in the eight reservoirs as having a water quality component in the conservation pool. As presented in this document, Damsite 11 was to have a conservation pool of 4,600 acre-feet. Of this storage, 820 acre-feet was indicated as the water quality storage component. Subsequently, after recombination of the area-capacity table, the conservation or multipurpose storage was established at 3,910 acre-feet. Likewise, Damsite 18 was to have a conservation pool of 4,700 acre-feet with a water quality storage component of 620 acre-feet. After spillway design modifications, the conservation storage at Damsite 18 is 3,410 acre-feet. Damsite 20 was to have a conservation storage of 3,700 acre-feet with a water quality storage component of 490 acre-feet. As built, the conservation storage of Damsite 20 is 2,680 acre-feet. The conservation pools are estimated to fill with sediment in 100 years. To date, water quality releases have not been necessary because seepage, releases, and/or tributary inflows at Dams 11, 18 and 20 provide adequate flow.

b. Reservoir Water Quality Control. As stated in 8-05.a. (above), seepage is sufficient to provide the required downstream flow. Since authorized water quality storage has not normally been required for downstream uses, it is available for upstream (reservoir) water quality uses. The Papio Creek Reservoirs rarely stratify, thus water quality improvements associated with low level releases are negligible. In the event that stratification does occur releases can be made via the low level outlet to allow better quality inflow water to replace the released volume. Water quality sampling will be utilized to determine the timing and effectiveness of low level releases.

8-06. Fish Kills Due to Gate Operation. Fish kills can result from gate operation, especially during the winter months of November thru March. Fish seek out the warmth of deep water in the winter and may congregate near the release gates. When the gates are opened and fish pass through, they are killed by rapid decompression. By opening the gates slowly, this problem can be avoided. A proposed operational scheme would be to (1) open the gates to one cfs and leave for 15 minutes; (2) open the gates an additional cfs to two cfs and leave for additional 15 minutes; (3) open the gates an additional cfs to three cfs and leave for another 15 minutes; and (4) open the gates to the desired discharge.

8-07. Water Rights. The reservoirs will be regulated to satisfy water right requests made through the Office of the Director of the State Department of Water Resources in Lincoln, Nebraska. See Section V, paragraph 5-05.

8-08. Drought Contingency Plan.

a. General. Section 216 of Public Law 91-611, Rivers and Harbors Act of 1970, gives authority to water control managers to review the operation of Corps of Engineers multipurpose projects constructed for flood control, navigation, water supply and related uses and to report to Congress on the advisability of modifying the structures or their operation in an effort to improve the quality of the environment in the overall public interest. Using this authority, a drought contingency plan has been prepared for the Papio Lakes Project using the guidance provided in Engineering Regulation No. 110-2-1941. The plan is divided into two phases: Phase 1 evaluates and establishes the limits of project flexibility under existing authorities, and Phase 2 evaluates the feasibility of further action if constraints now existing are removed.

b. Project Flexibility (Phase 1). The existing water control plan for the Papio Lakes provides for filling the conservation pool and spilling all excess water over the weir crest. The project was authorized for flood control, water quality control, recreation and fish and wildlife enhancement. No plans were included for irrigation and water supply. Any request for a water release from the reservoirs during a drought condition would have to be discussed with and releases approved by the projects' local sponsor and the storage water right holder prior to execution. The discussion will include an assessment of effects of a release on the pool level and the effects on the authorized project purposes of recreation and fish and wildlife enhancement.

c. Coordination with other Agencies. The Corps of Engineers' Water Control Section continually monitors precipitation and streamflow and is alerted to potential flooding and periods of prolonged deficiencies in precipitation

and streamflow. In establishing a drought condition, the water manager will refer to the data collected and reported by the National Weather Service and any other agencies or by the Governor. At the beginning of the growing season, particularly if the moisture supply is critical, the NWS furnishes a Drought Severity (Palmer Index) Report weekly. This map of the United States gives a realistic report of drought conditions throughout all areas. If a situation of extreme low flow conditions exists and requests for releases are anticipated, the Office of Chief of Engineers will be alerted (ER 1110-2-240).

d. Drought Contingency Plan.

(1) Routine surveillance of precipitation, streamflow adequacy, and the Palmer Index to determine the actuality of a drought.

(2) Notification to the Office of Chief of Engineers that drought conditions exist.

(3) Provide drought assistance to public (as determined by the Emergency Operations Managers).

(4) Coordinate request, information, and effects with the local sponsors and storage water rights holders.

e. Further Study (Phase 2). No further study regarding release of water during drought periods is warranted, as there are no constraints other than that given in (b) above known to exist.

Section IX - Flood Control Regulation

9-01. Objectives of Flood Control Regulation. The flood control storage of the reservoirs will be automatically regulated primarily for the reduction and prevention of flood damages downstream of the dams.

9-02. Method of Regulation. In general, the method of flood control regulation of the Papillion Creek Project Dam and Reservoirs may be classified as Method B, defined in EM 1110-2-3600. In this plan the flood capacity is based on control of the project design flood. The operation consists of releasing the ungated service spillway capacity corresponding to the pool elevation and storing the excess inflow.

9-03. Plan of Regulation. Releases for flood control will normally be automatically controlled by the drop inlet type outlet structure. Flood control storage requirements for the Papillion Creek Dam and Reservoir projects were based on containing the Standard Project Flood (SPF) volume without any appreciable outflow. The drop inlet type outlet structure was designed to have sufficient capacity to automatically evacuate the flood control zone within a reasonable period of time in order to provide flood protection against recurring events. Two different levels and size of outlet openings in the drop inlet type outlet structure were installed for this purpose. The reservoirs behind Damsites 11, 16, 18, and 20 will drain 75 percent of the storage accumulated from the SPF in approximately 8.9, 8.3, 10.0, and 10.2 days, respectively, and 50 percent in approximately 5.75, 4.25, 4.4 and 4.4 days, respectively. The spillway design flood routings were made with a beginning pool level at one-half of the storage required to store the Reservoir Design Flood (RDF). The SPF was selected as the RDF for all the proposed Papillion Creek dams (reference DM MPC-14, Section III, paragraph 1-g). A perched spillway crest located 4 feet, 6.1 feet, and 6.9 feet above the maximum pools obtained in the Reservoir Design Flood routings at Damsites 16, 11, and 20, respectively, provides additional flood control storage in each reservoir. Damsite 18 was not constructed with a perched spillway.

9-04. Supplemental Releases. As indicated previously, releases from the flood control zone are normally automatically controlled by the ungated drop inlet type outlet structure. However, at times when the outlet conduit is not under pressure flow, supplemental releases may be made from the flood control zone to hasten the pool drawdown by using the low level gated outlets.

9-05. Emergency Flood Control Regulation. The ungated drop inlet type outlet structure and emergency spillway will automatically provide the necessary emergency regulation of the project. No immediate regulation duties are necessary which require the services of a dam tender.

9-06. Reports of Reservoir Flood Operation. During severe flood periods daily summaries of hydrologic conditions and reservoir regulations will be furnished to the Office of the Chief of Engineers as directed by EM 500-1-1, with an information copy to the Missouri River Division. Pertinent data specifically required for reservoirs on these reports are as follows: name of reservoir, reservoir stage, predicted maximum stage and anticipated date, rate of inflow and outflow in c.f.s., percent of flood control storage utilized to date, and any special information particularly pertinent to the flood situation. Periodic reservoir reports, as discussed in Section VI, paragraph 6-04, are also prepared. Additionally, a copy of all regulation orders issued will be furnished to the Missouri River Division with a brief explanation why the order was issued.

Section X - Examples of Flood Control Regulation

10-01. General. Descriptions of the Standard Project Flood (SPF) and the Probable Maximum Flood (PMF) are given in paragraphs 2-14 through 2-18. The SPF was selected as the reservoir design flood and the Probable Maximum Flood was utilized in the design of the spillway and the top of the dam elevation. Numerous reservoir routings were made in determining the most economical balance between land costs, spillway excavation, and embankment fill height for the PMF. The final configuration of the embankment and spillway were based on these routings.

10-02. Design Routings for Damsite 11. The reservoir design routing, reservoir draining characteristics, and spillway design or Probable Maximum Flood routing for Damsite 11 are given on Plates 14, 15, and 16. The Reservoir Design Flood storage will drain from full level to half full level in 5.75 days. The half full Reservoir Design Flood storage level was selected as the beginning pool level in the spillway design routing of the PMF. The spillway has a perched crest elevation located 6.1 feet above the maximum pool resulting from the Reservoir Design Flood routing. The PMF routing allows 5 feet of freeboard between the maximum pool elevation reached in the routing and the top of dam elevation.

10-03. Design Routings for Damsite 16. The reservoir design routings, reservoir draining characteristics, and spillway design routing for Damsite 16 are given on Plates 25, 26, and 27. The Reservoir Design Flood storage will drain from full level to half full level in 4.25 days. The half full Reservoir Design Flood storage level was selected as the beginning pool level in the spillway design routing of the PMF. The spillway has a perched crest elevation located 4 feet above the maximum pool resulting from the Reservoir Design Flood routing. Three feet of freeboard exists between the maximum pool elevation reached in routing the PMF through the reservoir and the top of dam elevation.

10-04. Design Routings for Damsite 18. The reservoir design routing, reservoir draining characteristics, and spillway design or Probable Maximum Flood routing for Damsite 18 are given on Plates 36, 37, and 38. The Reservoir Design Flood storage will drain from full level to half full level in 4.4 days. The half full Reservoir Design Flood storage was selected as the beginning pool level in the spillway design flood routing of the PMF. The spillway does not have a perched condition. The PMF routing allows 5.3 feet of freeboard between the maximum pool elevation reached in the routing and the top of dam elevation.

10-05. Design Routing for Damsite 20. The reservoir design routing, reservoir draining characteristics, and spillway design or Probable Maximum Flood routing for Damsite 20 are given on Plates 47, 48, and 49. The Reservoir Design Flood storage will drain from full level to half full level in 4.4 days. The half full Reservoir Design Flood storage level was selected as the beginning pool level

in the spillway design routing of the PMF. The spillway has a perched crest elevation located 6.9 feet above the maximum pool resulting from the Reservoir Design Flood routing. The PMF routing allows 5.2 feet of freeboard between the maximum pool elevation reached in this routing and top of dam elevation.

Exhibit I

Resolutions by Local Interests

- Douglas County
- City of Omaha
- Papio Natural Resources District
(Initially Sarpy County)

**BOARD OF COUNTY COMMISSIONERS
DOUGLAS COUNTY, NEBRASKA**

Resolved WHEREAS, the project for flood protection and other purposes in the Papillion Creek Basin, Nebraska was authorized by Public Law 90-483 (82 Stat. 743) substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 349, Ninetieth Congress;

WHEREAS, the aforesaid recommendations of the Chief of Engineers include construction of a system of dams and reservoirs at locations throughout the Papillion Creek basin to serve the purposes of flood control, recreation, fish and wildlife enhancement, and water quality control, with local interests to reimburse certain costs in accordance with the Federal Water Project Recreation Act (Public Law 89-72) and with local interests to furnish certain assurances of local cooperation satisfactory to the Secretary of the Army;

WHEREAS, Douglas County intends, directly or by appropriate agreements with agencies of the State of Nebraska and other political subdivisions or bodies of the State of Nebraska, to furnish the necessary assurances of local cooperation with respect to those dams and reservoirs and downstream channels situate in the County;

WHEREAS, Douglas County, also in cooperation with the Corps of Engineers, the various agencies of the State of Nebraska and other political subdivisions or bodies of the State of Nebraska, has been and is attempting to preserve the reservoir sites and downstream channels to assure their feasibility at the lowest possible investment of public funds through various means; and

WHEREAS, Douglas County has been requested by the Corps of Engineers to reiterate its intentions with regard to the reservoirs and downstream channels at this time so the project may proceed;

NOW, THEREFORE, BE IT RESOLVED with respect to each reservoir and downstream channels situated within the County of Douglas, that the County of Douglas will:

1. Maintain the Papillion Creek channels downstream from the dam sites free of obstructions and available to accommodate reservoir releases and uncontrolled flow;
2. Insure that all new bridge construction, and future modification of existing bridges, downstream from reservoirs of the proposed system, shall have hydraulic capacity acceptable to the Chief of Engineers;
3. Provide guidance and leadership in preventing unwise and uneconomical future development of the flood plain areas by encouraging prudent use of flood proofing, land regulation planning, or other flood plain management techniques to reduce flood losses;
4. Hold and save the United States free from all damages arising from water-rights claims resulting from the construction and operation of the reservoirs;
5. Exercise, to the full extent of their legal capability, control against removal of streamflow made available for water quality control;
6. Assure that in accordance with Sections 210 and 305 of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Public Law 91-646) and implementing regulations:
 - a. Fair and reasonable relocation payments and assistance shall be provided to or for displaced persons, as are required to be provided by a Federal agency under Sections 202, 203 and 204 of said Act;
 - b. Relocation assistance programs offering the services described in Section 205 of said Act shall be provided to such displaced persons;

c. Within a reasonable period of time prior to displacement, decent, safe, and sanitary replacement dwellings will be available to displaced persons in accordance with Section 205(c)(3) of said Act;

d. In acquiring real property it will be guided, to the greatest extent practicable under State law, by the land acquisition policies in Section 301 and the provisions of Section 302 of said Act; and

e. Property owners will be paid or reimbursed for necessary expenses as specified in Sections 303 and 304 of said Act.

Provided, however, that for the period prior to 1 July 1972 it will be required to comply with the requirements of said Act and implementing regulations only to the extent compliance is permissible under applicable State law, provided further, that an opinion of its Chief Legal Officer is furnished with respect to any payments and services which it maintains it cannot provide pursuant to said Act under applicable State law for said period prior to 1 July 1972.

Dated this 14th day of September, 1971, at Omaha, Nebraska.

DOUGLAS COUNTY BOARD OF COUNTY COMMISSIONERS

Motion by Green; Seconded by Hassett,
I move the adoption of the Resolution.
ADOPTED: September 14, 1971
YEAS: Duglewick, Lynch, Green,
Hassett, Cavanaugh

(CERTIFIED COPY)

ATTEST

110

STATEMENT OF FINANCIAL ABILITY

I, Sam J. Howell, Treasurer of the County of Douglas, Nebraska, and as agent for the Papio Watershed Board (an agency of this county) do hereby certify that such agency has ~~the necessary financial ability to make~~ ~~current annual contributions in money to fulfill its assurances to the United States of America, heretofore given the Douglas County Board of County Commissioners~~ on August 31, 1971, ~~and~~ a balance of Seven Hundred Fifty Eight Thousand Nine Hundred Seven Dollars and Eighty Four Cents (\$758,907.84).

Dated this 7 day of October, 1971.



SAM J. HOWELL, DOUGLAS COUNTY TREASURER

I, John J. Cavanaugh, Chairman of the Board of County Commissioners for the County of Douglas, Nebraska, hereby certify that the Papio Watershed Board (an agency of this county) has the necessary ability to make "in like" contributions of property, services, labor, equipment and material required to fulfill its assurances to the United States of America, heretofore given and as contained in a certain Resolution of assurances adopted by such county prior to the execution of this statement.

Dated this 7 day of October, 1971.



JOHN J. CAVANAUGH, CHAIRMAN, DOUGLAS COUNTY BOARD OF COUNTY COMMISSIONERS

Certificate of Attorney
In Support of Assurances of Local Cooperation
For Flood Control Project

The undersigned Attorney at Law, as the County Attorney for the County of Douglas, which said County has undertaken to act as local sponsor of Republican Creek and Tributaries, Nebraska Flood Control Project, hereby certifies that the said County of Douglas, acting by and through its Board of Commissioners, has the statutory and legal authority to:

1. Provide the necessary assurances required by federal law for the construction, operation and maintenance of the project.
2. Collect, appropriate and expend the necessary monies and funds to be provided by it for the construction, operation and maintenance of the project.
3. Contract with the United States for the purposes enumerated in this Certificate and for the construction, operation and maintenance of the project.

In Witness Whereof I have made and executed this Certificate this

14th day of September 1971.


County Attorney

Douglas County, Nebraska

CITY OF OMAHA

COUNCIL CHAMBER

Omaha, Nebr. _____ September 28, 19__71

RESOLVED BY THE CITY COUNCIL OF THE CITY OF OMAHA:

WHEREAS, the project for flood protection and other purposes in the Papillion Creek Basin, Nebraska was authorized by Public Law 90-483 (82 Stat. 743) substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 349, Ninetieth Congress;

WHEREAS, the aforesaid recommendations of the Chief of Engineers include construction of a system of dams and reservoirs at locations throughout the Papillion Creek basin to serve the purposes of flood control, recreation, fish and wildlife enhancement, and water quality control with local interests to reimburse certain costs in accordance with the Federal Water Project Recreation Act (Public Law 89-72) and with local interests to furnish certain assurances of local cooperation satisfactory to the Secretary of the Army; and

WHEREAS, the City of Omaha has indicated its intent to cooperate with the Corps of Engineers in developing the recreational potential of Site 11 and to furnish assurances satisfactory to the Secretary of the Army in accordance with the Federal Water Project Recreation Act (Public Law 89-72);

NOW, THEREFORE, BE IT RESOLVED with respect to Site 11, that the City of Omaha will:

1. Hold and save the United States free from all damages arising from water-rights claims resulting from the construction and operation of the reservoirs;
2. Provide guidance and leadership in preventing unwise and uneconomical future development of the flood plain areas by encouraging prudent use of flood proofing, land regulation planning, or other flood plain management techniques to reduce flood losses;
3. In accordance with the Federal Water Project Recreation Act;
 - a. Administer project land and water areas for recreation and fish and wildlife enhancement;

By _____
Councilman

Accepted _____

City Clerk

Approved _____

CITY OF OMAHA

COUNCIL CHAMBER

Omaha, Nebr. _____ September 28, 1971

Page 2
RESOLVED

b. Pay, contribute in kind, or repay (which may be through user fees) with interest, one-half of the separable first cost of the project allocated to recreation and fish and wildlife enhancement, the amount involved being currently estimated at \$521,500 for Site 11;

c. Bear all costs of operation, maintenance, and replacement of lands and facilities for recreation and fish and wildlife enhancement an annual amount currently estimated at \$125,700 for Site 11;

4. Assure access to all members of the public on equal terms;

5. Operate and maintain for the life of the Federal Project the recreation area and all facilities installed pursuant to the agreement and in accordance with the manual, and any amendments thereto, provided by the District Engineer;

6. Provide assurances of compliance with Department of Defense Directive 5500.11, Nondiscrimination in Federally Assisted Programs, published in the Federal Register, 31 December 1964, and any amendments thereto or implementation thereof, as may be required by the Secretary of the Army.

7ST/6

[Redacted signature area]

SEP 28 1971

Adopted.....

[Redacted signature area]

Approved..... Mayor

10/1/71

RESOLUTION

Board of Commissioners of Sarpy County, Nebraska

WHEREAS, by resolution of this Board of Commissioners of September 1, 1971, Sarpy County gave to the United States Army Corps of Engineers (hereinafter referred to as "the Corps") a statement of the intention of the County to furnish the necessary assurances of local cooperation with respect to those reservoirs and downstream channels within the Papillion Creek and Tributaries Project, which are situated within in Sarpy County, and;

WHEREAS, the Papio Natural Resources District (hereinafter termed "the District") assumed existence on July 1, 1972 and has the authority to provide to the Corps the necessary assurances of local cooperation for the project; and,

WHEREAS, this Board desires to have the District assume the responsibility of giving assurances of local cooperation for reservoirs and downstream channels within the aforesaid Project which are situated in Sarpy County, and desires to enter into an agreement with the District regarding the assumption by the District of such responsibility, in the form as attached to this resolution as Exhibit "A" and incorporated herein by reference, entitled "Memorandum-Papillion Creek and Tributaries Project-Sarpy County, Nebraska."

NOW, THEREFORE, BE IT RESOLVED that the Chairman of the Board of Commissioners of Sarpy County, Nebraska, be, and he is hereby, authorized and directed to execute for and on behalf of Sarpy County the agreement in the form as attached hereto as Exhibit "A" to this resolution, providing for the assumption by the Papio Natural Resources District of the local sponsorship of the Papillion Creek and Tributaries Project in Sarpy County.

DATED this 4 day of Feb. 1974.

Attest:

Board of Commissioners of Sarpy
County, Nebraska


County Clerk

RESOLUTION

WHEREAS, the project for flood protection and other purposes in the Papillion Creek Basin, Nebraska was authorized by Public Law 90-483 (82 Stat. 743) substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 349, Ninetieth Congress;

WHEREAS, the aforesaid recommendations of the Chief of Engineers include construction of a system of dams and reservoirs at locations throughout the Papillion Creek Basin to serve the purposes of flood control, recreation, fish and wildlife enhancement, and water quality control, with local interests to reimburse certain costs in accordance with the Federal Water Project Recreation Act (Public Law 89-72) and with local interests to furnish certain assurances of local cooperation satisfactory to the Secretary of the Army;

WHEREAS, the County intends, directly or by appropriate agreements with agencies of the State of Nebraska and other political subdivisions or bodies of the State of Nebraska, to furnish the necessary assurances of local cooperation with respect to those dams and reservoirs and downstream channels situate in the County;

WHEREAS, the County, also in cooperation with the Corps of Engineers, the various agencies of the State of Nebraska and other political subdivisions or bodies of the State of Nebraska, has been and is attempting to preserve the reservoir sites and downstream channels to assure their feasibility at the lowest possible investment of public funds through various means, including the aforesaid advance of funds; and

WHEREAS, the County has been requested by the Corps of Engineers to reiterate its intentions with regard to the reservoirs and downstream channels at this time so the project may proceed;

NOW, THEREFORE, BE IT RESOLVED, with respect to each reservoir and downstream channels situated within the County of Sarpy, that the County of Sarpy will:

1. Maintain the Papillion Creek channels downstream from the damsites free of obstructions and available to accommodate reservoir releases and uncontrolled flow;
2. Insure that all new bridge construction, and future modification of existing bridges, downstream from reservoirs of the proposed system, shall have hydraulic capacity acceptable to the Chief of Engineers;

3. Provide guidance and leadership in preventing unwise and uneconomical future development of the flood plain areas by encouraging prudent use of flood proofing, land regulation planning, or other flood plain management techniques to reduce flood losses;

4. Hold and save the United States free from all damages arising from water-rights claims resulting from the construction and operation of the reservoirs;

5. Exercise, to the full extent of their legal capability, control against removal of streamflow made available for water quality control;

6. Assure that in accordance with Sections 210 and 305 of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Public Law 91-646) and implementing regulations:

a. Fair and reasonable relocation payments and assistance shall be provided to or for displaced persons, as are required to be provided by a Federal agency under Sections 202, 203, and 204 of said Act;

b. Relocation assistance programs offering the services described in Section 205 of said Act shall be provided to such displaced persons;

c. Within a reasonable period of time prior to displacement, decent, safe, and sanitary replacement dwellings will be available to displaced persons in accordance with Section 205(c)(3) of said Act;

d. In acquiring real property it will be guided, to the greatest extent practicable under State law, by the land acquisition policies in Section 301 and the provisions of Section 302 of said Act; and

e. Property owners will be paid or reimbursed for necessary expenses as specified in Sections 303 and 304 of said Act.

PROVIDED, HOWEVER, that for the period prior to July 1, 1972, it will be required to comply with the requirements of said Act and implementing regulations only to the extent compliance is permissible under applicable State law;

PROVIDED, FURTHER, that an opinion of its Chief Legal Officer is furnished with respect to any payments and services which it

maintains it cannot provide pursuant to said Act under applicable State law for said period prior to July 1, 1972.

DATED this 1 day of Sept, 1971, at Papillion, Nebraska.

[Redacted signature area]

[Signature]
CHAIRMAN, BOARD OF COUNTY COMMISSIONERS

ATTEST:

CERTIFICATE

I hereby certify that this is a true copy of the Resolution duly adopted at a regular meeting of the Board of County Commissioners of Sarpy County, Nebraska, on September 1, 1971.

[Redacted signature area]

COUNTY CLERK
SARPY COUNTY,
NEBRASKA

MEMORANDUM

Papillion Creek and Tributaries Project - Sarpy County, Nebraska

THIS MEMORANDUM is made by the COUNTY OF SARPY, a governmental subdivision of the State of Nebraska, acting by and through its Board of Commissioners (hereinafter termed "the County") and the PAPIO NATURAL RESOURCES DISTRICT, a political subdivision of the State of Nebraska, acting by and through its Board of Directors (hereinafter termed "the District"), for the approval of the UNITED STATES OF AMERICA, acting by and through the UNITED STATES ARMY CORPS OF ENGINEERS (hereinafter termed "the Corps").

WHEREAS, the Papillion Creek and Tributaries Project (hereinafter termed "the Project"), for flood protection and other purposes in Washington, Douglas and Sarpy Counties, Nebraska, was authorized by Public Law 90-483 (82 Stat. 743); and,

WHEREAS, by a resolution of its Board of Commissioners of September 1, 1971, a copy of which is attached hereto as Exhibit "A" and incorporated herein by reference, the County gave to the Corps a statement of the intention of the County to furnish the necessary assurances of local cooperation with respect to the reservoirs and downstream channels within the Project which are situated in Sarpy County; and,

WHEREAS, the District assumed existence on July 1, 1972 by virtue of Sections 2-3201 to 2-3261, Rev. Stat. Supp. Neb., and has the authority pursuant thereto to provide the necessary assurances of local cooperation for the Project; and,

WHEREAS, the County desires to withdraw its statement of intention to furnish the necessary assurances of local coopera-

7. If those parts of the Project subject to this Memorandum are applicable Projects within the meaning of Public Law 91-611, Title II, §221 (42 USC § 1962d-5b), as amended, assume responsibility and pay damages, if necessary, in the event of failure to perform in accordance with Section 221 of P.L. 91-611.

For and in consideration of the assumption by the District of the County's assurances of local cooperation for the Project,

IT IS AGREED between the County and the District that, within thirty (30) days after the County shall be notified by the Corps or the District of the approval of this Memorandum by the Corps, the County shall assign such personnel as may be necessary to assist the District to prepare an inventory of all tangible property, both real and personal, acquired and now held by the County for and in connection with the Project. The County further agrees to convey good and marketable title to any and all such personal property to the District, and quitclaim any and all such real property to the District, upon the request of the District, and do all other things necessary to assist the District to effectuate such conveyances.

Executed this 4 day of Feb, 1974
by the County of Sarpy, Nebraska (the County).

Attest:

[Redacted]
County Clerk

[Redacted]
Chairman, Board of Commissioners

Executed this 7 day of Feb, 1974
by the Papio Natural Resources District (the District).

Attest:


[Redacted]
Secretary

[Redacted]
Chairman, Board of Directors

APPROVAL

The Corps does hereby approve the withdrawal by the County of its statement of intention to provide local assurances for the Project, does hereby release and discharge the County from all responsibility in connection therewith, and does hereby accept the District's statement of intention to provide such assurances, as described in the foregoing Memorandum.

Executed this 7th day of May, 1974
by the United States of America (the Corps).


Colonel, Corps of Engineers
District Engineer

tion and in order to assume the same responsibility as the County had assumed in its resolution of September 1, 1971, the District desires to provide to the Corps a statement of the District's intention to furnish the necessary assurances of local cooperation with respect to reservoirs and downstream channels within the Project which are situated within Sarpy County.

NOW THEREFORE, subject to the approval of this Memorandum by the Corps, the County and the District do state as follows:

1. The County does hereby withdraw its statement of intention to provide local assurances for each Project reservoir and downstream channels situated within Sarpy County, as shown on Exhibit "A" hereto.
2. With respect to each Project reservoir and downstream channels situated within the boundaries of Sarpy County, Nebraska, the District intends to furnish, upon request of the Corps, assurances of local cooperation satisfactory to the Secretary of the Army that the District will:
 1. Maintain the Papillion Creek channels downstream from the damsites free of obstructions and available to accommodate reservoir releases and uncontrolled flow;
 2. Insure that all new bridge construction, and future modification of existing bridges, downstream from reservoirs of the proposed system, shall have hydraulic capacity acceptable to the Chief of Engineers;
 3. Provide guidance and leadership in preventing unwise and uneconomical future development of the flood plain areas by encouraging prudent use of flood proofing, land regulation planning, or other flood plain management techniques to reduce flood losses;
 4. Hold and save the United States free from all damages arising from water-rights claims resulting from the construction and operation of the reservoirs;
 5. Exercise, to the full extent of their legal capability, control against removal of streamflow made available for water quality control;
 6. Comply with the requirements of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646; and

RESOLUTION

Board of Directors, Papio Natural Resources District

WHEREAS, by resolution of the Sarpy County Board of Commissioners (hereinafter termed "Sarpy County Board") of September 1, 1971, the Sarpy County Board gave to the United States Army Corps of Engineers (hereinafter referred to as "the Corps") a statement of the intention of the County to furnish the necessary assurances of local cooperation with respect to those reservoirs and downstream channels within the Papillion Creek and Tributaries Project, which are situated within in Sarpy County; and,

WHEREAS, the Papio Natural Resources District (hereinafter termed "the District") assumed existence on July 1, 1972 and has the authority to provide to the Corps the necessary assurances of local cooperation for the project; and,

WHEREAS, the Sarpy County Board has requested that the District assume the responsibility of giving assurances of local cooperation for reservoirs and downstream channels within the aforesaid Project which are situated in Sarpy County, and has asked the District to enter into an agreement with the County regarding the assumption by the District of such responsibility, in the form as attached to this resolution as Exhibit "A" and incorporated herein by reference, entitled "Memorandum-Papillion Creek and Tributaries Project-Sarpy County, Nebraska."

NOW, THEREFORE, BE IT RESOLVED that the Chairman of the Board of Directors of the Papio Natural Resources District be, and he is hereby, authorized and directed to execute for and on behalf of the District the agreement in the form as attached hereto as Exhibit "A" to this resolution, providing for the assumption by the Papio Natural Resources District of the local sponsorship of the Papillion Creek and Tributaries Project in Sarpy County.

DATED this 7th day of February, 1974.

Mark Gautier being Secretary of the Board of the Papio Natural Resources District does hereby certify that the above and foregoing resolution was passed at a duly constituted meeting of the Board of Directors of the Papio Natural Resources District held on February 7, 1974, as the same appears in the records of the said District.



Mark O. Gautier
Secretary.

Exhibit II

Standing Instructions to Field Personnel

For Regulation of

Papillion Creek Dams and Reservoirs

Standing Instructions to Field Personnel
For Regulation of
Papillion Creek Dams and Reservoirs

1. General. Reservoir regulation during flood periods is normally automatic. The service of operating personnel is not required unless opening the low level outlet gates is necessary and prudent to expedite the evacuation of flood storage or to reduce the duration of flooding of the recreational facilities. At high flood control pool levels, however, the main outlet conduits will be under pressure flow conditions and the opening of the low level outlets will have no effect on the total dam discharge. Releases of water through the low flow outlets may also be made to meet requirements for water rights, water quality and for lowering the pool to permit inspection and repair of the project.

2. Responsibility.

a. The decision to open the low level gated outlets are the responsibility of the Water Control Section, Hydrologic Engineering Branch, Engineering Division, Omaha District Office (telephone numbers 221-4608, 4607, or 4610). Inquiries relating to regulation of the reservoir are to be referred to the Water Control Section for response. The Water Control Section prepares reports of daily reservoir pool levels and reservoir inflow and outflow.

b. The City of Omaha has the prime responsibility for routine inspection and maintenance of Papillion Creek Dams 11 and 16. The Missouri River Project Office of the Corps of Engineers has the prime responsibility for routine inspection and maintenance of Papillion Creek Dams 18 and 20. Inspection of the projects to determine maintenance requirements is covered in the respective Operation and Maintenance Manuals. Major repairs to the embankment, spillway, outlet works, and channel at all four projects are accomplished by the Corps of Engineers. The Project Engineer will provide personnel to open or adjust the low level outlets at all four projects as ordered by the Water Control Section.

3. Observation.

a. A telephone telemetering device has been installed at Damsites 11 and 16 in conjunction with the reservoir pool gage and may be utilized by Area and District personnel to obtain pool level readings:

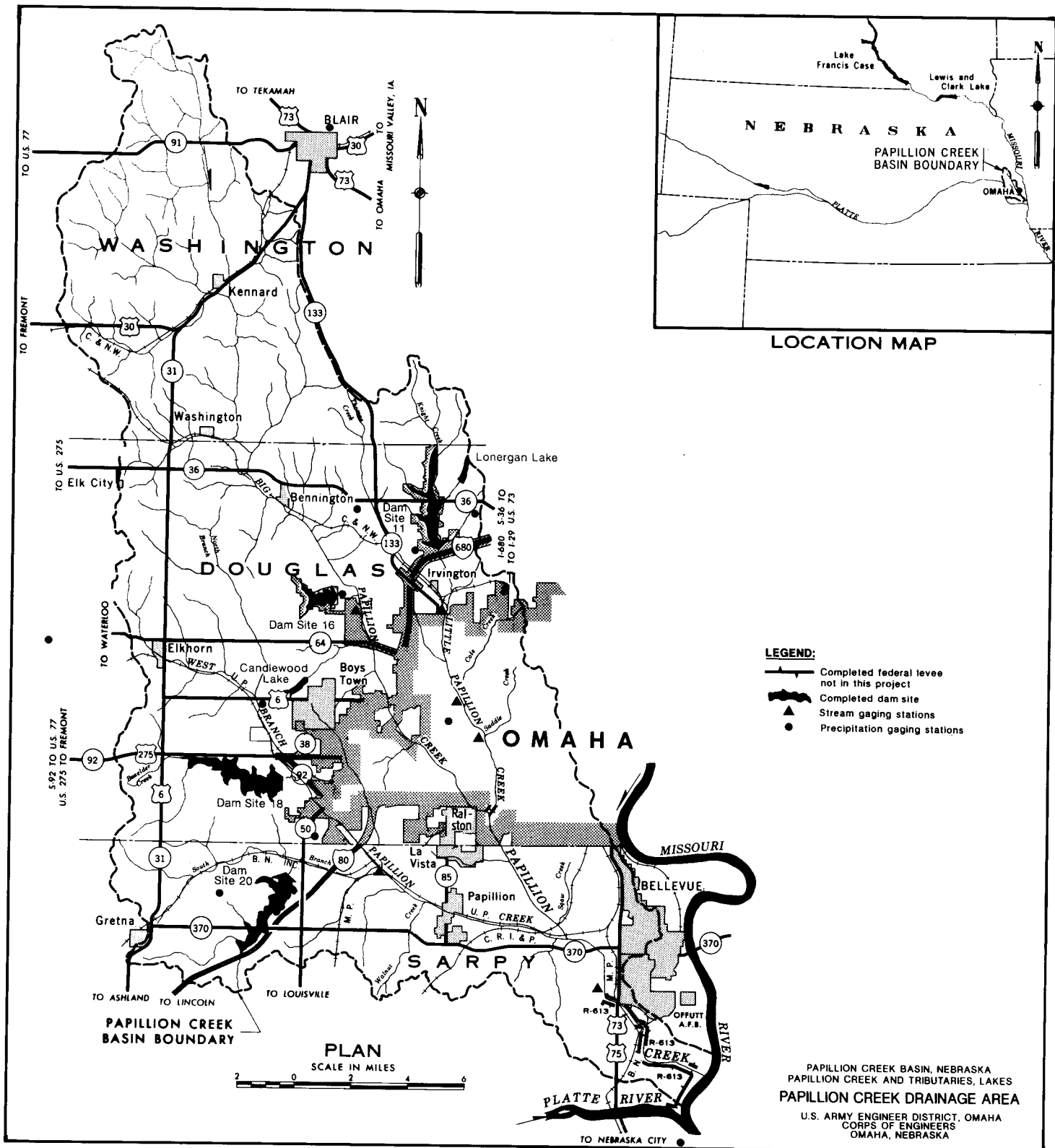


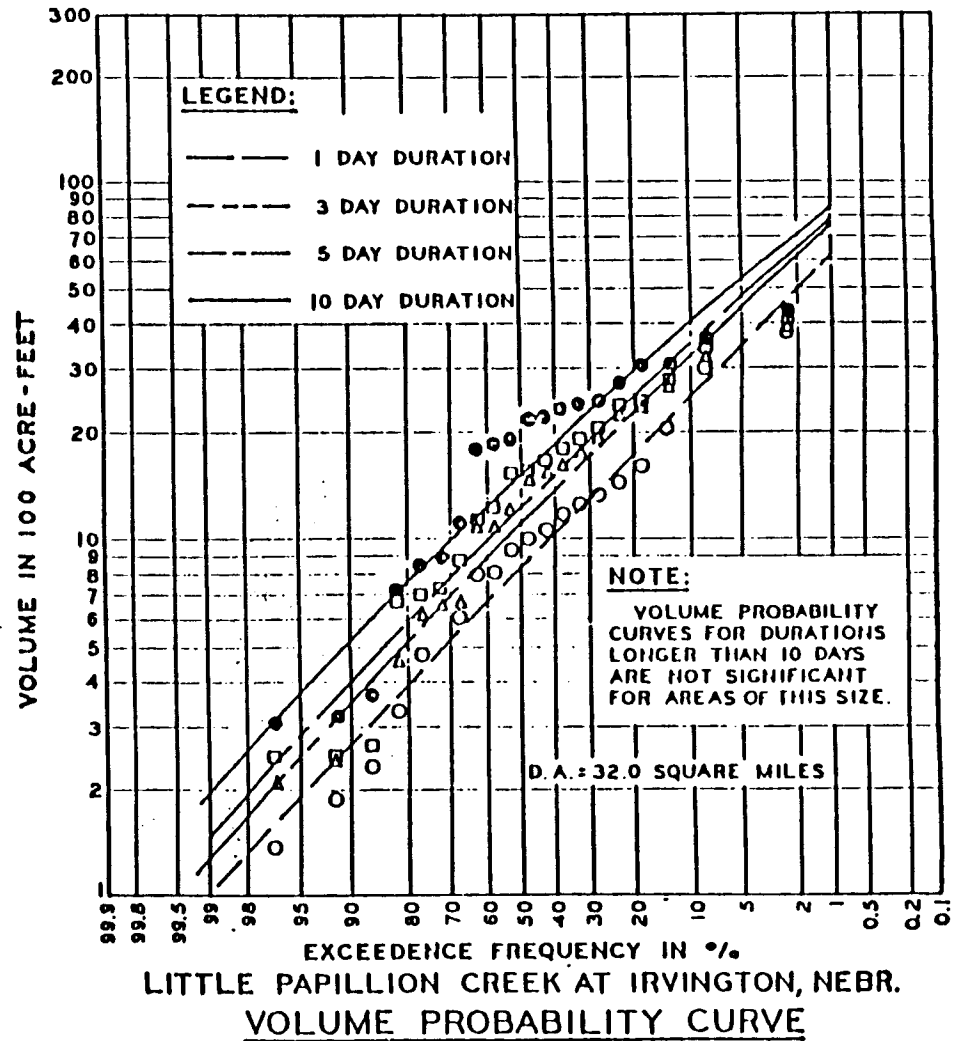
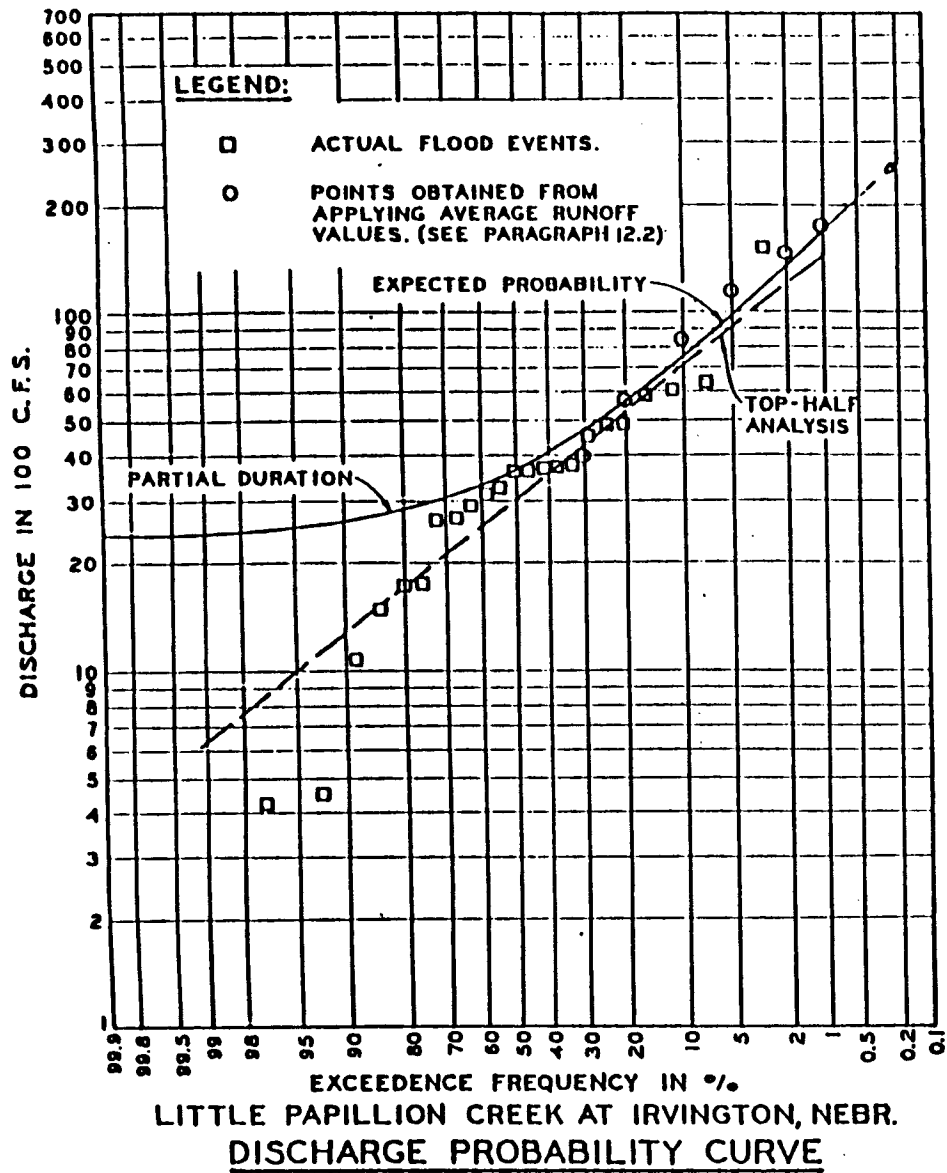
b. All four projects have been equipped with satellite Data Collection Platforms (DCP) which transmit pertinent reservoir data to the Water Control Section. This equipment is maintained by Water Control Section personnel. Rainfall observers have also been contracted for data collection near the dams.

c. The Project Office or City of Omaha should notify Water Control Section personnel of any reports of rainfall in the basin over 3.0 inches.

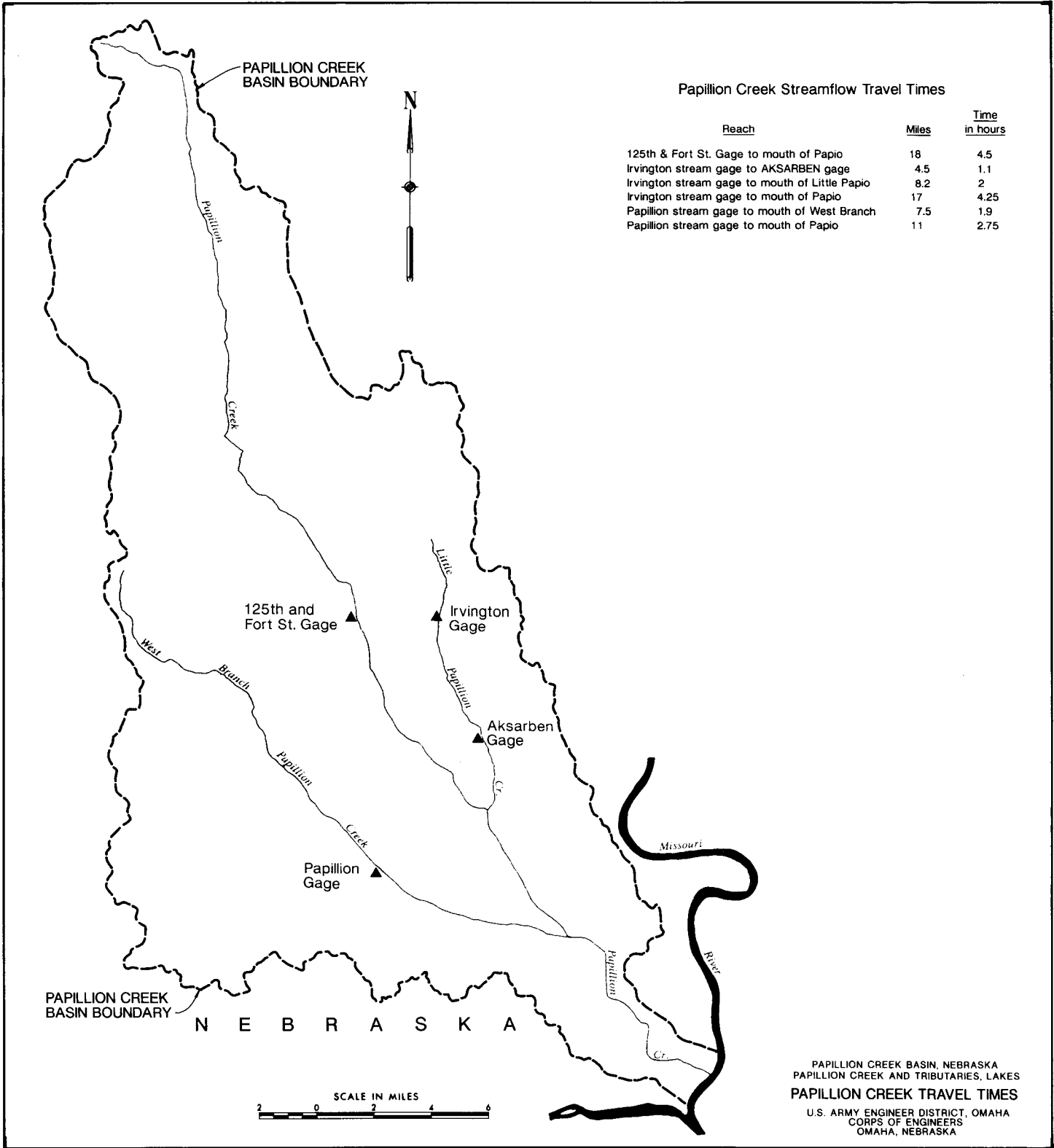
4. Reports. If a pool level rises so that there is a high possibility of emergency spillway operation, the Project Engineer or City of Omaha should immediately contact the Water Control Section personnel for instruction. If this is not possible, contact the Omaha Police and Civil Defense, and dispatch an observer to the project and warn downstream interests of potential high discharges. Attempts should continue to be made to contact the Water Control Section personnel. Duties outlined by the District's Natural Disaster Activities Manual should also be performed.

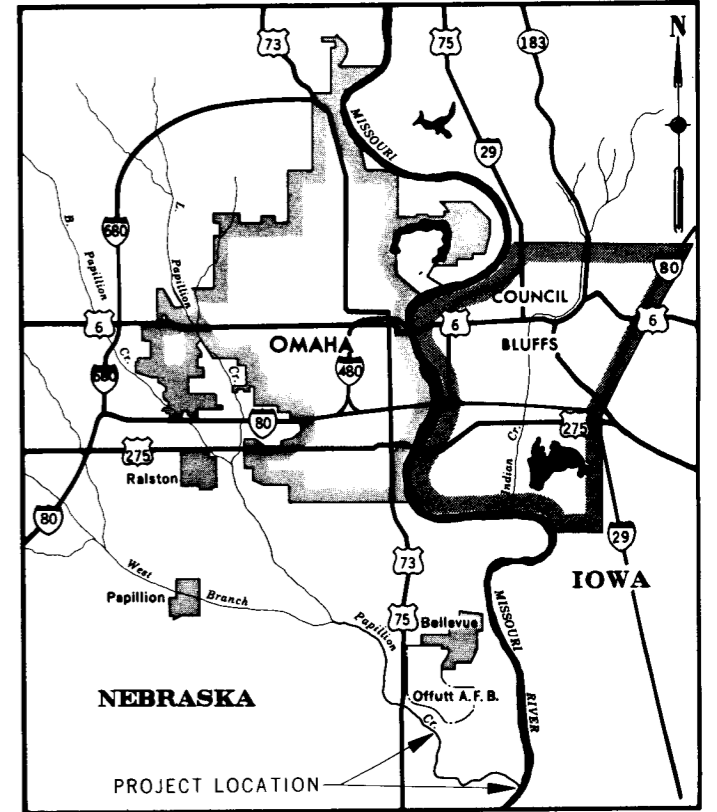
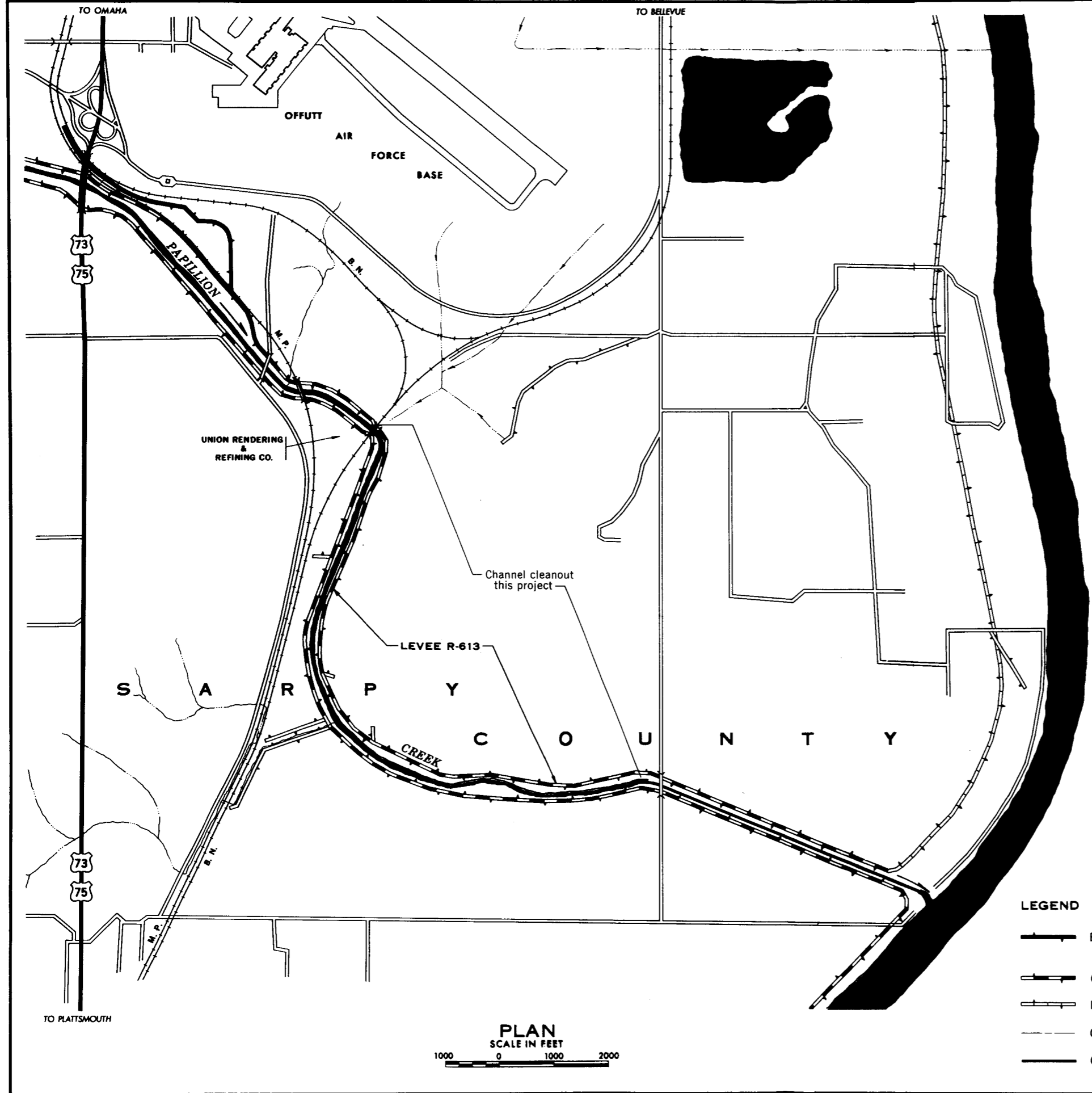
5. Personnel. A telephone directory of Water Control Section personnel and Missouri River Project Office personnel are updated periodically and provided to all interested parties.



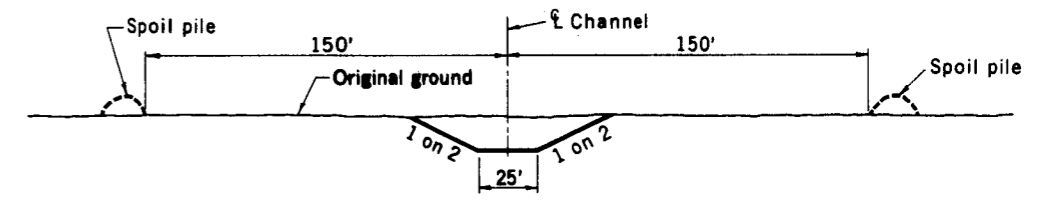


DISCHARGE PROBABILITY AND
VOLUME PROBABILITY CURVES
AT IRVINGTON, NEBRASKA
(FOR NATURAL STREAMFLOW CONDITIONS)

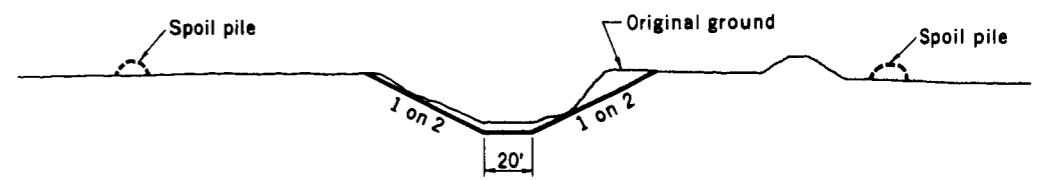




LOCATION MAP








TYPICAL CHANNEL CUT-OFF SECTION



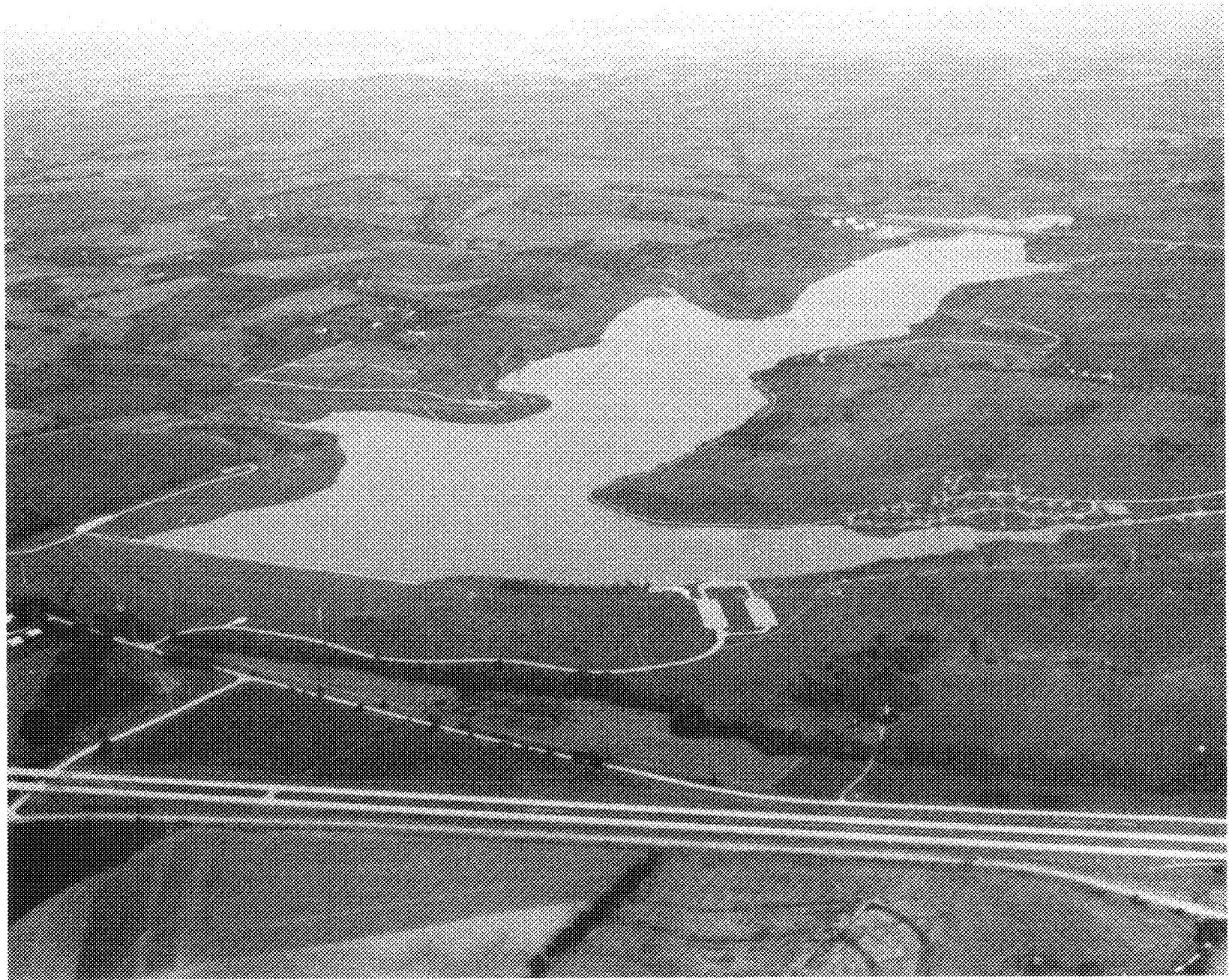
TYPICAL CHANNEL CLEANOUT SECTION

LEGEND

-  Existing federal levee not in this project (Constructed with Air Force funds)
-  Completed federal levee not in this project (R-613)
-  Proposed federal levee not in this project (R-616)
-  Completed channel cleanout this project
-  Completed channel cut-off excavation this project

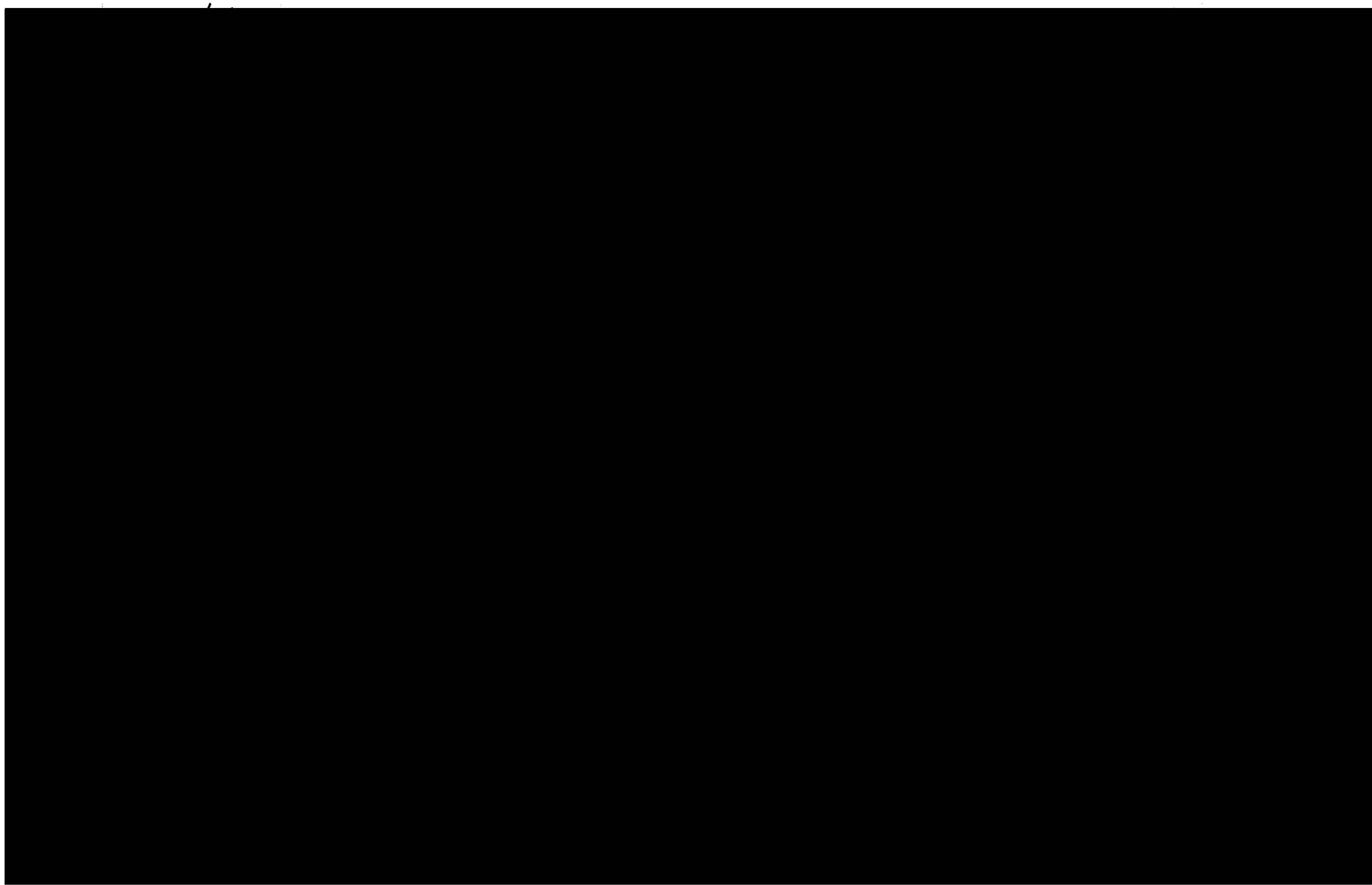


FLOOD CONTROL PROJECT
LOWER PAPILLION CREEK
 NEBRASKA
 U. S. ARMY ENGINEER DISTRICT, OMAHA
 CORPS OF ENGINEERS
 OMAHA, NEBRASKA
 30 SEPT 1977



1986

PAPILLION CREEK BASIN
DAM SITE #11 — GLENN CUNNINGHAM LAKE





SCALE: 1/4" INCH = 1 FOOT

CURVE
SCALE: 1/4" INCH = 1 FOOT

THIS PLAN ACCOMPANIES CONTRACT NO.
DACW45-73-C-0137 MODIFICATION NO. P00008

Agree & Submit
DR. S. L. DETROIT ENGINEERS

SHEET MPC10-40E19

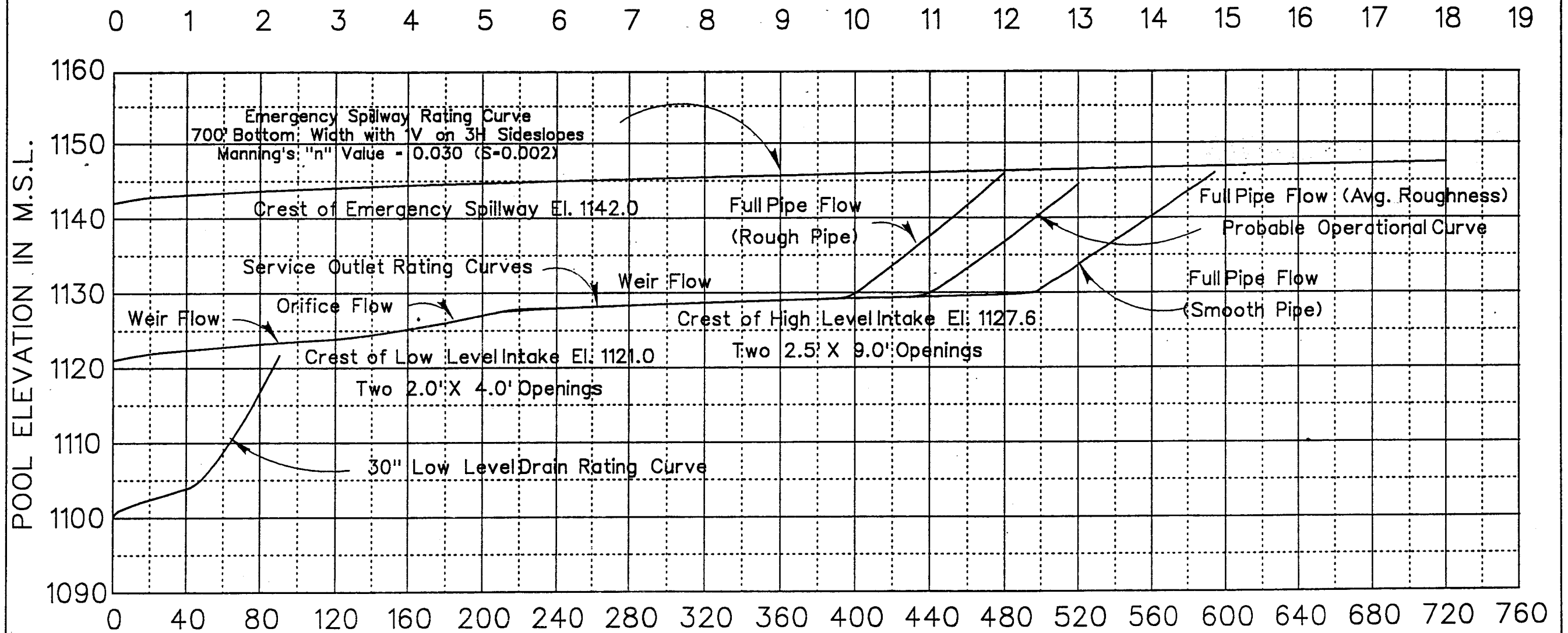
RECORD DRAWING

PLATE 8

EMERGENCY SPILLWAY RATING CURVE DISCHARGE IN 1,000 C.F.S.

PREPARED BY: J.T.M.

CHECKED BY: R.L.K.



US Army Corps
of Engineers
Omaha District

SERVICE OUTLET RATING CURVE

PAPILLION CREEK AND TRIBUTARIES LAKES,
NEBRASKA
DAM SITE 11
SERVICE OUTLET AND EMERGENCY
SPILLWAY RATING CURVES
WATER CONTROL MANUAL
MARCH 1991

PAPIO PROJECT - SITE 11

AREA - CAPACITY TABLES

U.S. ARMY ENGINEER DISTRICT, OMAHA
OMAHA, NEBRASKA

DECEMBER 1987

PAPIO CREEK SITE 11

CAPACITY IN ACRE-FT.
(1987 SURVEY)

EFFECTIVE 07 DEC 1987

ELEV	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
1099.0	6	6	6	6	7	7	7	7	7	7
.1	8	8	8	8	8	8	9	9	9	9
.2	9	9	10	10	10	10	10	10	10	11
.3	11	11	11	11	11	12	12	12	12	12
.4	12	13	13	13	13	13	13	14	14	14
.5	14	14	14	14	15	15	15	15	15	15
.6	16	16	16	16	16	16	17	17	17	17
.7	17	17	18	18	18	18	18	18	18	19
.8	19	19	19	19	19	20	20	20	20	20
.9	20	21	21	21	21	21	21	22	22	22
1100.0	22	22	22	23	23	23	23	23	24	24
.1	24	24	25	25	25	25	25	26	26	26
.2	26	26	27	27	27	27	27	28	28	28
.3	28	29	29	29	29	29	30	30	30	30
.4	30	31	31	31	31	31	32	32	32	32
.5	32	33	33	33	33	34	34	34	34	34
.6	35	35	35	35	35	36	36	36	36	36
.7	37	37	37	37	38	38	38	38	38	39
.8	39	39	39	39	40	40	40	40	40	41
.9	41	41	41	42	42	42	42	42	43	43
1101.0	43	43	44	44	44	44	45	45	45	45
.1	46	46	46	46	47	47	47	47	48	48
.2	48	48	49	49	49	50	50	50	50	51
.3	51	51	51	52	52	52	52	53	53	53
.4	53	54	54	54	54	55	55	55	55	56
.5	56	56	57	57	57	57	58	58	58	58
.6	59	59	59	59	60	60	60	60	61	61
.7	61	61	62	62	62	63	63	63	63	64
.8	64	64	64	65	65	65	65	66	66	66
.9	66	67	67	67	67	68	68	68	68	69
1102.0	69	69	70	70	70	71	71	71	72	72
.1	72	73	73	73	74	74	74	75	75	75
.2	76	76	76	77	77	78	78	78	79	79
.3	79	80	80	80	81	81	81	82	82	82
.4	83	83	83	84	84	84	85	85	85	86
.5	86	86	87	87	87	88	88	88	89	89
.6	89	90	90	90	91	91	91	92	92	92
.7	93	93	93	94	94	95	95	95	96	96
.8	96	97	97	97	98	98	98	99	99	99
.9	100	100	100	101	101	101	102	102	102	103
1103.0	103	103	104	104	105	105	106	106	106	107
.1	107	108	108	109	109	109	110	110	111	111
.2	112	112	112	113	113	114	114	115	115	115
.3	116	116	117	117	118	118	118	119	119	120
.4	120	121	121	121	122	122	123	123	124	124
.5	124	125	125	126	126	127	127	128	128	128
.6	129	129	130	130	131	131	131	132	132	133
.7	133	134	134	134	135	135	136	136	137	137
.8	137	138	138	139	139	140	140	140	141	141
.9	142	142	143	143	143	144	144	145	145	146

PAPIO CREEK SITE 11

CAPACITY IN ACRE-FT.
(1987 SURVEY)

EFFECTIVE 07 DEC 1987

ELEV	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
1104.0	146	147	147	148	148	149	149	150	150	151
.1	152	152	153	153	154	154	155	155	156	156
.2	157	158	158	159	159	160	160	161	161	162
.3	163	163	164	164	165	165	166	166	167	167
.4	168	169	169	170	170	171	171	172	172	173
.5	174	174	175	175	176	176	177	177	178	178
.6	179	180	180	181	181	182	182	183	183	184
.7	185	185	186	186	187	187	188	188	189	189
.8	190	191	191	192	192	193	193	194	194	195
.9	196	196	197	197	198	198	199	199	200	200
1105.0	201	202	202	203	204	204	205	205	206	207
.1	207	208	209	209	210	210	211	212	212	213
.2	214	214	215	215	216	217	217	218	219	219
.3	220	221	221	222	222	223	224	224	225	226
.4	226	227	227	228	229	229	230	231	231	232
.5	233	233	234	234	235	236	236	237	238	238
.6	239	239	240	241	241	242	243	243	244	244
.7	245	246	246	247	248	248	249	250	250	251
.8	251	252	253	253	254	255	255	256	256	257
.9	258	258	259	260	260	261	261	262	263	263
1106.0	264	265	265	266	267	268	268	269	270	270
.1	271	272	273	273	274	275	275	276	277	277
.2	278	279	280	280	281	282	282	283	284	285
.3	285	286	287	287	288	289	290	290	291	292
.4	292	293	294	295	295	296	297	297	298	299
.5	300	300	301	302	302	303	304	304	305	306
.6	307	307	308	309	309	310	311	312	312	313
.7	314	314	315	316	317	317	318	319	319	320
.8	321	322	322	323	324	324	325	326	326	327
.9	328	329	329	330	331	331	332	333	334	334
1107.0	335	336	337	337	338	339	340	341	342	342
.1	343	344	345	346	346	347	348	349	350	351
.2	351	352	353	354	355	356	356	357	358	359
.3	360	360	361	362	363	364	365	365	366	367
.4	368	369	369	370	371	372	373	374	374	375
.5	376	377	378	378	379	380	381	382	383	383
.6	384	385	386	387	387	388	389	390	391	392
.7	392	393	394	395	396	397	397	398	399	400
.8	401	401	402	403	404	405	406	406	407	408
.9	409	410	410	411	412	413	414	415	415	416
1108.0	417	418	419	420	421	422	423	424	425	426
.1	427	428	429	430	431	432	433	433	434	435
.2	436	437	438	439	440	441	442	443	444	445
.3	446	447	448	449	450	451	452	453	454	455
.4	456	457	458	459	460	461	462	463	464	465
.5	466	466	467	468	469	470	471	472	473	474
.6	475	476	477	478	479	480	481	482	483	484
.7	485	486	487	488	489	490	491	492	493	494
.8	495	496	497	498	498	499	500	501	502	503
.9	504	505	506	507	508	509	510	511	512	513

PAPIO CREEK SITE 11

CAPACITY IN ACRE-FT.
(1987 SURVEY)

EFFECTIVE 07 DEC 1987

ELEV	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
1109.0	514	515	516	518	519	520	521	522	523	525
.1	526	527	528	529	530	532	533	534	535	536
.2	537	539	540	541	542	543	544	546	547	548
.3	549	550	551	553	554	555	556	557	558	560
.4	561	562	563	564	565	567	568	569	570	571
.5	573	574	575	576	577	578	580	581	582	583
.6	584	585	587	588	589	590	591	592	594	595
.7	596	597	598	599	601	602	603	604	605	606
.8	608	609	610	611	612	613	615	616	617	618
.9	619	620	622	623	624	625	626	627	629	630
1110.0	631	632	634	635	636	638	639	640	642	643
.1	644	646	647	648	650	651	652	654	655	656
.2	658	659	660	662	663	664	666	667	668	670
.3	671	672	674	675	676	678	679	680	682	683
.4	684	686	687	688	690	691	692	694	695	696
.5	698	699	700	701	703	704	705	707	708	709
.6	711	712	713	715	716	717	719	720	721	723
.7	724	725	727	728	729	731	732	733	735	736
.8	737	739	740	741	743	744	745	747	748	749
.9	751	752	753	755	756	757	759	760	761	763
1111.0	764	765	767	768	770	771	773	774	776	777
.1	779	780	782	783	785	786	788	789	790	792
.2	793	795	796	798	799	801	802	804	805	807
.3	808	810	811	813	814	815	817	818	820	821
.4	823	824	826	827	829	830	832	833	835	836
.5	838	839	840	842	843	845	846	848	849	851
.6	852	854	855	857	858	860	861	862	864	865
.7	867	868	870	871	873	874	876	877	879	880
.8	882	883	885	886	887	889	890	892	893	895
.9	896	898	899	901	902	904	905	907	908	910
1112.0	911	913	914	916	918	919	921	923	924	926
.1	928	929	931	933	934	936	938	939	941	943
.2	944	946	948	949	951	953	954	956	957	959
.3	961	962	964	966	967	969	971	972	974	976
.4	977	979	981	982	984	986	987	989	991	992
.5	994	996	997	999	1001	1002	1004	1006	1007	1009
.6	1011	1012	1014	1016	1017	1019	1021	1022	1024	1026
.7	1027	1029	1031	1032	1034	1036	1037	1039	1040	1042
.8	1044	1045	1047	1049	1050	1052	1054	1055	1057	1059
.9	1060	1062	1064	1065	1067	1069	1070	1072	1074	1075
1113.0	1077	1079	1081	1083	1084	1086	1088	1090	1092	1094
.1	1096	1097	1099	1101	1103	1105	1107	1109	1110	1112
.2	1114	1116	1118	1120	1122	1124	1125	1127	1129	1131
.3	1133	1135	1137	1138	1140	1142	1144	1146	1148	1150
.4	1151	1153	1155	1157	1159	1161	1163	1164	1166	1168
.5	1170	1172	1174	1176	1177	1179	1181	1183	1185	1187
.6	1189	1190	1192	1194	1196	1198	1200	1202	1203	1205
.7	1207	1209	1211	1213	1215	1217	1218	1220	1222	1224
.8	1226	1228	1230	1231	1233	1235	1237	1239	1241	1243
.9	1244	1246	1248	1250	1252	1254	1256	1257	1259	1261

PAPIO CREEK SITE 11

CAPACITY IN ACRE-FT.
(1987 SURVEY)

EFFECTIVE 07 DEC 1987

ELEV	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
1114.0	1263	1265	1267	1269	1272	1274	1276	1278	1280	1282
.1	1284	1286	1289	1291	1293	1295	1297	1299	1301	1303
.2	1306	1308	1310	1312	1314	1316	1318	1321	1323	1325
.3	1327	1329	1331	1333	1335	1338	1340	1342	1344	1346
.4	1348	1350	1352	1355	1357	1359	1361	1363	1365	1367
.5	1370	1372	1374	1376	1378	1380	1382	1384	1387	1389
.6	1391	1393	1395	1397	1399	1401	1404	1406	1408	1410
.7	1412	1414	1416	1418	1421	1423	1425	1427	1429	1431
.8	1433	1436	1438	1440	1442	1444	1446	1448	1450	1453
.9	1455	1457	1459	1461	1463	1465	1467	1470	1472	1474
1115.0	1476	1478	1481	1483	1485	1488	1490	1493	1495	1497
.1	1500	1502	1504	1507	1509	1512	1514	1516	1519	1521
.2	1523	1526	1528	1531	1533	1535	1538	1540	1542	1545
.3	1547	1549	1552	1554	1557	1559	1561	1564	1566	1568
.4	1571	1573	1576	1578	1580	1583	1585	1587	1590	1592
.5	1595	1597	1599	1602	1604	1606	1609	1611	1613	1616
.6	1618	1621	1623	1625	1628	1630	1632	1635	1637	1640
.7	1642	1644	1647	1649	1651	1654	1656	1658	1661	1663
.8	1666	1668	1670	1673	1675	1677	1680	1682	1685	1687
.9	1689	1692	1694	1696	1699	1701	1704	1706	1708	1711
1116.0	1713	1716	1718	1721	1723	1726	1729	1731	1734	1736
.1	1739	1741	1744	1747	1749	1752	1754	1757	1760	1762
.2	1765	1767	1770	1773	1775	1778	1780	1783	1786	1788
.3	1791	1793	1796	1798	1801	1804	1806	1809	1811	1814
.4	1817	1819	1822	1824	1827	1830	1832	1835	1837	1840
.5	1843	1845	1848	1850	1853	1855	1858	1861	1863	1866
.6	1868	1871	1874	1876	1879	1881	1884	1887	1889	1892
.7	1894	1897	1899	1902	1905	1907	1910	1912	1915	1918
.8	1920	1923	1925	1928	1931	1933	1936	1938	1941	1944
.9	1946	1949	1951	1954	1956	1959	1962	1964	1967	1969
1117.0	1972	1975	1978	1980	1983	1986	1989	1992	1995	1997
.1	2000	2003	2006	2009	2011	2014	2017	2020	2023	2026
.2	2028	2031	2034	2037	2040	2043	2045	2048	2051	2054
.3	2057	2059	2062	2065	2068	2071	2074	2076	2079	2082
.4	2085	2088	2090	2093	2096	2099	2102	2105	2107	2110
.5	2113	2116	2119	2121	2124	2127	2130	2133	2136	2138
.6	2141	2144	2147	2150	2152	2155	2158	2161	2164	2167
.7	2169	2172	2175	2178	2181	2184	2186	2189	2192	2195
.8	2198	2200	2203	2206	2209	2212	2215	2217	2220	2223
.9	2226	2229	2231	2234	2237	2240	2243	2246	2248	2251
1118.0	2254	2257	2260	2263	2266	2269	2272	2276	2279	2282
.1	2285	2288	2291	2294	2297	2300	2303	2306	2309	2313
.2	2316	2319	2322	2325	2328	2331	2334	2337	2340	2343
.3	2346	2349	2353	2356	2359	2362	2365	2368	2371	2374
.4	2377	2380	2383	2386	2390	2393	2396	2399	2402	2405
.5	2408	2411	2414	2417	2420	2423	2426	2430	2433	2436
.6	2439	2442	2445	2448	2451	2454	2457	2460	2463	2467
.7	2470	2473	2476	2479	2482	2485	2488	2491	2494	2497
.8	2500	2503	2507	2510	2513	2516	2519	2522	2525	2528
.9	2531	2534	2537	2540	2544	2547	2550	2553	2556	2559

PAPIO CREEK SITE 11

CAPACITY IN ACRE-FT.
(1987 SURVEY)

EFFECTIVE 07 DEC 1987

ELEV	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
1119.0	2562	2565	2569	2572	2575	2579	2582	2586	2589	2592
.1	2596	2599	2602	2606	2609	2612	2616	2619	2622	2626
.2	2629	2633	2636	2639	2643	2646	2649	2653	2656	2659
.3	2663	2666	2670	2673	2676	2680	2683	2686	2690	2693
.4	2696	2700	2703	2706	2710	2713	2717	2720	2723	2727
.5	2730	2733	2737	2740	2743	2747	2750	2754	2757	2760
.6	2764	2767	2770	2774	2777	2780	2784	2787	2790	2794
.7	2797	2801	2804	2807	2811	2814	2817	2821	2824	2827
.8	2831	2834	2838	2841	2844	2848	2851	2854	2858	2861
.9	2864	2868	2871	2874	2878	2881	2885	2888	2891	2895
1120.0	2898	2902	2905	2909	2913	2916	2920	2923	2927	2931
.1	2934	2938	2942	2945	2949	2953	2956	2960	2964	2967
.2	2971	2974	2978	2982	2985	2989	2993	2996	3000	3004
.3	3007	3011	3014	3018	3022	3025	3029	3033	3036	3040
.4	3044	3047	3051	3055	3058	3062	3065	3069	3073	3076
.5	3080	3084	3087	3091	3095	3098	3102	3105	3109	3113
.6	3116	3120	3124	3127	3131	3135	3138	3142	3146	3149
.7	3153	3156	3160	3164	3167	3171	3175	3178	3182	3186
.8	3189	3193	3196	3200	3204	3207	3211	3215	3218	3222
.9	3226	3229	3233	3237	3240	3244	3247	3251	3255	3258
1121.0	3262	3266	3270	3274	3278	3282	3285	3289	3293	3297
.1	3301	3305	3309	3313	3317	3321	3324	3328	3332	3336
.2	3340	3344	3348	3352	3356	3360	3363	3367	3371	3375
.3	3379	3383	3387	3391	3395	3399	3402	3406	3410	3414
.4	3418	3422	3426	3430	3434	3438	3441	3445	3449	3453
.5	3457	3461	3465	3469	3473	3477	3480	3484	3488	3492
.6	3496	3500	3504	3508	3512	3516	3519	3523	3527	3531
.7	3535	3539	3543	3547	3551	3555	3558	3562	3566	3570
.8	3574	3578	3582	3586	3590	3594	3597	3601	3605	3609
.9	3613	3617	3621	3625	3629	3633	3636	3640	3644	3648
1122.0	3652	3656	3660	3665	3669	3673	3677	3681	3685	3690
.1	3694	3698	3702	3706	3710	3715	3719	3723	3727	3731
.2	3735	3740	3744	3748	3752	3756	3760	3765	3769	3773
.3	3777	3781	3785	3790	3794	3798	3802	3806	3810	3815
.4	3819	3823	3827	3831	3835	3840	3844	3848	3852	3856
.5	3861	3865	3869	3873	3877	3881	3886	3890	3894	3898
.6	3902	3906	3911	3915	3919	3923	3927	3931	3936	3940
.7	3944	3948	3952	3956	3961	3965	3969	3973	3977	3981
.8	3986	3990	3994	3998	4002	4006	4011	4015	4019	4023
.9	4027	4031	4036	4040	4044	4048	4052	4056	4061	4065
1123.0	4069	4073	4078	4082	4087	4091	4096	4100	4104	4109
.1	4113	4118	4122	4127	4131	4135	4140	4144	4149	4153
.2	4158	4162	4166	4171	4175	4180	4184	4189	4193	4197
.3	4202	4206	4211	4215	4220	4224	4228	4233	4237	4242
.4	4246	4251	4255	4259	4264	4268	4273	4277	4282	4286
.5	4291	4295	4299	4304	4308	4313	4317	4322	4326	4330
.6	4335	4339	4344	4348	4353	4357	4361	4366	4370	4375
.7	4379	4384	4388	4392	4397	4401	4406	4410	4415	4419
.8	4423	4428	4432	4437	4441	4446	4450	4454	4459	4463
.9	4468	4472	4477	4481	4485	4490	4494	4499	4503	4508

PAPIO CREEK SITE 11

CAPACITY IN ACRE-FT.
(1987 SURVEY)

EFFECTIVE 07 DEC 1987

ELEV	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
1124.0	4512	4517	4521	4526	4531	4535	4540	4545	4550	4554
.1	4559	4564	4568	4573	4578	4582	4587	4592	4596	4601
.2	4606	4610	4615	4620	4625	4629	4634	4639	4643	4648
.3	4653	4657	4662	4667	4671	4676	4681	4686	4690	4695
.4	4700	4704	4709	4714	4718	4723	4728	4732	4737	4742
.5	4747	4751	4756	4761	4765	4770	4775	4779	4784	4789
.6	4793	4798	4803	4807	4812	4817	4822	4826	4831	4836
.7	4840	4845	4850	4854	4859	4864	4868	4873	4878	4883
.8	4887	4892	4897	4901	4906	4911	4915	4920	4925	4929
.9	4934	4939	4943	4948	4953	4958	4962	4967	4972	4976
1125.0	4981	4986	4991	4996	5001	5006	5011	5016	5021	5025
.1	5030	5035	5040	5045	5050	5055	5060	5065	5070	5075
.2	5080	5085	5090	5095	5100	5105	5109	5114	5119	5124
.3	5129	5134	5139	5144	5149	5154	5159	5164	5169	5174
.4	5179	5184	5188	5193	5198	5203	5208	5213	5218	5223
.5	5228	5233	5238	5243	5248	5253	5258	5263	5268	5272
.6	5277	5282	5287	5292	5297	5302	5307	5312	5317	5322
.7	5327	5332	5337	5342	5347	5352	5356	5361	5366	5371
.8	5376	5381	5386	5391	5396	5401	5406	5411	5416	5421
.9	5426	5431	5435	5440	5445	5450	5455	5460	5465	5470
1126.0	5475	5480	5485	5491	5496	5501	5506	5511	5517	5522
.1	5527	5532	5537	5543	5548	5553	5558	5563	5569	5574
.2	5579	5584	5589	5595	5600	5605	5610	5615	5621	5626
.3	5631	5636	5641	5647	5652	5657	5662	5667	5673	5678
.4	5683	5688	5693	5699	5704	5709	5714	5719	5725	5730
.5	5735	5740	5745	5751	5756	5761	5766	5771	5777	5782
.6	5787	5792	5797	5803	5808	5813	5818	5823	5829	5834
.7	5839	5844	5849	5855	5860	5865	5870	5875	5881	5886
.8	5891	5896	5901	5907	5912	5917	5922	5927	5933	5938
.9	5943	5948	5953	5959	5964	5969	5974	5979	5985	5990
1127.0	5995	6000	6006	6011	6017	6022	6028	6033	6039	6044
.1	6050	6055	6061	6066	6072	6077	6083	6088	6093	6099
.2	6104	6110	6115	6121	6126	6132	6137	6143	6148	6154
.3	6159	6165	6170	6176	6181	6186	6192	6197	6203	6208
.4	6214	6219	6225	6230	6236	6241	6247	6252	6258	6263
.5	6269	6274	6279	6285	6290	6296	6301	6307	6312	6318
.6	6323	6329	6334	6340	6345	6351	6356	6361	6367	6372
.7	6378	6383	6389	6394	6400	6405	6411	6416	6422	6427
.8	6433	6438	6444	6449	6454	6460	6465	6471	6476	6482
.9	6487	6493	6498	6504	6509	6515	6520	6526	6531	6537
1128.0	6542	6548	6553	6559	6565	6571	6576	6582	6588	6593
.1	6599	6605	6611	6616	6622	6628	6634	6639	6645	6651
.2	6656	6662	6668	6674	6679	6685	6691	6696	6702	6708
.3	6714	6719	6725	6731	6736	6742	6748	6754	6759	6765
.4	6771	6777	6782	6788	6794	6799	6805	6811	6817	6822
.5	6828	6834	6839	6845	6851	6857	6862	6868	6874	6879
.6	6885	6891	6897	6902	6908	6914	6920	6925	6931	6937
.7	6942	6948	6954	6960	6965	6971	6977	6982	6988	6994
.8	7000	7005	7011	7017	7022	7028	7034	7040	7045	7051
.9	7057	7063	7068	7074	7080	7085	7091	7097	7103	7108
.1	9074	9079	9084	9089	9094	9099	9104	9109	9114	9119
.2	9127	9133	9140	9147	9154	9161	9167	9174	9181	9188
.3	9194	9201	9208	9215	9222	9228	9235	9242	9249	9255
.4	9262	9269	9276	9283	9289	9296	9303	9310	9316	9323
.5	9330	9337	9344	9350	9357	9364	9371	9377	9384	9391
.6	9398	9405	9411	9418	9425	9432	9438	9445	9452	9459
.7	9466	9472	9479	9486	9493	9500	9506	9513	9520	9527
.8	9533	9540	9547	9554	9561	9567	9574	9581	9588	9594
.9	9601	9608	9615	9622	9628	9635	9642	9649	9655	9662
1133.0	9669	9676	9683	9690	9697	9704	9711	9718	9726	9733
.1	9740	9747	9754	9761	9768	9775	9782	9789	9796	9803
.2	9810	9817	9825	9832	9839	9846	9853	9860	9867	9874
.3	9881	9888	9895	9902	9909	9916	9924	9931	9938	9945
.4	9952	9959	9966	9973	9980	9987	9994	10001	10008	10015
.5	10023	10030	10037	10044	10051	10058	10065	10072	10079	10086
.6	10093	10100	10107	10114	10121	10129	10136	10143	10150	10157
.7	10164	10171	10178	10185	10192	10199	10206	10213	10220	10228
.8	10235	10242	10249	10256	10263	10270	10277	10284	10291	10298
.9	10305	10312	10319	10327	10334	10341	10348	10355	10362	10369

PAPIO CREEK SITE 11

CAPACITY IN ACRE-FT.
(1987 SURVEY)

EFFECTIVE 07 DEC 1987

ELEV	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
1129.0	7114	7120	7126	7132	7138	7144	7150	7156	7162	7168
.1	7174	7180	7186	7192	7198	7204	7210	7216	7222	7228
.2	7234	7240	7246	7252	7258	7264	7270	7276	7282	7288
.3	7294	7300	7306	7312	7318	7324	7330	7336	7342	7348
.4	7354	7360	7366	7372	7378	7384	7390	7396	7402	7408
.5	7414	7420	7426	7432	7438	7444	7450	7456	7462	7468
.6	7474	7480	7486	7492	7498	7504	7510	7516	7522	7528
.7	7534	7540	7546	7552	7558	7564	7570	7576	7582	7588
.8	7594	7600	7606	7612	7618	7624	7630	7636	7642	7648
.9	7654	7660	7666	7672	7678	7684	7690	7696	7702	7708
1130.0	7714	7720	7727	7733	7739	7745	7752	7758	7764	7770
.1	7777	7783	7789	7795	7802	7808	7814	7820	7827	7833
.2	7839	7845	7852	7858	7864	7871	7877	7883	7889	7896
.3	7902	7908	7914	7921	7927	7933	7939	7946	7952	7958
.4	7964	7971	7977	7983	7989	7996	8002	8008	8014	8021
.5	8027	8033	8040	8046	8052	8058	8065	8071	8077	8083
.6	8090	8096	8102	8108	8115	8121	8127	8133	8140	8146
.7	8152	8158	8165	8171	8177	8184	8190	8196	8202	8209
.8	8215	8221	8227	8234	8240	8246	8252	8259	8265	8271
.9	8277	8284	8290	8296	8302	8309	8315	8321	8327	8334
1131.0	8340	8347	8353	8360	8366	8373	8379	8386	8392	8399
.1	8405	8412	8418	8425	8431	8438	8444	8451	8457	8464
.2	8470	8477	8483	8490	8496	8503	8509	8516	8522	8529
.3	8535	8542	8548	8555	8561	8568	8574	8581	8587	8594
.4	8600	8607	8613	8620	8626	8633	8639	8646	8652	8659
.5	8666	8672	8679	8685	8692	8698	8705	8711	8718	8724
.6	8731	8737	8744	8750	8757	8763	8770	8776	8783	8789
.7	8796	8802	8809	8815	8822	8828	8835	8841	8848	8854
.8	8861	8867	8874	8880	8887	8893	8900	8906	8913	8919
.9	8926	8932	8939	8945	8952	8958	8965	8971	8978	8984
1132.0	8991	8998	9005	9011	9018	9025	9032	9038	9045	9052
.1	9059	9066	9072	9079	9086	9093	9099	9106	9113	9120
.2	9127	9133	9140	9147	9154	9161	9167	9174	9181	9188
.3	9194	9201	9208	9215	9222	9228	9235	9242	9249	9255
.4	9262	9269	9276	9283	9289	9296	9303	9310	9316	9323
.5	9330	9337	9344	9350	9357	9364	9371	9377	9384	9391
.6	9398	9405	9411	9418	9425	9432	9438	9445	9452	9459
.7	9466	9472	9479	9486	9493	9500	9506	9513	9520	9527
.8	9533	9540	9547	9554	9561	9567	9574	9581	9588	9594
.9	9601	9608	9615	9622	9628	9635	9642	9649	9655	9662
1133.0	9669	9676	9683	9690	9697	9704	9711	9718	9726	9733
.1	9740	9747	9754	9761	9768	9775	9782	9789	9796	9803
.2	9810	9817	9825	9832	9839	9846	9853	9860	9867	9874
.3	9881	9888	9895	9902	9909	9916	9924	9931	9938	9945
.4	9952	9959	9966	9973	9980	9987	9994	10001	10008	10015
.5	10023	10030	10037	10044	10051	10058	10065	10072	10079	10086
.6	10093	10100	10107	10114	10121	10129	10136	10143	10150	10157
.7	10164	10171	10178	10185	10192	10199	10206	10213	10220	10228
.8	10235	10242	10249	10256	10263	10270	10277	10284	10291	10298
.9	10305	10312	10319	10327	10334	10341	10348	10355	10362	10369

PAPIO CREEK SITE 11

CAPACITY IN ACRE-FT.
(1987 SURVEY)

EFFECTIVE 07 DEC 1987

ELEV	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
1134.0	10376	10383	10391	10398	10406	10413	10420	10428	10435	10442
.1	10450	10457	10465	10472	10479	10487	10494	10501	10509	10516
.2	10524	10531	10538	10546	10553	10561	10568	10575	10583	10590
.3	10597	10605	10612	10620	10627	10634	10642	10649	10656	10664
.4	10671	10679	10686	10693	10701	10708	10715	10723	10730	10738
.5	10745	10752	10760	10767	10775	10782	10789	10797	10804	10811
.6	10819	10826	10834	10841	10848	10856	10863	10870	10878	10885
.7	10893	10900	10907	10915	10922	10930	10937	10944	10952	10959
.8	10966	10974	10981	10989	10996	11003	11011	11018	11025	11033
.9	11040	11048	11055	11062	11070	11077	11084	11092	11099	11107
1135.0	11114	11122	11129	11137	11145	11152	11160	11168	11175	11183
.1	11191	11198	11206	11214	11221	11229	11237	11244	11252	11260
.2	11267	11275	11283	11290	11298	11306	11313	11321	11328	11336
.3	11344	11351	11359	11367	11374	11382	11390	11397	11405	11413
.4	11420	11428	11436	11443	11451	11459	11466	11474	11482	11489
.5	11497	11505	11512	11520	11528	11535	11543	11551	11558	11566
.6	11574	11581	11589	11597	11604	11612	11620	11627	11635	11643
.7	11650	11658	11666	11673	11681	11689	11696	11704	11711	11719
.8	11727	11734	11742	11750	11757	11765	11773	11780	11788	11796
.9	11803	11811	11819	11826	11834	11842	11849	11857	11865	11872
1136.0	11880	11888	11896	11904	11912	11920	11928	11936	11943	11951
.1	11959	11967	11975	11983	11991	11999	12007	12015	12023	12031
.2	12039	12047	12054	12062	12070	12078	12086	12094	12102	12110
.3	12118	12126	12134	12142	12150	12158	12165	12173	12181	12189
.4	12197	12205	12213	12221	12229	12237	12245	12253	12261	12269
.5	12277	12284	12292	12300	12308	12316	12324	12332	12340	12348
.6	12356	12364	12372	12380	12388	12395	12403	12411	12419	12427
.7	12435	12443	12451	12459	12467	12475	12483	12491	12499	12506
.8	12514	12522	12530	12538	12546	12554	12562	12570	12578	12586
.9	12594	12602	12610	12617	12625	12633	12641	12649	12657	12665
1137.0	12673	12681	12689	12698	12706	12714	12722	12731	12739	12747
.1	12755	12764	12772	12780	12788	12796	12805	12813	12821	12829
.2	12838	12846	12854	12862	12871	12879	12887	12895	12903	12912
.3	12920	12928	12936	12945	12953	12961	12969	12978	12986	12994
.4	13002	13010	13019	13027	13035	13043	13052	13060	13068	13076
.5	13085	13093	13101	13109	13117	13126	13134	13142	13150	13159
.6	13167	13175	13183	13191	13200	13208	13216	13224	13233	13241
.7	13249	13257	13266	13274	13282	13290	13298	13307	13315	13323
.8	13331	13340	13348	13356	13364	13373	13381	13389	13397	13405
.9	13414	13422	13430	13438	13447	13455	13463	13471	13480	13488
1138.0	13496	13505	13513	13522	13530	13539	13548	13556	13565	13573
.1	13582	13590	13599	13608	13616	13625	13633	13642	13651	13659
.2	13668	13676	13685	13694	13702	13711	13719	13728	13737	13745
.3	13754	13762	13771	13779	13788	13797	13805	13814	13822	13831
.4	13840	13848	13857	13865	13874	13883	13891	13900	13908	13917
.5	13926	13934	13943	13951	13960	13968	13977	13986	13994	14003
.6	14011	14020	14029	14037	14046	14054	14063	14072	14080	14089
.7	14097	14106	14114	14123	14132	14140	14149	14157	14166	14175
.8	14183	14192	14200	14209	14218	14226	14235	14243	14252	14261
.9	14269	14278	14286	14295	14303	14312	14321	14329	14338	14346

PAPIO CREEK SITE 11

CAPACITY IN ACRE-FT.
(1987 SURVEY)

EFFECTIVE 07 DEC 1987

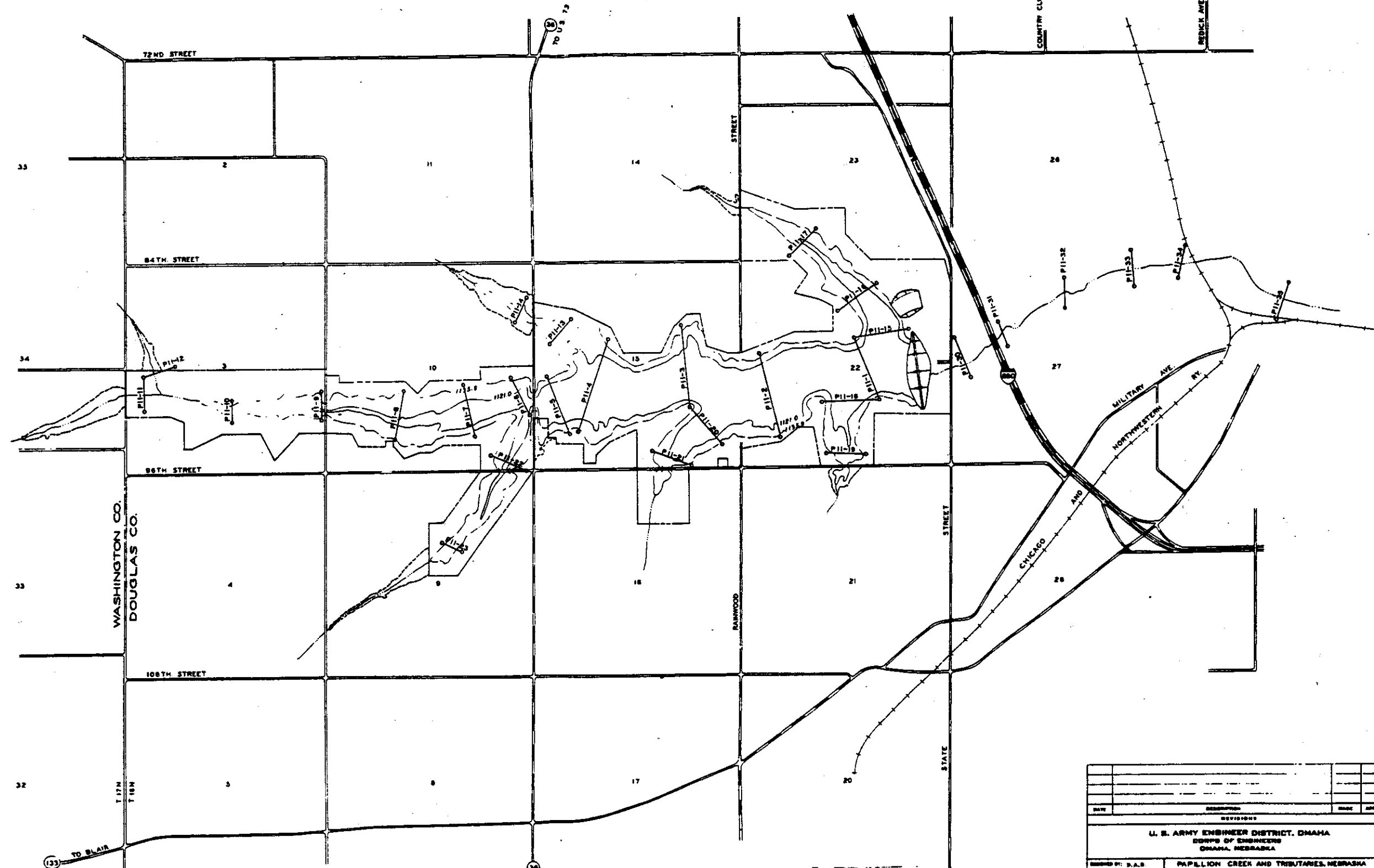
ELEV	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
1139.0	14355	14364	14373	14382	14391	14400	14409	14418	14427	14436
.1	14445	14454	14463	14472	14481	14490	14499	14507	14516	14525
.2	14534	14543	14552	14561	14570	14579	14588	14597	14606	14615
.3	14624	14633	14642	14651	14660	14669	14678	14687	14696	14705
.4	14714	14723	14732	14741	14750	14759	14768	14777	14786	14795
.5	14804	14812	14821	14830	14839	14848	14857	14866	14875	14884
.6	14893	14902	14911	14920	14929	14938	14947	14956	14965	14974
.7	14983	14992	15001	15010	15019	15028	15037	15046	15055	15064
.8	15073	15082	15091	15100	15108	15117	15126	15135	15144	15153
.9	15162	15171	15180	15189	15198	15207	15216	15225	15234	15243
1140.0	15252	15261	15271	15280	15289	15299	15308	15318	15327	15336
.1	15346	15355	15364	15374	15383	15392	15402	15411	15420	15430
.2	15439	15449	15458	15467	15477	15486	15495	15505	15514	15523
.3	15533	15542	15552	15561	15570	15580	15589	15598	15608	15617
.4	15626	15636	15645	15654	15664	15673	15683	15692	15701	15711
.5	15720	15729	15739	15748	15757	15767	15776	15786	15795	15804
.6	15814	15823	15832	15842	15851	15860	15870	15879	15888	15898
.7	15907	15917	15926	15935	15945	15954	15963	15973	15982	15991
.8	16001	16010	16020	16029	16038	16048	16057	16066	16076	16085
.9	16094	16104	16113	16122	16132	16141	16151	16160	16169	16179
1141.0	16188	16198	16207	16217	16227	16237	16246	16256	16266	16276
.1	16285	16295	16305	16314	16324	16334	16344	16353	16363	16373
.2	16383	16392	16402	16412	16422	16431	16441	16451	16460	16470
.3	16480	16490	16499	16509	16519	16529	16538	16548	16558	16567
.4	16577	16587	16597	16606	16616	16626	16636	16645	16655	16665
.5	16675	16684	16694	16704	16713	16723	16733	16743	16752	16762
.6	16772	16782	16791	16801	16811	16820	16830	16840	16850	16859
.7	16869	16879	16889	16898	16908	16918	16927	16937	16947	16957
.8	16966	16976	16986	16996	17005	17015	17025	17035	17044	17054
.9	17064	17073	17083	17093	17103	17112	17122	17132	17142	17151
1142.0	17161	17171	17181	17191	17201	17211	17222	17232	17242	17252
.1	17262	17272	17282	17292	17302	17312	17322	17333	17343	17353
.2	17363	17373	17383	17393	17403	17413	17423	17433	17444	17454
.3	17464	17474	17484	17494	17504	17514	17524	17534	17544	17555
.4	17565	17575	17585	17595	17605	17615	17625	17635	17645	17655
.5	17666	17676	17686	17696	17706	17716	17726	17736	17746	17756
.6	17766	17776	17787	17797	17807	17817	17827	17837	17847	17857
.7	17867	17877	17887	17898	17908	17918	17928	17938	17948	17958
.8	17968	17978	17988	17998	18009	18019	18029	18039	18049	18059
.9	18069	18079	18089	18099	18109	18120	18130	18140	18150	18160
1143.0	18170	18180	18191	18201	18212	18222	18233	18243	18254	18264
.1	18275	18285	18295	18306	18316	18327	18337	18348	18358	18369
.2	18379	18389	18400	18410	18421	18431	18442	18452	18463	18473
.3	18484	18494	18504	18515	18525	18536	18546	18557	18567	18578
.4	18588	18598	18609	18619	18630	18640	18651	18661	18672	18682
.5	18693	18703	18713	18724	18734	18745	18755	18766	18776	18787
.6	18797	18807	18818	18828	18839	18849	18860	18870	18881	18891
.7	18902	18912	18922	18933	18943	18954	18964	18975	18985	18996
.8	19006	19016	19027	19037	19048	19058	19069	19079	19090	19100
.9	19111	19121	19131	19142	19152	19163	19173	19184	19194	19205

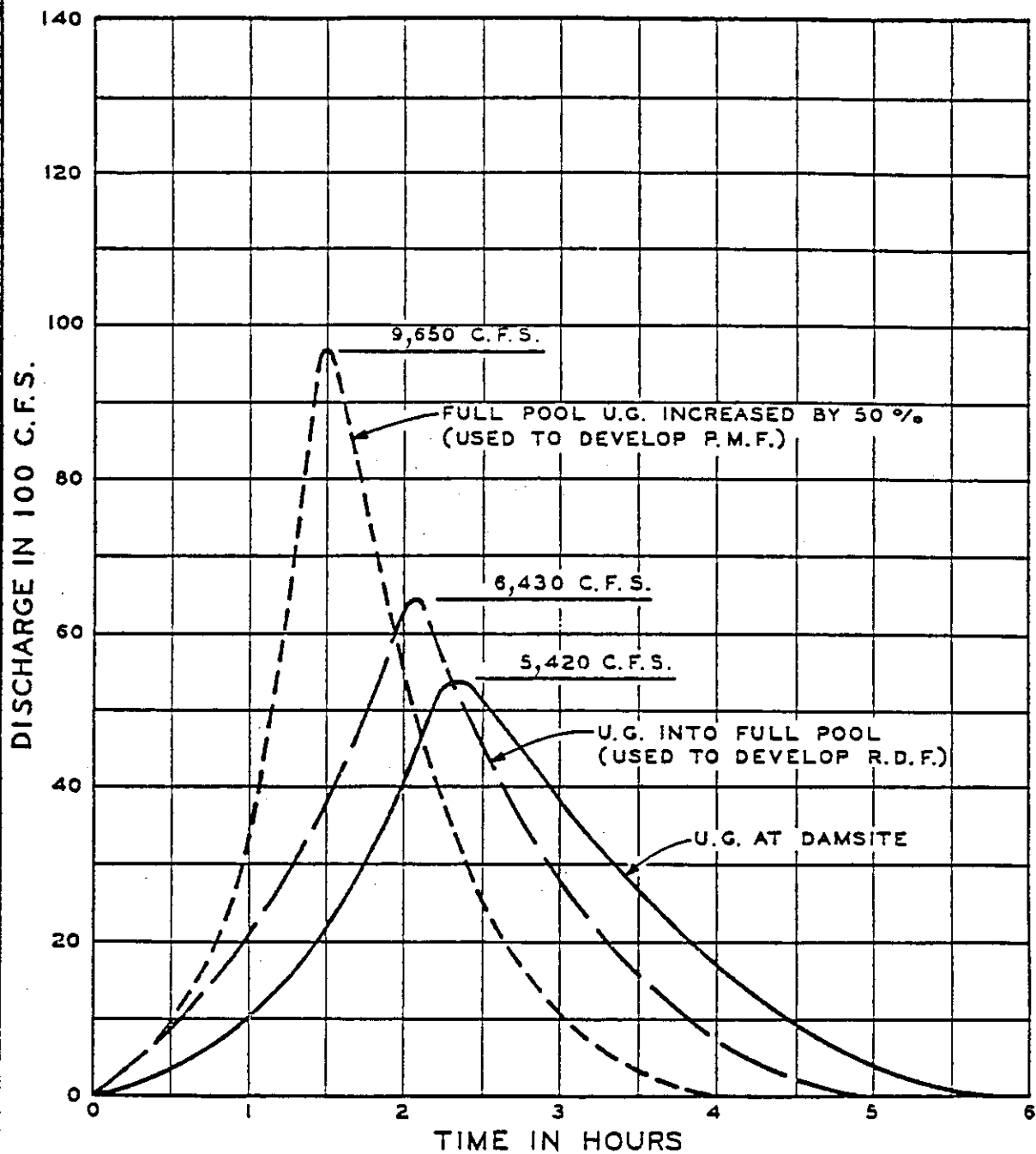
PAPIO CREEK SITE 11

CAPACITY IN ACRE-FT.
(1987 SURVEY)

EFFECTIVE 07 DEC 1987

ELEV	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
1144.0	19215	19226	19237	19247	19258	19269	19280	19291	19301	19312
.1	19323	19334	19345	19356	19366	19377	19388	19399	19410	19420
.2	19431	19442	19453	19464	19474	19485	19496	19507	19518	19528
.3	19539	19550	19561	19572	19583	19593	19604	19615	19626	19637
.4	19647	19658	19669	19680	19691	19701	19712	19723	19734	19745
.5	19756	19766	19777	19788	19799	19810	19820	19831	19842	19853
.6	19864	19874	19885	19896	19907	19918	19928	19939	19950	19961
.7	19972	19983	19993	20004	20015	20026	20037	20047	20058	20069
.8	20080	20091	20101	20112	20123	20134	20145	20155	20166	20177
.9	20188	20199	20210	20220	20231	20242	20253	20264	20274	20285
1145.0	20296	20307	20318	20330	20341	20352	20363	20374	20385	20397
.1	20408	20419	20430	20441	20452	20464	20475	20486	20497	20508
.2	20519	20531	20542	20553	20564	20575	20586	20598	20609	20620
.3	20631	20642	20653	20665	20676	20687	20698	20709	20720	20732
.4	20743	20754	20765	20776	20787	20799	20810	20821	20832	20843
.5	20855	20866	20877	20888	20899	20910	20922	20933	20944	20955
.6	20966	20977	20989	21000	21011	21022	21033	21044	21056	21067
.7	21078	21089	21100	21111	21123	21134	21145	21156	21167	21178
.8	21190	21201	21212	21223	21234	21245	21257	21268	21279	21290
.9	21301	21312	21324	21335	21346	21357	21368	21379	21391	21402
1146.0	21413	21425	21436	21448	21459	21471	21482	21494	21505	21517
.1	21528	21540	21551	21563	21574	21586	21597	21609	21621	21632
.2	21644	21655	21667	21678	21690	21701	21713	21724	21736	21747
.3	21759	21770	21782	21793	21805	21817	21828	21840	21851	21863
.4	21874	21886	21897	21909	21920	21932	21943	21955	21966	21978
.5	21990	22001	22013	22024	22036	22047	22059	22070	22082	22093
.6	22105	22116	22128	22139	22151	22162	22174	22186	22197	22209
.7	22220	22232	22243	22255	22266	22278	22289	22301	22312	22324
.8	22335	22347	22358	22370	22382	22393	22405	22416	22428	22439
.9	22451	22462	22474	22485	22497	22508	22520	22531	22543	22554
1147.0	22566	22578	22590	22602	22614	22625	22637	22649	22661	22673
.1	22685	22697	22709	22720	22732	22744	22756	22768	22780	22792
.2	22804	22815	22827	22839	22851	22863	22875	22887	22899	22911
.3	22922	22934	22946	22958	22970	22982	22994	23006	23017	23029
.4	23041	23053	23065	23077	23089	23101	23112	23124	23136	23148
.5	23160	23172	23184	23196	23208	23219	23231	23243	23255	23267
.6	23279	23291	23303	23314	23326	23338	23350	23362	23374	23386
.7	23398	23409	23421	23433	23445	23457	23469	23481	23493	23505
.8	23516	23528	23540	23552	23564	23576	23588	23600	23611	23623
.9	23635	23647	23659	23671	23683	23695	23706	23718	23730	23742
1148.0	23754	23766	23779	23791	23803	23815	23828	23840	23852	23864
.1	23877	23889	23901	23913	23926	23938	23950	23962	23975	23987
.2	23999	24011	24024	24036	24048	24060	24073	24085	24097	24109
.3	24122	24134	24146	24158	24171	24183	24195	24207	24220	24232
.4	24244	24256	24269	24281	24293	24305	24318	24330	24342	24354
.5	24367	24379	24391	24403	24416	24428	24440	24452	24465	24477
.6	24489	24501	24514	24526	24538	24550	24563	24575	24587	24599
.7	24612	24624	24636	24648	24661	24673	24685	24697	24710	24722
.8	24734	24746	24759	24771	24783	24795	24808	24820	24832	24844
.9	24857	24869	24881	24893	24906	24918	24930	24942	24955	24967





C.F.V.

PAPILLION CREEK AND TRIBUTARIES, NEBRASKA

SITE II

1 HOUR UNIT HYDROGRAPHS

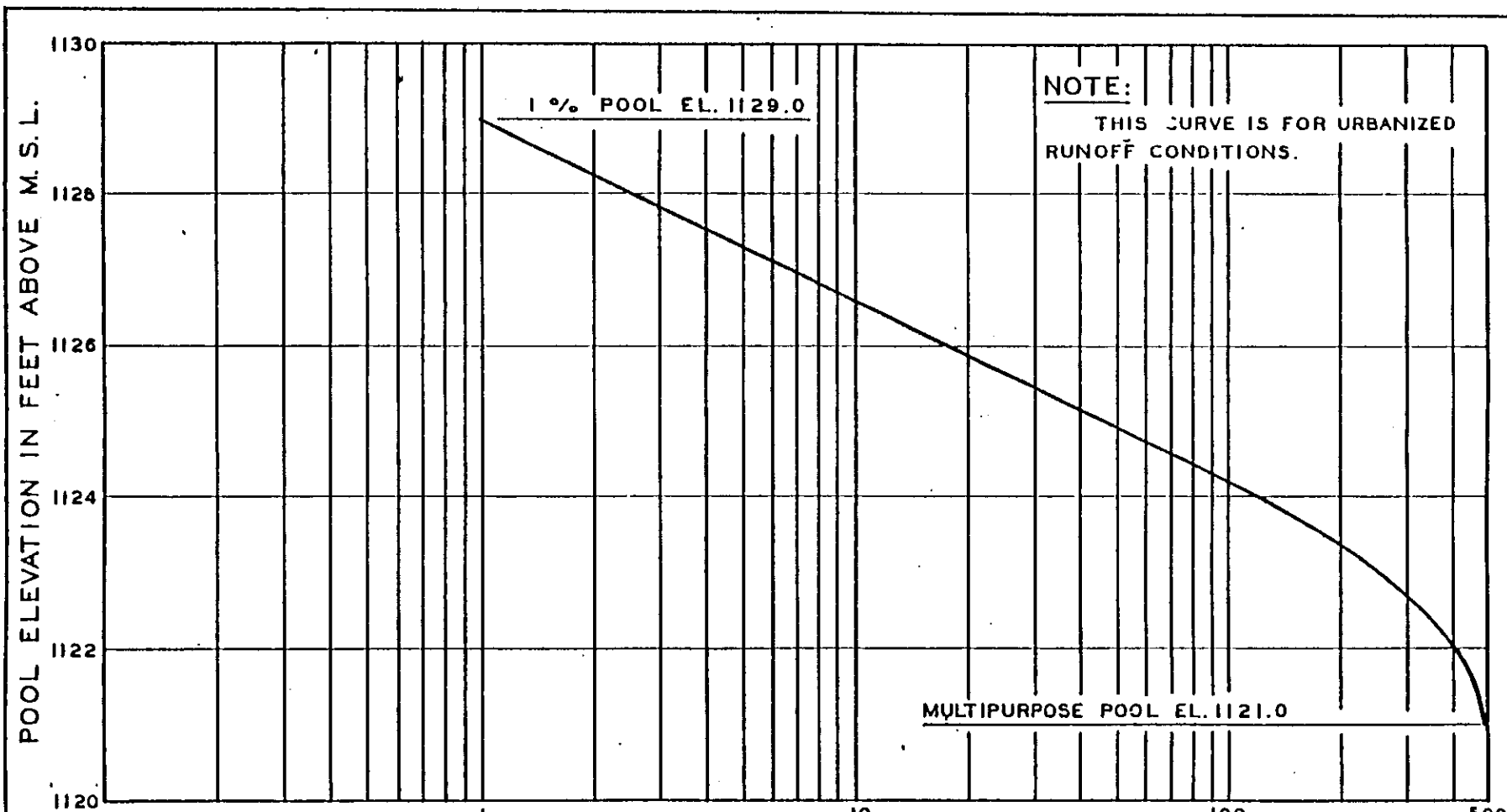
D. A. = 17.8 SQUARE MILES

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS OMAHA, NEBRASKA

JAN. 1972

DESIGN MEMO. NO. MPC-15

DESIGN MEMO. NO. MPC-15

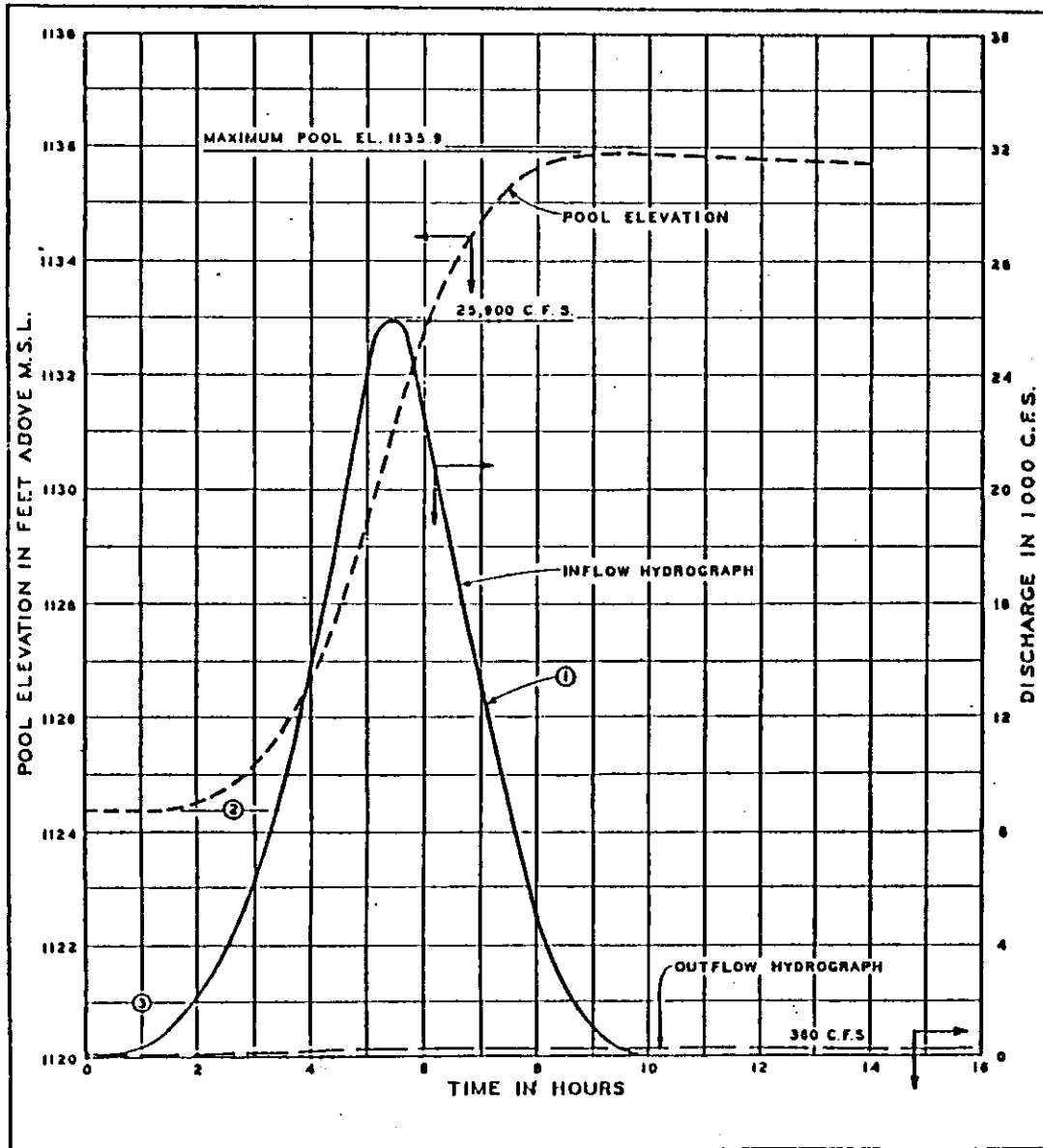


NUMBER OF EVENTS EQUALLED OR EXCEEDED PER 100 YEARS
PAPILLION CREEK AND TRIBUTARIES, NEBRASKA

SITE II
POOL ELEVATION
PROBABILITY CURVE

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS OMAHA, NEBRASKA
JAN. 1972

C. F. P.



LEGEND:

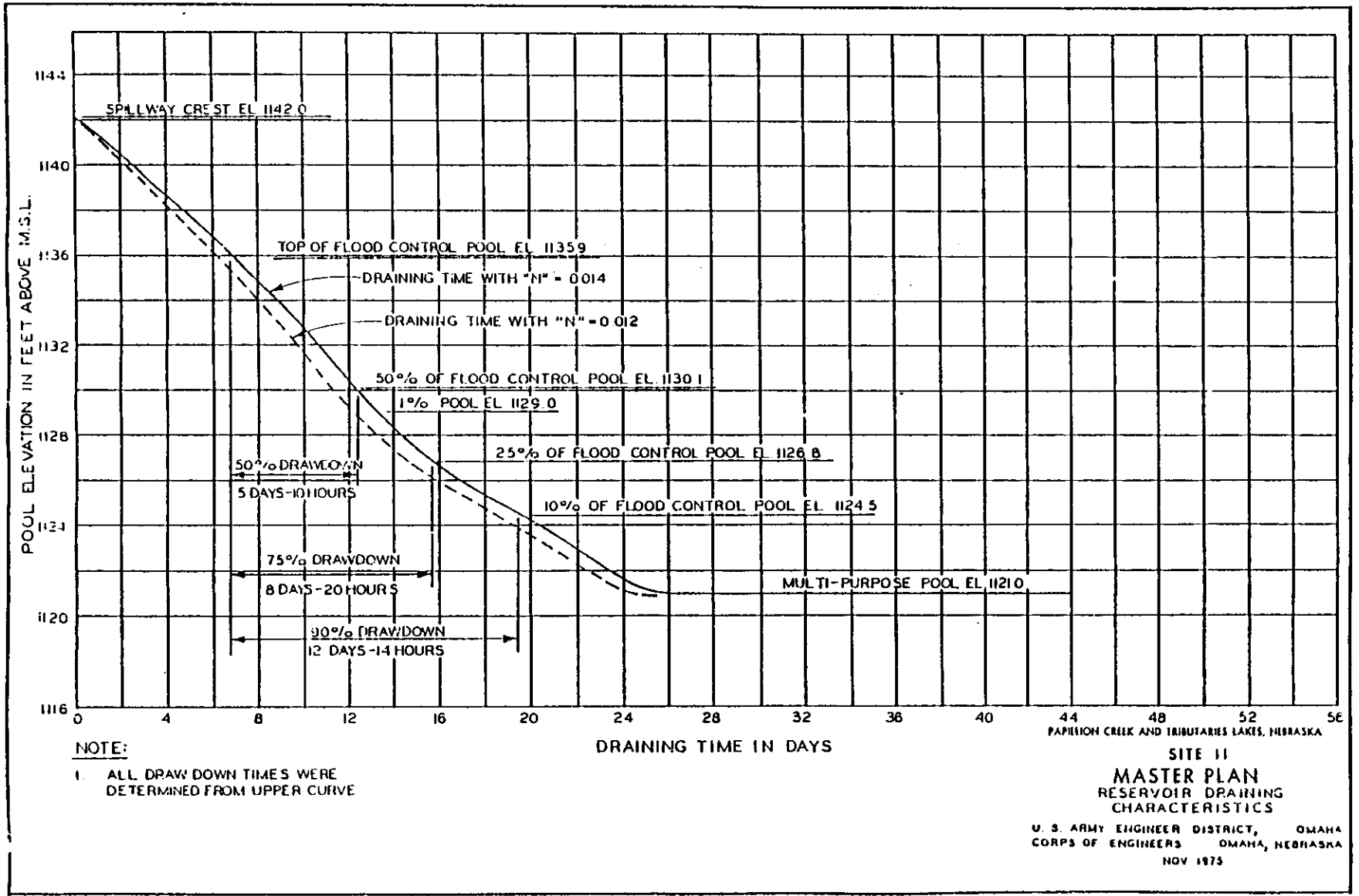
- 1 This hydrograph represents the maximum 6 hours of runoff (60 to 66 hours).
- 2 Antecedent runoff from 0 to 60 hours raised the pool from 1121.0 ft. to 1124.4 ft.
- 3 Multi-purpose pool elevation 1121.0 ft.

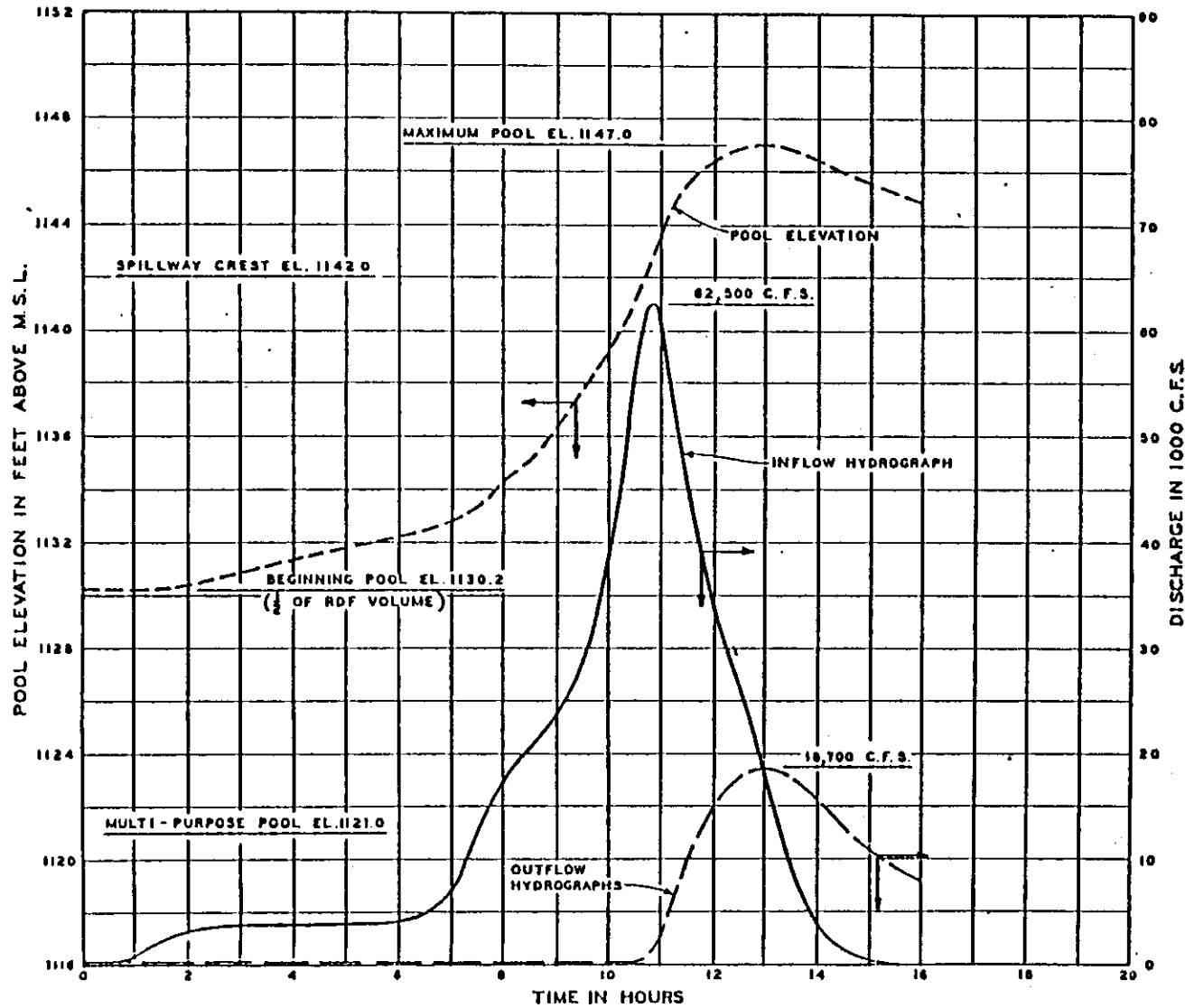
NOTE: Reservoir Design Storage Accumulation Summary.
All values include base flow.

From 0 to 60 hrs.	Inflow = 1005.5 A.F.
	Outflow = 230.0 A.F.
	Storage = 775.5 A.F.
From 60 to 70 hrs.	Inflow = 7135.5 A.F.
	Outflow = 191.0 A.F.
	Storage = 7124.5 A.F.
From 70 to 96 hrs.	Inflow = 398.4 A.F.
	Outflow = 750.0 A.F.
	Storage = -351.6 A.F.
MAXIMUM STORAGE = 775.5 + 7124.5 = 7900 A.F.	

C.F.D.

PAPILLION CREEK AND TRIBUTARIES, NEBRASKA
SITE II
RESERVOIR DESIGN FLOOD
 U. S. ARMY ENGINEER DISTRICT, OMAHA
 CORPS OF ENGINEERS OMAHA, NEBRASKA
 JAN. 1972





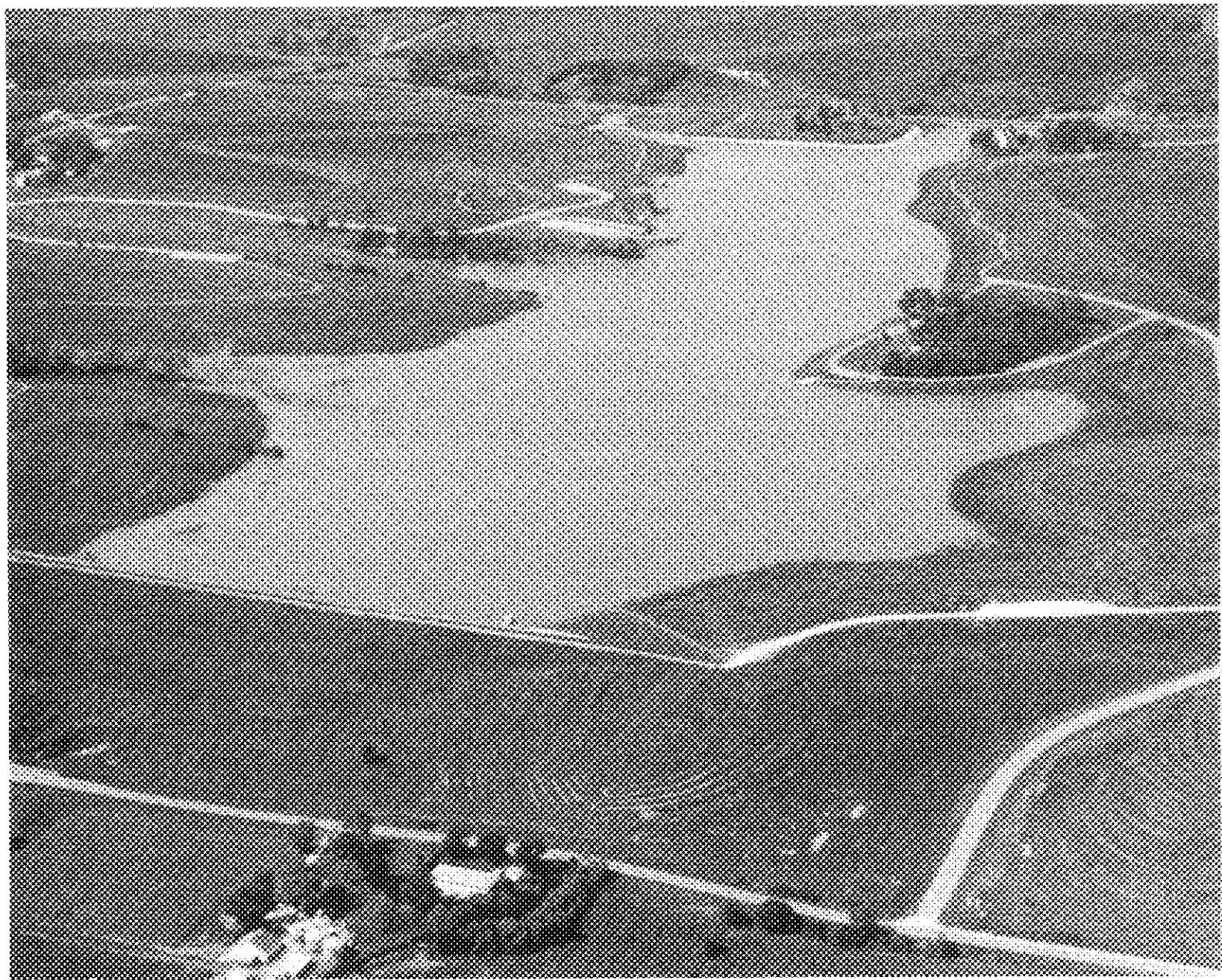
PAPILLION CREEK AND TRIBUTARIES, NEBRASKA

SITE II

PROBABLE MAXIMUM
FLOOD ROUTING

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS OMAHA, NEBRASKA
JAN. 1972

C.F.S.



1986

PAPILLION CREEK BASIN
DAM SITE #16 — STANDING BEAR LAKE

E
E
E

1/16
2/27

KS
AN

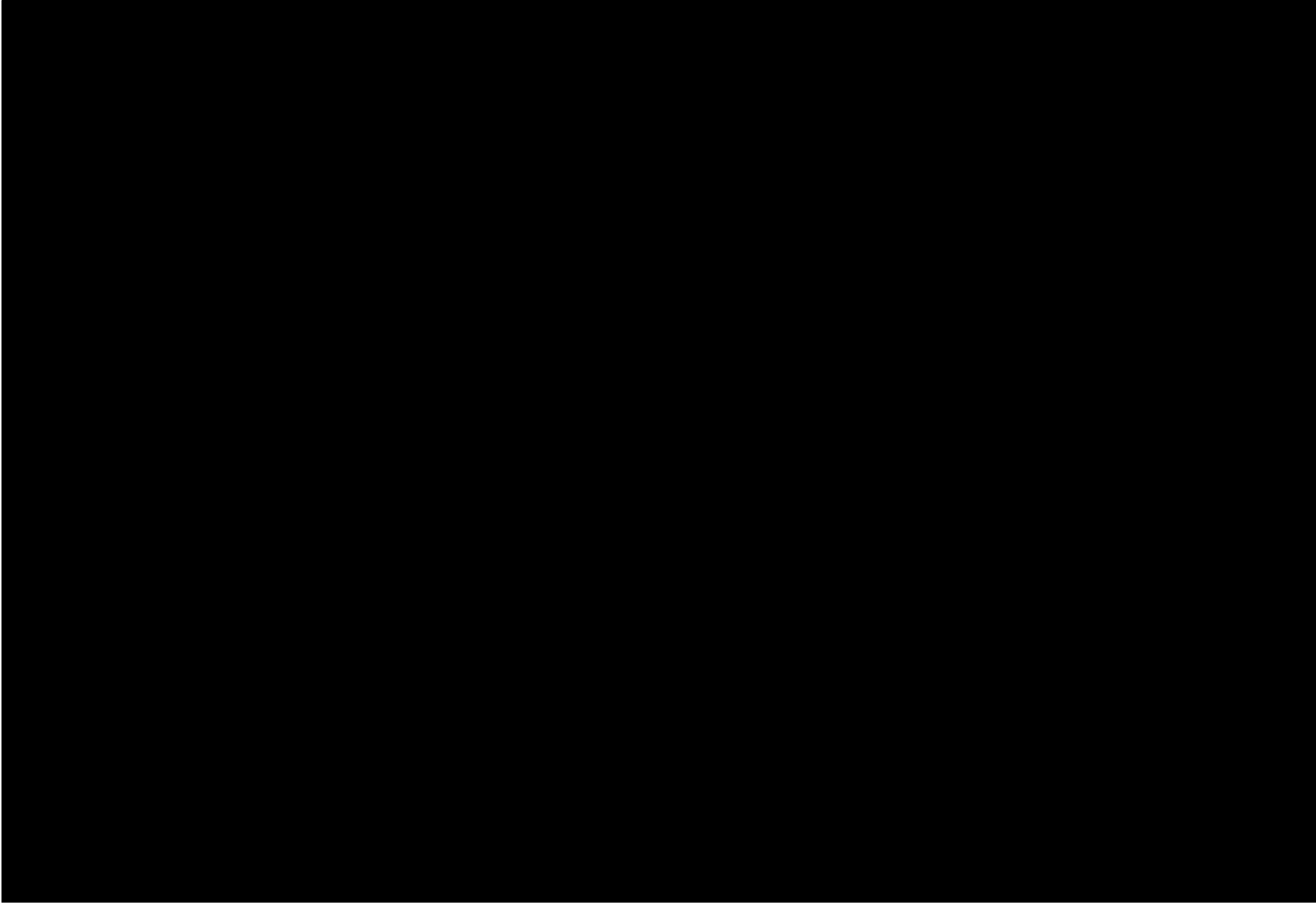
DAW 76-77-C-0124

REPRODUCTION NO.

DAW 76-77-C-0124

1/16

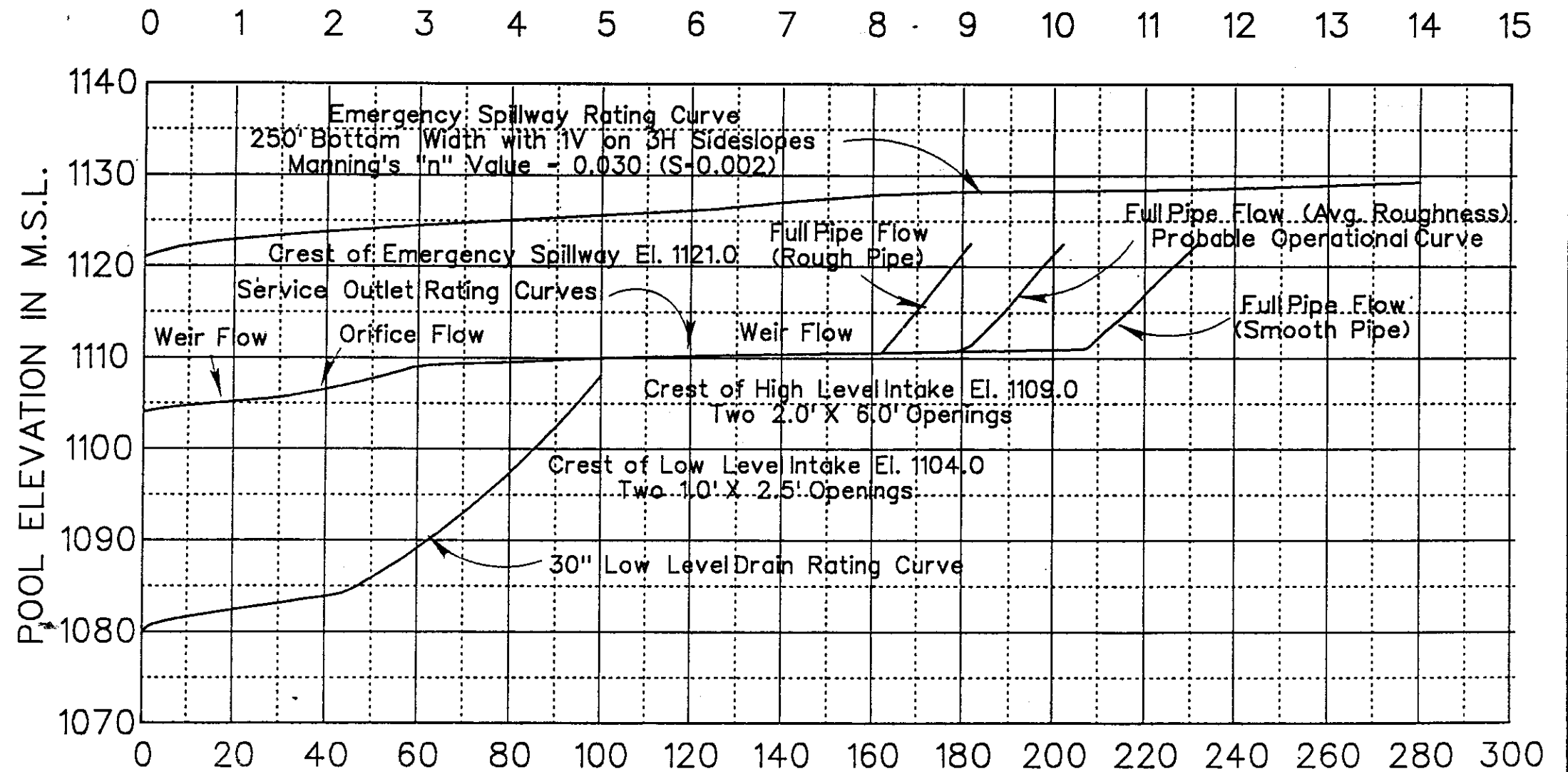




EMERGENCY SPILLWAY RATING CURVE
DISCHARGE IN 1,000 C.F.S.

PREPARED BY: J.T.M.

CHECKED BY: R.L.K.



US Army Corps
of Engineers
Omaha District

DISCHARGE IN C.F.S.
SERVICE OUTLET RATING CURVE

PAPILLION CREEK AND TRIBUTARIES LAKES,
NEBRASKA
DAM SITE 16
SERVICE OUTLET AND EMERGENCY
SPILLWAY RATING CURVES
WATER CONTROL MANUAL
MARCH 1991

PAPIO PROJECT - SITE 16

AREA - CAPACITY TABLES

U.S. ARMY ENGINEER DISTRICT, OMAHA
OMAHA, NEBRASKA

OCTOBER 1986

PAPIO CREEK SITE 16 ---- STANDING BEAR

CAPACITY IN ACRE-FT.
(1984 SURVEY)

EFFECTIVE 21 OCT 1986

ELEV	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
1080.0	2	2	2	2	2	2	2	2	2	2
.1	2	2	2	3	3	3	3	3	3	3
.2	3	3	3	3	3	3	3	3	3	3
.3	3	3	3	3	3	3	3	3	4	4
.4	4	4	4	4	4	4	4	4	4	4
.5	4	4	4	4	4	4	4	4	4	4
.6	4	4	4	5	5	5	5	5	5	5
.7	5	5	5	5	5	5	5	5	5	5
.8	5	5	5	5	5	5	5	5	6	6
.9	6	6	6	6	6	6	6	6	6	6
1081.0	6	6	6	6	6	6	6	6	6	7
.1	7	7	7	7	7	7	7	7	7	7
.2	7	7	7	7	7	8	8	8	8	8
.3	8	8	8	8	8	8	8	8	8	8
.4	8	8	9	9	9	9	9	9	9	9
.5	9	9	9	9	9	9	9	9	9	10
.6	10	10	10	10	10	10	10	10	10	10
.7	10	10	10	10	10	11	11	11	11	11
.8	11	11	11	11	11	11	11	11	11	11
.9	11	11	12	12	12	12	12	12	12	12
1082.0	12	12	12	12	12	12	12	13	13	13
.1	13	13	13	13	13	13	13	13	13	14
.2	14	14	14	14	14	14	14	14	14	14
.3	14	14	15	15	15	15	15	15	15	15
.4	15	15	15	15	16	16	16	16	16	16
.5	16	16	16	16	16	16	16	17	17	17
.6	17	17	17	17	17	17	17	17	17	18
.7	18	18	18	18	18	18	18	18	18	18
.8	18	18	19	19	19	19	19	19	19	19
.9	19	19	19	19	20	20	20	20	20	20
1083.0	20	20	20	20	20	21	21	21	21	21
.1	21	21	21	22	22	22	22	22	22	22
.2	22	23	23	23	23	23	23	23	23	23
.3	24	24	24	24	24	24	24	24	25	25
.4	25	25	25	25	25	25	26	26	26	26
.5	26	26	26	26	26	27	27	27	27	27
.6	27	27	27	28	28	28	28	28	28	28
.7	28	29	29	29	29	29	29	29	29	29
.8	30	30	30	30	30	30	30	30	31	31
.9	31	31	31	31	31	31	32	32	32	32
1084.0	32	32	32	32	33	33	33	33	33	33
.1	34	34	34	34	34	34	34	35	35	35
.2	35	35	35	35	36	36	36	36	36	36
.3	37	37	37	37	37	37	37	38	38	38
.4	38	38	38	38	39	39	39	39	39	39
.5	40	40	40	40	40	40	40	41	41	41
.6	41	41	41	41	42	42	42	42	42	42
.7	43	43	43	43	43	43	43	44	44	44
.8	44	44	44	44	45	45	45	45	45	45
.9	46	46	46	46	46	46	46	47	47	47

PAPIO CREEK SITE 16 ---- STANDING BEAR

CAPACITY IN ACRE-FT.
(1984 SURVEY)

EFFECTIVE 21 OCT 1986

ELEV	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
1085.0	47	47	47	48	48	48	48	48	48	49
.1	49	49	49	49	50	50	50	50	50	50
.2	51	51	51	51	51	52	52	52	52	52
.3	52	53	53	53	53	53	53	54	54	54
.4	54	54	55	55	55	55	55	55	56	56
.5	56	56	56	57	57	57	57	57	57	58
.6	58	58	58	58	59	59	59	59	59	59
.7	60	60	60	60	60	61	61	61	61	61
.8	61	62	62	62	62	62	62	63	63	63
.9	63	63	64	64	64	64	64	64	65	65
1086.0	65	65	65	66	66	66	66	66	67	67
.1	67	67	67	68	68	68	68	68	69	69
.2	69	69	69	70	70	70	70	70	71	71
.3	71	71	71	72	72	72	72	72	73	73
.4	73	73	73	74	74	74	74	74	75	75
.5	75	75	75	76	76	76	76	76	77	77
.6	77	77	77	78	78	78	78	78	79	79
.7	79	79	79	80	80	80	80	80	81	81
.8	81	81	81	82	82	82	82	82	83	83
.9	83	83	83	84	84	84	84	84	85	85
1087.0	85	85	85	86	86	86	86	87	87	87
.1	87	88	88	88	88	89	89	89	89	90
.2	90	90	90	91	91	91	91	91	92	92
.3	92	92	93	93	93	93	94	94	94	94
.4	95	95	95	95	96	96	96	96	97	97
.5	97	97	97	98	98	98	98	99	99	99
.6	99	100	100	100	100	101	101	101	101	102
.7	102	102	102	103	103	103	103	103	104	104
.8	104	104	105	105	105	105	106	106	106	106
.9	107	107	107	107	108	108	108	108	109	109
1088.0	109	109	110	110	110	110	111	111	111	112
.1	112	112	112	113	113	113	113	114	114	114
.2	115	115	115	115	116	116	116	117	117	117
.3	117	118	118	118	119	119	119	119	120	120
.4	120	120	121	121	121	122	122	122	122	123
.5	123	123	124	124	124	124	125	125	125	126
.6	126	126	126	127	127	127	127	128	128	128
.7	129	129	129	129	130	130	130	131	131	131
.8	131	132	132	132	133	133	133	133	134	134
.9	134	134	135	135	135	136	136	136	136	137
1089.0	137	137	138	138	138	139	139	139	140	140
.1	140	141	141	141	142	142	142	143	143	143
.2	144	144	144	145	145	146	146	146	147	147
.3	147	148	148	148	149	149	149	150	150	150
.4	151	151	151	152	152	152	153	153	153	154
.5	154	154	155	155	155	156	156	156	157	157
.6	157	158	158	158	159	159	159	160	160	160
.7	161	161	161	162	162	163	163	163	164	164
.8	164	165	165	165	166	166	166	167	167	167
.9	168	168	168	169	169	169	170	170	170	171

PAPIO CREEK SITE 16 ---- STANDING BEAR

CAPACITY IN ACRE-FT.
(1984 SURVEY)

EFFECTIVE 21 OCT 1986

ELEV	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
1090.0	171	171	172	172	173	173	173	174	174	175
.1	175	175	176	176	176	177	177	178	178	178
.2	179	179	180	180	180	181	181	182	182	182
.3	183	183	183	184	184	185	185	185	186	186
.4	187	187	187	188	188	189	189	189	190	190
.5	191	191	191	192	192	192	193	193	194	194
.6	194	195	195	196	196	196	197	197	198	198
.7	198	199	199	199	200	200	201	201	201	202
.8	202	203	203	203	204	204	205	205	205	206
.9	206	206	207	207	208	208	208	209	209	210
1091.0	210	210	211	211	212	212	213	213	213	214
.1	214	215	215	216	216	216	217	217	218	218
.2	219	219	219	220	220	221	221	222	222	222
.3	223	223	224	224	225	225	225	226	226	227
.4	227	228	228	228	229	229	230	230	231	231
.5	232	232	232	233	233	234	234	235	235	235
.6	236	236	237	237	238	238	238	239	239	240
.7	240	241	241	241	242	242	243	243	244	244
.8	244	245	245	246	246	247	247	247	248	248
.9	249	249	250	250	250	251	251	252	252	253
1092.0	253	253	254	254	255	255	256	256	257	257
.1	258	258	259	259	260	260	261	261	262	262
.2	263	263	264	264	265	265	266	266	267	267
.3	268	268	269	269	270	270	271	271	272	272
.4	273	273	274	274	275	275	276	276	277	277
.5	278	278	278	279	279	280	280	281	281	282
.6	282	283	283	284	284	285	285	286	286	287
.7	287	288	288	289	289	290	290	291	291	292
.8	292	293	293	294	294	295	295	296	296	297
.9	297	298	298	299	299	300	300	301	301	302
1093.0	302	303	303	304	304	305	305	306	306	307
.1	307	308	308	309	310	310	311	311	312	312
.2	313	313	314	314	315	316	316	317	317	318
.3	318	319	319	320	320	321	321	322	323	323
.4	324	324	325	325	326	326	327	327	328	328
.5	329	330	330	331	331	332	332	333	333	334
.6	334	335	335	336	337	337	338	338	339	339
.7	340	340	341	341	342	343	343	344	344	345
.8	345	346	346	347	347	348	348	349	350	350
.9	351	351	352	352	353	353	354	354	355	355
1094.0	356	357	357	358	358	359	360	360	361	361
.1	362	363	363	364	364	365	366	366	367	367
.2	368	369	369	370	370	371	372	372	373	373
.3	374	375	375	376	376	377	378	378	379	379
.4	380	381	381	382	382	383	384	384	385	385
.5	386	387	387	388	388	389	390	390	391	391
.6	392	393	393	394	394	395	396	396	397	397
.7	398	399	399	400	400	401	402	402	403	403
.8	404	405	405	406	406	407	408	408	409	409
.9	410	411	411	412	412	413	414	414	415	415

PAPIO CREEK SITE 16 ---- STANDING BEAR

CAPACITY IN ACRE-FT.
(1984 SURVEY)

EFFECTIVE 21 OCT 1986

ELEV	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
1095.0	416	417	417	418	419	419	420	421	421	422
.1	423	423	424	425	425	426	427	427	428	429
.2	429	430	431	431	432	433	433	434	434	435
.3	436	436	437	438	438	439	440	440	441	442
.4	442	443	444	444	445	446	446	447	448	448
.5	449	450	450	451	452	452	453	454	454	455
.6	456	456	457	458	458	459	460	460	461	462
.7	462	463	464	464	465	466	466	467	467	468
.8	469	469	470	471	471	472	473	473	474	475
.9	475	476	477	477	478	479	479	480	481	481
1096.0	482	483	483	484	485	486	486	487	488	488
.1	489	490	491	491	492	493	494	494	495	496
.2	496	497	498	499	499	500	501	501	502	503
.3	504	504	505	506	506	507	508	509	509	510
.4	511	512	512	513	514	514	515	516	517	517
.5	518	519	519	520	521	522	522	523	524	524
.6	525	526	527	527	528	529	530	530	531	532
.7	532	533	534	535	535	536	537	537	538	539
.8	540	540	541	542	542	543	544	545	545	546
.9	547	548	548	549	550	550	551	552	553	553
1097.0	554	555	556	556	557	558	559	559	560	561
.1	562	563	563	564	565	566	566	567	568	569
.2	570	570	571	572	573	574	574	575	576	577
.3	577	578	579	580	581	581	582	583	584	584
.4	585	586	587	588	588	589	590	591	591	592
.5	593	594	595	595	596	597	598	598	599	600
.6	601	602	602	603	604	605	605	606	607	608
.7	609	609	610	611	612	613	613	614	615	616
.8	616	617	618	619	620	620	621	622	623	623
.9	624	625	626	627	627	628	629	630	630	631
1098.0	632	633	634	635	635	636	637	638	639	640
.1	641	641	642	643	644	645	646	646	647	648
.2	649	650	651	652	652	653	654	655	656	657
.3	658	658	659	660	661	662	663	663	664	665
.4	666	667	668	669	669	670	671	672	673	674
.5	675	675	676	677	678	679	680	680	681	682
.6	683	684	685	686	686	687	688	689	690	691
.7	692	692	693	694	695	696	697	697	698	699
.8	700	701	702	703	703	704	705	706	707	708
.9	709	709	710	711	712	713	714	714	715	716
1099.0	717	718	719	720	721	722	723	723	724	725
.1	726	727	728	729	730	731	732	733	734	734
.2	735	736	737	738	739	740	741	742	743	744
.3	745	746	746	747	748	749	750	751	752	753
.4	754	755	756	757	757	758	759	760	761	762
.5	763	764	765	766	767	768	769	769	770	771
.6	772	773	774	775	776	777	778	779	780	780
.7	781	782	783	784	785	786	787	788	789	790
.8	791	792	792	793	794	795	796	797	798	799
.9	800	801	802	803	803	804	805	806	807	808

PAPIO CREEK SITE 16 ---- STANDING BEAR

CAPACITY IN ACRE-FT.
(1984 SURVEY)

EFFECTIVE 21 OCT 1986

ELEV	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
1100.0	809	810	811	812	813	814	815	816	817	818
.1	819	820	821	822	823	824	825	826	827	828
.2	829	830	831	832	833	834	835	836	837	838
.3	839	840	841	842	843	844	845	846	847	848
.4	849	850	851	852	853	854	855	856	857	858
.5	859	860	861	862	863	864	865	866	867	868
.6	869	870	871	872	873	874	875	876	877	878
.7	879	880	881	882	883	884	885	886	887	888
.8	889	890	891	892	893	894	895	896	897	898
.9	899	900	901	902	903	904	905	906	907	908
1101.0	909	910	911	912	913	914	915	916	917	919
.1	920	921	922	923	924	925	926	927	928	929
.2	930	931	932	933	934	936	937	938	939	940
.3	941	942	943	944	945	946	947	948	949	950
.4	951	952	954	955	956	957	958	959	960	961
.5	962	963	964	965	966	967	968	969	970	972
.6	973	974	975	976	977	978	979	980	981	982
.7	983	984	985	986	987	989	990	991	992	993
.8	994	995	996	997	998	999	1000	1001	1002	1003
.9	1004	1005	1007	1008	1009	1010	1011	1012	1013	1014
1102.0	1015	1016	1017	1018	1020	1021	1022	1023	1024	1025
.1	1026	1028	1029	1030	1031	1032	1033	1034	1036	1037
.2	1038	1039	1040	1041	1042	1044	1045	1046	1047	1048
.3	1049	1050	1051	1053	1054	1055	1056	1057	1058	1059
.4	1061	1062	1063	1064	1065	1066	1067	1069	1070	1071
.5	1072	1073	1074	1075	1077	1078	1079	1080	1081	1082
.6	1083	1085	1086	1087	1088	1089	1090	1091	1093	1094
.7	1095	1096	1097	1098	1099	1101	1102	1103	1104	1105
.8	1106	1107	1108	1110	1111	1112	1113	1114	1115	1116
.9	1118	1119	1120	1121	1122	1123	1124	1126	1127	1128
1103.0	1129	1130	1131	1133	1134	1135	1136	1138	1139	1140
.1	1141	1142	1144	1145	1146	1147	1149	1150	1151	1152
.2	1153	1155	1156	1157	1158	1160	1161	1162	1163	1164
.3	1166	1167	1168	1169	1170	1172	1173	1174	1175	1177
.4	1178	1179	1180	1181	1183	1184	1185	1186	1188	1189
.5	1190	1191	1192	1194	1195	1196	1197	1199	1200	1201
.6	1202	1203	1205	1206	1207	1208	1210	1211	1212	1213
.7	1214	1216	1217	1218	1219	1221	1222	1223	1224	1225
.8	1227	1228	1229	1230	1231	1233	1234	1235	1236	1238
.9	1239	1240	1241	1242	1244	1245	1246	1247	1249	1250
1104.0	1251	1252	1254	1255	1256	1258	1259	1260	1261	1263
.1	1264	1265	1267	1268	1269	1271	1272	1273	1275	1276
.2	1277	1279	1280	1281	1282	1284	1285	1286	1288	1289
.3	1290	1292	1293	1294	1296	1297	1298	1299	1301	1302
.4	1303	1305	1306	1307	1309	1310	1311	1313	1314	1315
.5	1317	1318	1319	1320	1322	1323	1324	1326	1327	1328
.6	1330	1331	1332	1334	1335	1336	1337	1339	1340	1341
.7	1343	1344	1345	1347	1348	1349	1351	1352	1353	1354
.8	1356	1357	1358	1360	1361	1362	1364	1365	1366	1368
.9	1369	1370	1372	1373	1374	1375	1377	1378	1379	1381

PAPIO CREEK SITE 16 ---- STANDING BEAR

CAPACITY IN ACRE-FT.
(1984 SURVEY)

EFFECTIVE 21 OCT 1986

ELEV	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
1105.0	1382	1383	1385	1386	1388	1389	1390	1392	1393	1395
.1	1396	1397	1399	1400	1402	1403	1404	1406	1407	1409
.2	1410	1411	1413	1414	1416	1417	1418	1420	1421	1423
.3	1424	1425	1427	1428	1430	1431	1432	1434	1435	1437
.4	1438	1439	1441	1442	1444	1445	1446	1448	1449	1451
.5	1452	1453	1455	1456	1458	1459	1460	1462	1463	1465
.6	1466	1467	1469	1470	1472	1473	1474	1476	1477	1479
.7	1480	1481	1483	1484	1486	1487	1488	1490	1491	1493
.8	1494	1495	1497	1498	1500	1501	1502	1504	1505	1507
.9	1508	1509	1511	1512	1514	1515	1516	1518	1519	1521
1106.0	1522	1523	1525	1526	1528	1529	1531	1532	1534	1535
.1	1537	1538	1540	1541	1543	1544	1546	1547	1549	1550
.2	1552	1553	1555	1556	1558	1559	1560	1562	1563	1565
.3	1566	1568	1569	1571	1572	1574	1575	1577	1578	1580
.4	1581	1583	1584	1586	1587	1589	1590	1592	1593	1595
.5	1596	1597	1599	1600	1602	1603	1605	1606	1608	1609
.6	1611	1612	1614	1615	1617	1618	1620	1621	1623	1624
.7	1626	1627	1629	1630	1632	1633	1634	1636	1637	1639
.8	1640	1642	1643	1645	1646	1648	1649	1651	1652	1654
.9	1655	1657	1658	1660	1661	1663	1664	1666	1667	1669
1107.0	1670	1672	1673	1675	1676	1678	1679	1681	1682	1684
.1	1686	1687	1689	1690	1692	1693	1695	1697	1698	1700
.2	1701	1703	1704	1706	1707	1709	1711	1712	1714	1715
.3	1717	1718	1720	1721	1723	1725	1726	1728	1729	1731
.4	1732	1734	1736	1737	1739	1740	1742	1743	1745	1746
.5	1748	1750	1751	1753	1754	1756	1757	1759	1760	1762
.6	1764	1765	1767	1768	1770	1771	1773	1775	1776	1778
.7	1779	1781	1782	1784	1785	1787	1789	1790	1792	1793
.8	1795	1796	1798	1799	1801	1803	1804	1806	1807	1809
.9	1810	1812	1814	1815	1817	1818	1820	1821	1823	1824
1108.0	1826	1828	1829	1831	1833	1834	1836	1838	1839	1841
.1	1843	1844	1846	1848	1849	1851	1853	1854	1856	1858
.2	1859	1861	1863	1864	1866	1868	1869	1871	1873	1874
.3	1876	1878	1879	1881	1883	1884	1886	1888	1889	1891
.4	1893	1894	1896	1898	1899	1901	1903	1904	1906	1908
.5	1910	1911	1913	1915	1916	1918	1920	1921	1923	1925
.6	1926	1928	1930	1931	1933	1935	1936	1938	1940	1941
.7	1943	1945	1946	1948	1950	1951	1953	1955	1956	1958
.8	1960	1961	1963	1965	1966	1968	1970	1971	1973	1975
.9	1976	1978	1980	1981	1983	1985	1986	1988	1990	1991
1109.0	1993	1995	1997	1998	2000	2002	2004	2005	2007	2009
.1	2011	2012	2014	2016	2018	2020	2021	2023	2025	2027
.2	2028	2030	2032	2034	2035	2037	2039	2041	2043	2044
.3	2046	2048	2050	2051	2053	2055	2057	2058	2060	2062
.4	2064	2066	2067	2069	2071	2073	2074	2076	2078	2080
.5	2082	2083	2085	2087	2089	2090	2092	2094	2096	2097
.6	2099	2101	2103	2105	2106	2108	2110	2112	2113	2115
.7	2117	2119	2120	2122	2124	2126	2128	2129	2131	2133
.8	2135	2136	2138	2140	2142	2143	2145	2147	2149	2151
.9	2152	2154	2156	2158	2159	2161	2163	2165	2166	2168

PAPIO CREEK SITE 16 ---- STANDING BEAR

CAPACITY IN ACRE-FT.
(1984 SURVEY)

EFFECTIVE 21 OCT 1986

ELEV	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
1110.0	2170	2172	2174	2176	2177	2179	2181	2183	2185	2187
.1	2189	2191	2192	2194	2196	2198	2200	2202	2204	2206
.2	2207	2209	2211	2213	2215	2217	2219	2220	2222	2224
.3	2226	2228	2230	2232	2234	2235	2237	2239	2241	2243
.4	2245	2247	2249	2250	2252	2254	2256	2258	2260	2262
.5	2264	2265	2267	2269	2271	2273	2275	2277	2278	2280
.6	2282	2284	2286	2288	2290	2292	2293	2295	2297	2299
.7	2301	2303	2305	2307	2308	2310	2312	2314	2316	2318
.8	2320	2321	2323	2325	2327	2329	2331	2333	2335	2336
.9	2338	2340	2342	2344	2346	2348	2350	2351	2353	2355
1111.0	2357	2359	2361	2363	2365	2367	2369	2371	2373	2375
.1	2377	2379	2381	2383	2385	2387	2389	2390	2392	2394
.2	2396	2398	2400	2402	2404	2406	2408	2410	2412	2414
.3	2416	2418	2420	2422	2424	2426	2428	2430	2432	2434
.4	2436	2438	2440	2442	2444	2446	2448	2450	2452	2454
.5	2456	2457	2459	2461	2463	2465	2467	2469	2471	2473
.6	2475	2477	2479	2481	2483	2485	2487	2489	2491	2493
.7	2495	2497	2499	2501	2503	2505	2507	2509	2511	2513
.8	2515	2517	2519	2521	2522	2524	2526	2528	2530	2532
.9	2534	2536	2538	2540	2542	2544	2546	2548	2550	2552
1112.0	2554	2556	2558	2560	2562	2564	2566	2568	2570	2573
.1	2575	2577	2579	2581	2583	2585	2587	2589	2591	2593
.2	2595	2597	2600	2601	2603	2606	2608	2610	2612	2614
.3	2616	2618	2620	2622	2624	2626	2628	2630	2632	2634
.4	2636	2638	2641	2643	2645	2647	2649	2651	2653	2655
.5	2657	2659	2661	2663	2665	2667	2669	2671	2673	2676
.6	2678	2680	2682	2684	2686	2688	2690	2692	2694	2696
.7	2698	2700	2702	2704	2706	2709	2711	2713	2715	2717
.8	2719	2721	2723	2725	2727	2729	2731	2733	2735	2737
.9	2739	2741	2744	2746	2748	2750	2752	2754	2756	2758
1113.0	2760	2762	2764	2767	2769	2771	2773	2775	2777	2780
.1	2782	2784	2786	2788	2791	2793	2795	2797	2799	2801
.2	2804	2806	2808	2810	2812	2815	2817	2819	2821	2823
.3	2825	2828	2830	2832	2834	2836	2838	2841	2843	2845
.4	2847	2849	2852	2854	2856	2858	2860	2862	2865	2867
.5	2869	2871	2873	2876	2878	2880	2882	2884	2886	2889
.6	2891	2893	2895	2897	2900	2902	2904	2906	2908	2910
.7	2913	2915	2917	2919	2921	2924	2926	2928	2930	2932
.8	2934	2937	2939	2941	2943	2945	2947	2950	2952	2954
.9	2956	2958	2961	2963	2965	2967	2969	2971	2974	2976
1114.0	2978	2980	2983	2985	2987	2990	2992	2994	2996	2999
.1	3001	3003	3006	3008	3010	3013	3015	3017	3019	3022
.2	3024	3026	3029	3031	3033	3036	3038	3040	3042	3045
.3	3047	3049	3052	3054	3056	3059	3061	3063	3065	3068
.4	3070	3072	3075	3077	3079	3082	3084	3086	3088	3091
.5	3093	3095	3098	3100	3102	3105	3107	3109	3111	3114
.6	3116	3118	3121	3123	3125	3128	3130	3132	3134	3137
.7	3139	3141	3144	3146	3148	3151	3153	3155	3157	3160
.8	3162	3164	3167	3169	3171	3174	3176	3178	3180	3183
.9	3185	3187	3190	3192	3194	3197	3199	3201	3203	3206

PAPIO CREEK SITE 16 ---- STANDING BEAR

CAPACITY IN ACRE-FT.
(1984 SURVEY)

EFFECTIVE 21 OCT 1986

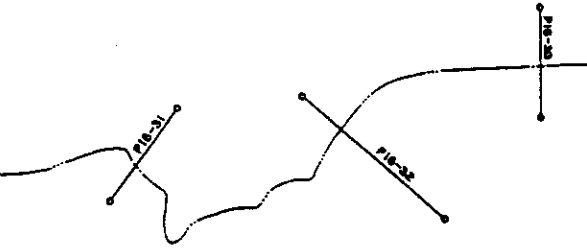
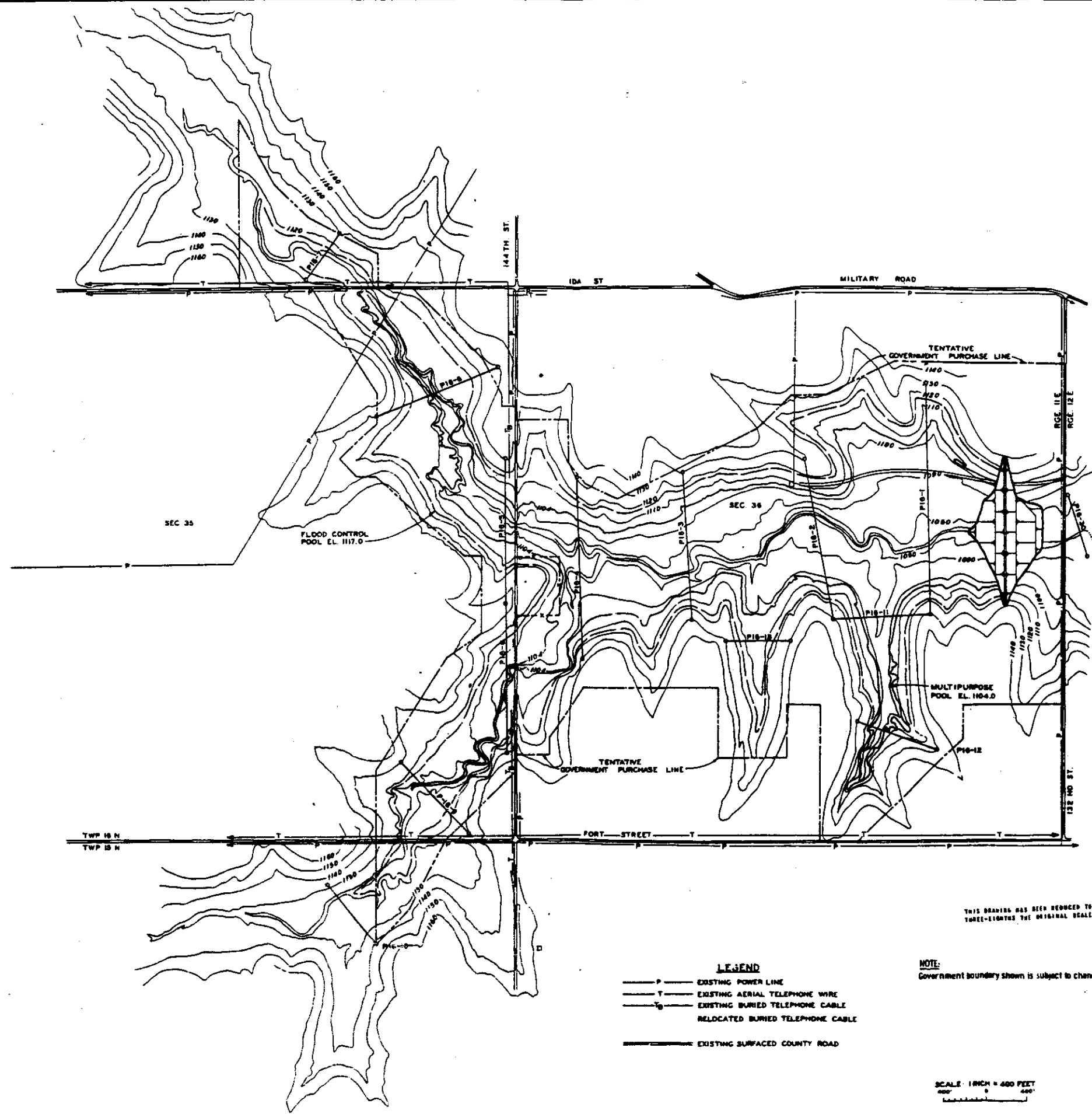
ELEV	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
1115.0	3208	3210	3213	3215	3218	3220	3222	3225	3227	3230
.1	3232	3235	3237	3239	3242	3244	3247	3249	3251	3254
.2	3256	3259	3261	3263	3266	3268	3271	3273	3275	3278
.3	3280	3283	3285	3288	3290	3292	3295	3297	3300	3302
.4	3304	3307	3309	3312	3314	3316	3319	3321	3324	3326
.5	3329	3331	3333	3336	3338	3341	3343	3345	3348	3350
.6	3353	3355	3357	3360	3362	3365	3367	3369	3372	3374
.7	3377	3379	3382	3384	3386	3389	3391	3394	3396	3398
.8	3401	3403	3406	3408	3410	3413	3415	3418	3420	3422
.9	3425	3427	3430	3432	3435	3437	3439	3442	3444	3447
1116.0	3449	3452	3454	3457	3459	3462	3464	3467	3469	3472
.1	3474	3477	3479	3482	3484	3487	3489	3492	3494	3497
.2	3499	3502	3504	3507	3509	3512	3514	3517	3519	3522
.3	3524	3527	3529	3532	3534	3537	3539	3542	3544	3547
.4	3549	3552	3554	3557	3559	3562	3564	3567	3569	3572
.5	3575	3577	3580	3582	3585	3587	3590	3592	3595	3597
.6	3600	3602	3605	3607	3610	3612	3615	3617	3620	3622
.7	3625	3627	3630	3632	3635	3637	3640	3642	3645	3647
.8	3650	3652	3655	3657	3660	3662	3665	3667	3670	3672
.9	3675	3677	3680	3682	3685	3687	3690	3692	3695	3697
1117.0	3700	3703	3705	3708	3711	3713	3716	3718	3721	3724
.1	3726	3729	3732	3734	3737	3740	3742	3745	3748	3750
.2	3753	3755	3758	3761	3763	3766	3769	3771	3774	3777
.3	3779	3782	3784	3787	3790	3792	3795	3798	3800	3803
.4	3806	3808	3811	3814	3816	3819	3821	3824	3827	3829
.5	3832	3835	3837	3840	3843	3845	3848	3850	3853	3856
.6	3858	3861	3864	3866	3869	3872	3874	3877	3880	3882
.7	3885	3887	3890	3893	3895	3898	3901	3903	3906	3909
.8	3911	3914	3916	3919	3922	3924	3927	3930	3932	3935
.9	3938	3940	3943	3946	3948	3951	3953	3956	3959	3961
1118.0	3964	3967	3970	3972	3975	3978	3981	3983	3986	3989
.1	3992	3994	3997	4000	4003	4005	4008	4011	4014	4016
.2	4019	4022	4025	4027	4030	4033	4036	4039	4041	4044
.3	4047	4050	4052	4055	4058	4061	4063	4066	4069	4072
.4	4074	4077	4080	4083	4085	4088	4091	4094	4096	4099
.5	4102	4105	4108	4110	4113	4116	4119	4121	4124	4127
.6	4130	4132	4135	4138	4141	4143	4146	4149	4152	4154
.7	4157	4160	4163	4165	4168	4171	4174	4177	4179	4182
.8	4185	4188	4190	4193	4196	4199	4201	4204	4207	4210
.9	4212	4215	4218	4221	4223	4226	4229	4232	4234	4237
1119.0	4240	4243	4246	4249	4252	4255	4257	4260	4263	4266
.1	4269	4272	4275	4278	4281	4284	4287	4289	4292	4295
.2	4298	4301	4304	4307	4310	4313	4316	4319	4321	4324
.3	4327	4330	4333	4336	4339	4342	4345	4348	4351	4353
.4	4356	4359	4362	4365	4368	4371	4374	4377	4380	4383
.5	4386	4388	4391	4394	4397	4400	4403	4406	4409	4412
.6	4415	4418	4420	4423	4426	4429	4432	4435	4438	4441
.7	4444	4447	4450	4452	4455	4458	4461	4464	4467	4470
.8	4473	4476	4479	4482	4484	4487	4490	4493	4496	4499
.9	4502	4505	4508	4511	4514	4516	4519	4522	4525	4528

PAPIO CREEK SITE 16 ---- STANDING BEAR

CAPACITY IN ACRE-FT.
(1984 SURVEY)

EFFECTIVE 21 OCT 1986

ELEV	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
1120.0	4531	4534	4537	4540	4543	4546	4549	4552	4555	4559
.1	4562	4565	4568	4571	4574	4577	4580	4583	4586	4589
.2	4592	4595	4598	4601	4604	4608	4611	4614	4617	4620
.3	4623	4626	4629	4632	4635	4638	4641	4644	4647	4650
.4	4653	4656	4660	4663	4666	4669	4672	4675	4678	4681
.5	4684	4687	4690	4693	4696	4699	4702	4705	4708	4712
.6	4715	4718	4721	4724	4727	4730	4733	4736	4739	4742
.7	4745	4748	4751	4754	4757	4761	4764	4767	4770	4773
.8	4776	4779	4782	4785	4788	4791	4794	4797	4800	4803
.9	4806	4809	4813	4816	4819	4822	4825	4828	4831	4834
1121.0	4837	4840	4843	4847	4850	4853	4856	4859	4863	4866
.1	4869	4872	4875	4878	4882	4885	4888	4891	4894	4898
.2	4901	4904	4907	4910	4914	4917	4920	4923	4926	4930
.3	4933	4936	4939	4942	4945	4949	4952	4955	4958	4961
.4	4965	4968	4971	4974	4977	4981	4984	4987	4990	4993
.5	4997	5000	5003	5006	5009	5012	5016	5019	5022	5025
.6	5028	5032	5035	5038	5041	5044	5048	5051	5054	5057
.7	5060	5063	5067	5070	5073	5076	5079	5083	5086	5089
.8	5092	5095	5099	5102	5105	5108	5111	5115	5118	5121
.9	5124	5127	5130	5134	5137	5140	5143	5146	5150	5153
1122.0	5156	5159	5163	5166	5169	5173	5176	5179	5183	5186
.1	5189	5193	5196	5199	5203	5206	5209	5213	5216	5219
.2	5223	5226	5229	5233	5236	5239	5243	5246	5249	5253
.3	5256	5259	5263	5266	5269	5273	5276	5279	5283	5286
.4	5289	5293	5296	5299	5303	5306	5309	5313	5316	5319
.5	5323	5326	5329	5332	5336	5339	5342	5346	5349	5352
.6	5356	5359	5362	5366	5369	5372	5376	5379	5382	5386
.7	5389	5392	5396	5399	5402	5406	5409	5412	5416	5419
.8	5422	5426	5429	5432	5436	5439	5442	5446	5449	5452
.9	5456	5459	5462	5466	5469	5472	5476	5479	5482	5486
1123.0	5489	5492	5496	5499	5503	5506	5510	5513	5517	5520
.1	5524	5527	5531	5534	5537	5541	5544	5548	5551	5555
.2	5558	5562	5565	5569	5572	5576	5579	5582	5586	5589
.3	5593	5596	5600	5603	5607	5610	5614	5617	5620	5624
.4	5627	5631	5634	5638	5641	5645	5648	5652	5655	5659
.5	5662	5665	5669	5672	5676	5679	5683	5686	5690	5693
.6	5697	5700	5704	5707	5710	5714	5717	5721	5724	5728
.7	5731	5735	5738	5742	5745	5749	5752	5755	5759	5762
.8	5766	5769	5773	5776	5780	5783	5787	5790	5793	5797
.9	5800	5804	5807	5811	5814	5818	5821	5825	5828	5832
1124.0	5835	5839	5842	5846	5849	5853	5857	5860	5864	5867
.1	5871	5874	5878	5882	5885	5889	5892	5896	5900	5903
.2	5907	5910	5914	5918	5921	5925	5928	5932	5936	5939
.3	5943	5946	5950	5953	5957	5961	5964	5968	5971	5975
.4	5979	5982	5986	5989	5993	5997	6000	6004	6007	6011
.5	6015	6018	6022	6025	6029	6032	6036	6040	6043	6047
.6	6050	6054	6058	6061	6065	6068	6072	6076	6079	6083
.7	6086	6090	6093	6097	6101	6104	6108	6111	6115	6119
.8	6122	6126	6129	6133	6137	6140	6144	6147	6151	6155
.9	6158	6162	6165	6169	6172	6176	6180	6183	6187	6190



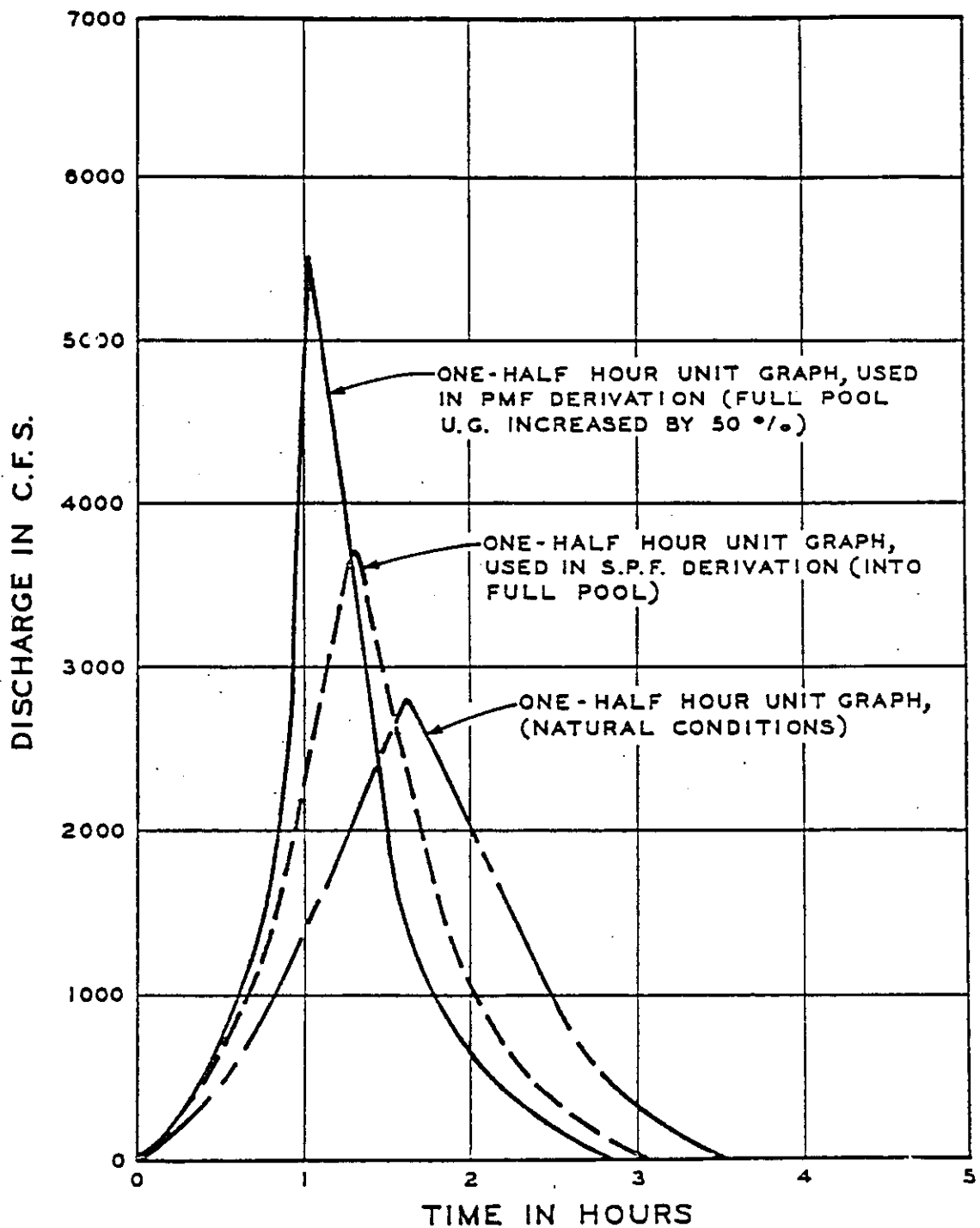
- LEGEND**
- P — EXISTING POWER LINE
 - T — EXISTING AERIAL TELEPHONE WIRE
 - T_b — EXISTING BURIED TELEPHONE CABLE
 - T_r — RELOCATED BURIED TELEPHONE CABLE
 - — — — — EXISTING SURFACED COUNTY ROAD

NOTE:
Government boundary shown is subject to change.

SCALE 1 INCH = 400 FEET

THIS DRAWING HAS BEEN REDUCED TO THREE-EIGHTHS THE ORIGINAL SCALE.

DATE	DESIGNED BY	NAME	APPROVED
U. S. ARMY ENGINEER DISTRICT, MEMPHIS GROUP OF ENGINEERS MEMPHIS, TENNESSEE			
DESIGNED BY S.A.S. CHECKED BY C.P.H.		PAPILLION CREEK AND TRIBUTARIES, MEMPHIS	
DRAWN BY		SITE 16	
CHECKED BY		SEDIMENTATION STUDIES	
UNIT - U.S.A.S. OFFICE		LOCATION OF SEDIMENT RANGES	
APPROVED <i>R. W. ...</i>	DATE SEP. 1975	SCALE AS SHOWN	DATE
DESIGNED BY <i>Russell A. Allen</i>		DATE	DATE



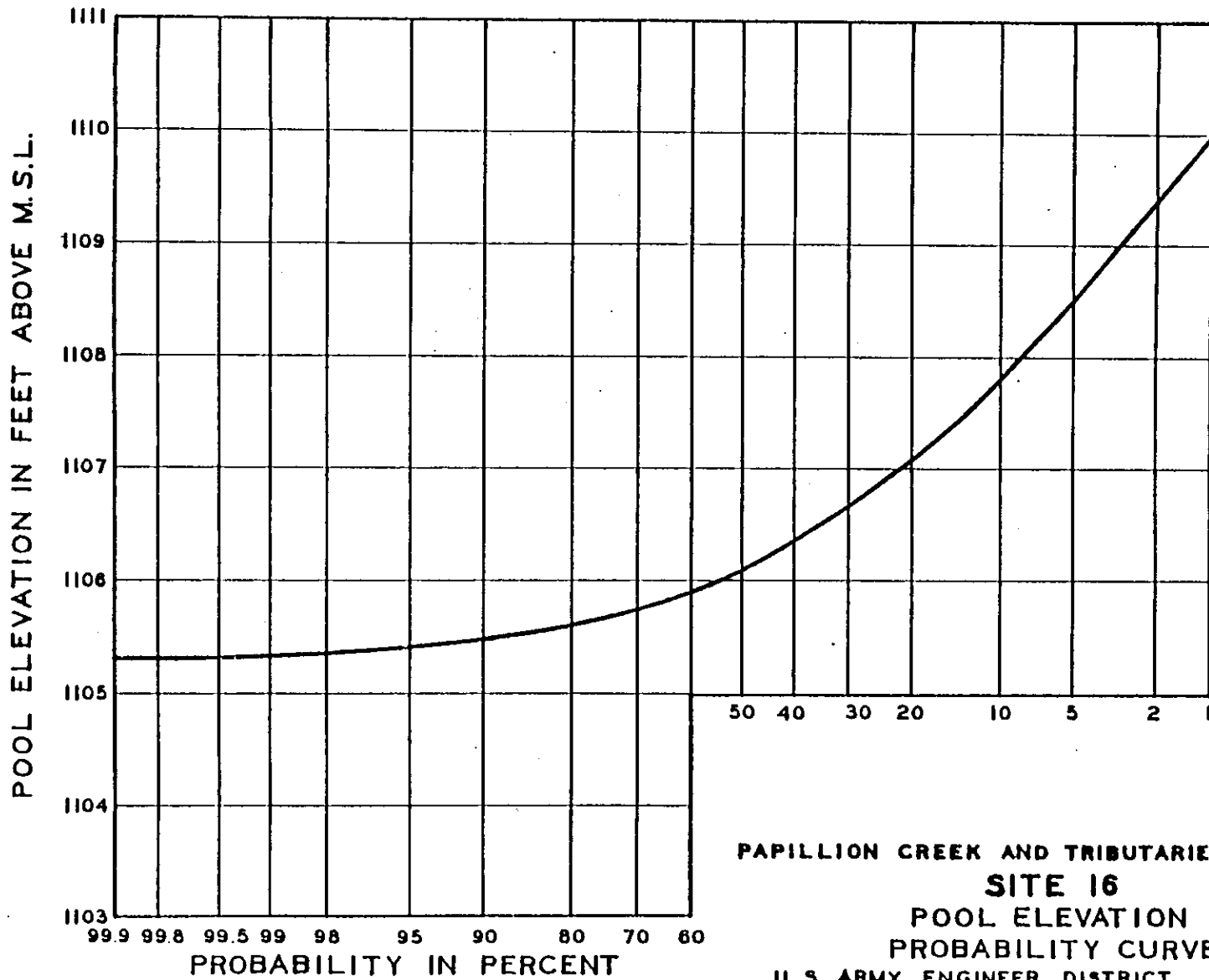
C.F.E.

PAPILLION CREEK AND TRIBUTARIES, NEBRASKA
SITE 16

ONE-HALF HOUR UNIT HYDROGRAPHS
DRAINAGE AREA - 6.0 SQUARE MILES

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS OMAHA, NEBRASKA

SEPT, 1918

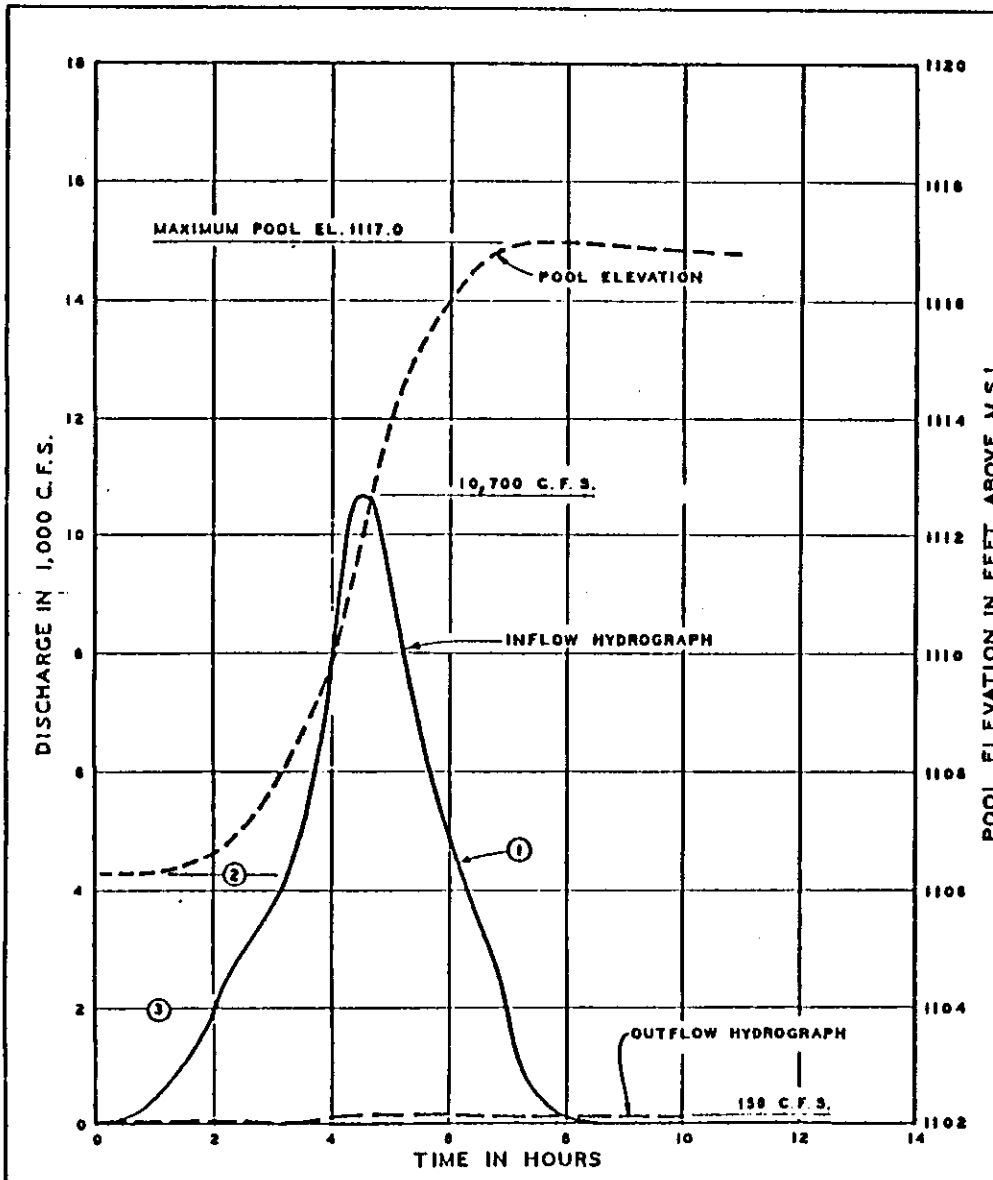


C.F.T.

PAPILLION CREEK AND TRIBUTARIES, NEBRASKA
SITE 16
POOL ELEVATION
PROBABILITY CURVE

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS OMAHA, NEBRASKA

SEPT. 1971



LEGEND:

- ① This hydrograph represents the maximum 6 hours of runoff (60 to 66 hours).
- ② Antecedent runoff from 0 to 60 hours raised the pool from 1104.0 ft. to 1106.3 ft.
- ③ Multi-purpose pool elevation 1104.0 ft.

NOTE:

Reservoir design flood storage accumulation summary. All values include base flow.

From 0 to 60 Hrs.	Inflow = 339.2 A.F.
	Outflow = 81.7 A.F.
	Storage = 257.5 A.F.
From 60 to 66 Hrs.	Inflow = 2515.2 A.F.
	Outflow = 72.7 A.F.
	Storage = 2442.5 A.F.
From 66 to 96 Hrs.	Inflow = 134.4 A.F.
	Outflow = 369.6 A.F.
	Storage = -235.2 A.F.

Maximum Storage = 257.5 + 2442.5 = 2700 A.F.

C.F.P.

PAPILLION CREEK AND TRIBUTARIES, NEBRASKA

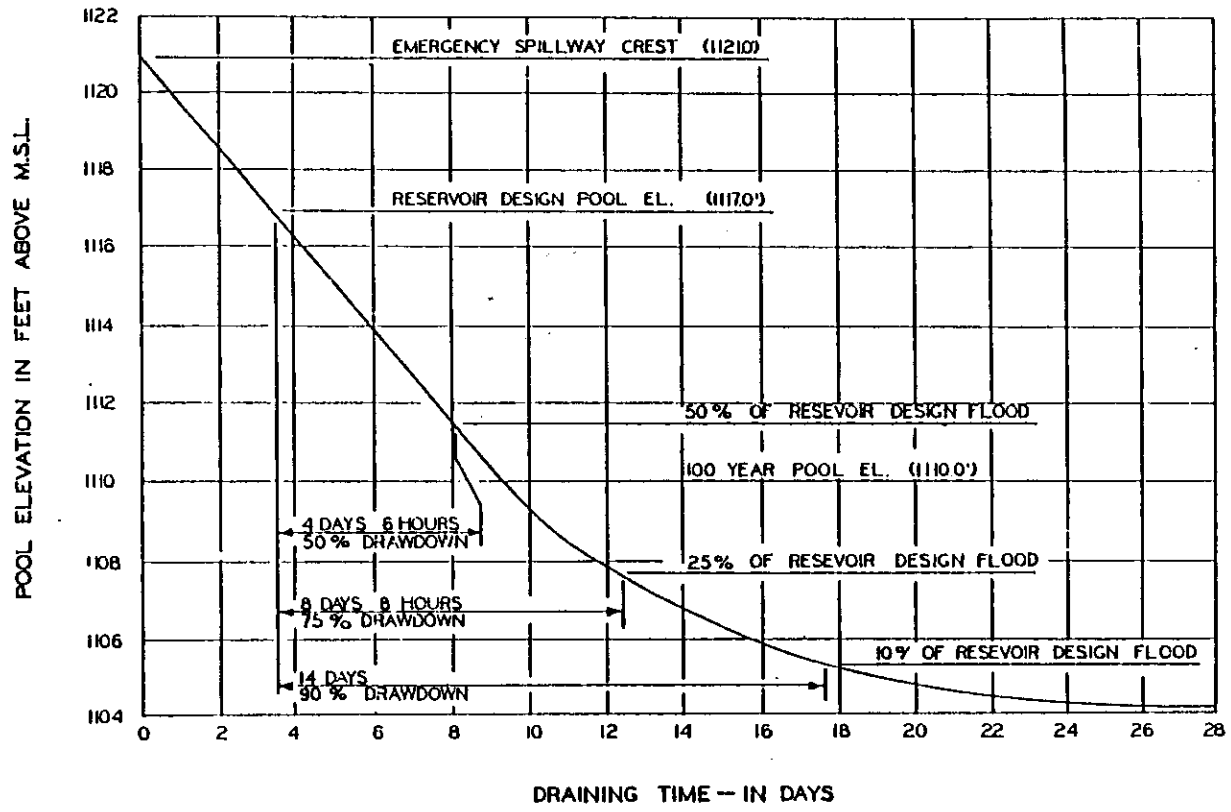
SITE 16

RESERVOIR DESIGN FLOOD ROUTING

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS OMAHA, NEBRASKA

SEP 1971

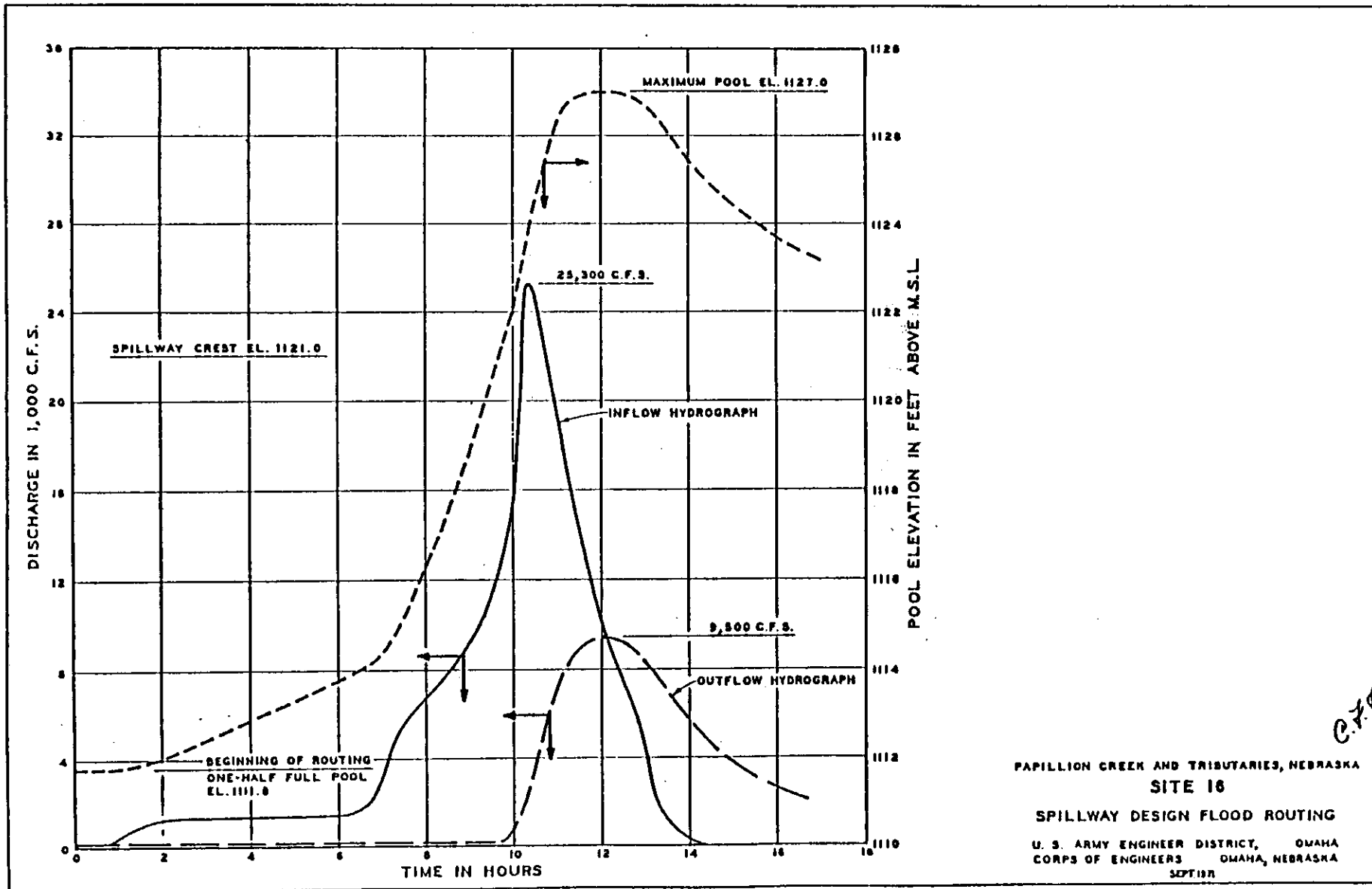
DESIGN MEMO. NO. MPC14



PAPILLION CREEK AND TRIBUTARIES LAKES, NEBRASKA
 SITE 18
MASTER PLAN
 RESERVOIR DRAINING CHARACTERISTICS
 GATED OUTLET CLOSED
 MITS KAWAMOTO & ASSOCIATES
 OMAHA, NEBRASKA
 US ARMY ENGINEER DISTRICT
 OMAHA
 CORPS OF ENGINEERS
 OMAHA, NEBRASKA
 1973

DESIGN MEMO. NO. MPC-26

PLATE 26



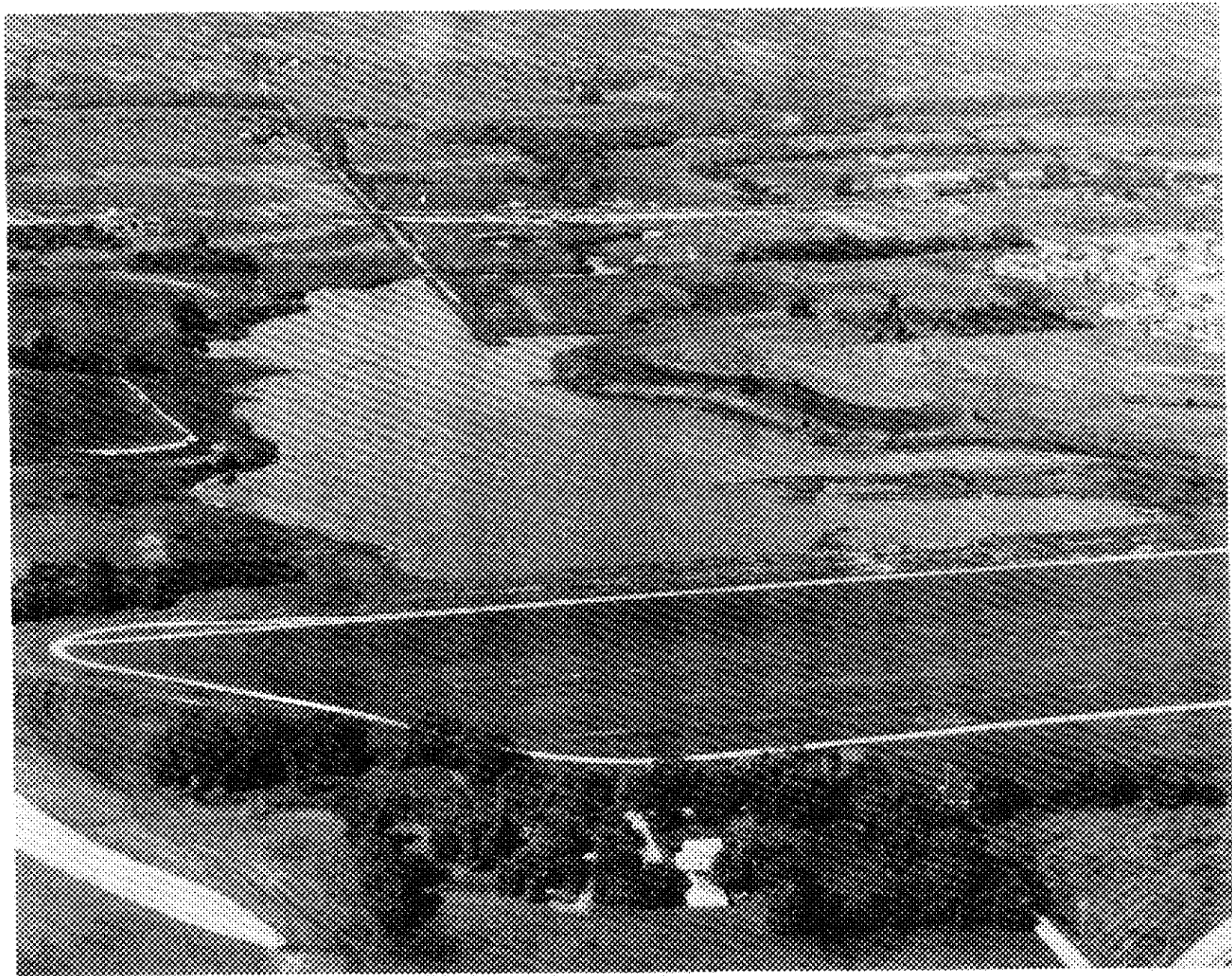
C.F.F.

PAPILLION CREEK AND TRIBUTARIES, NEBRASKA
 SITE 16

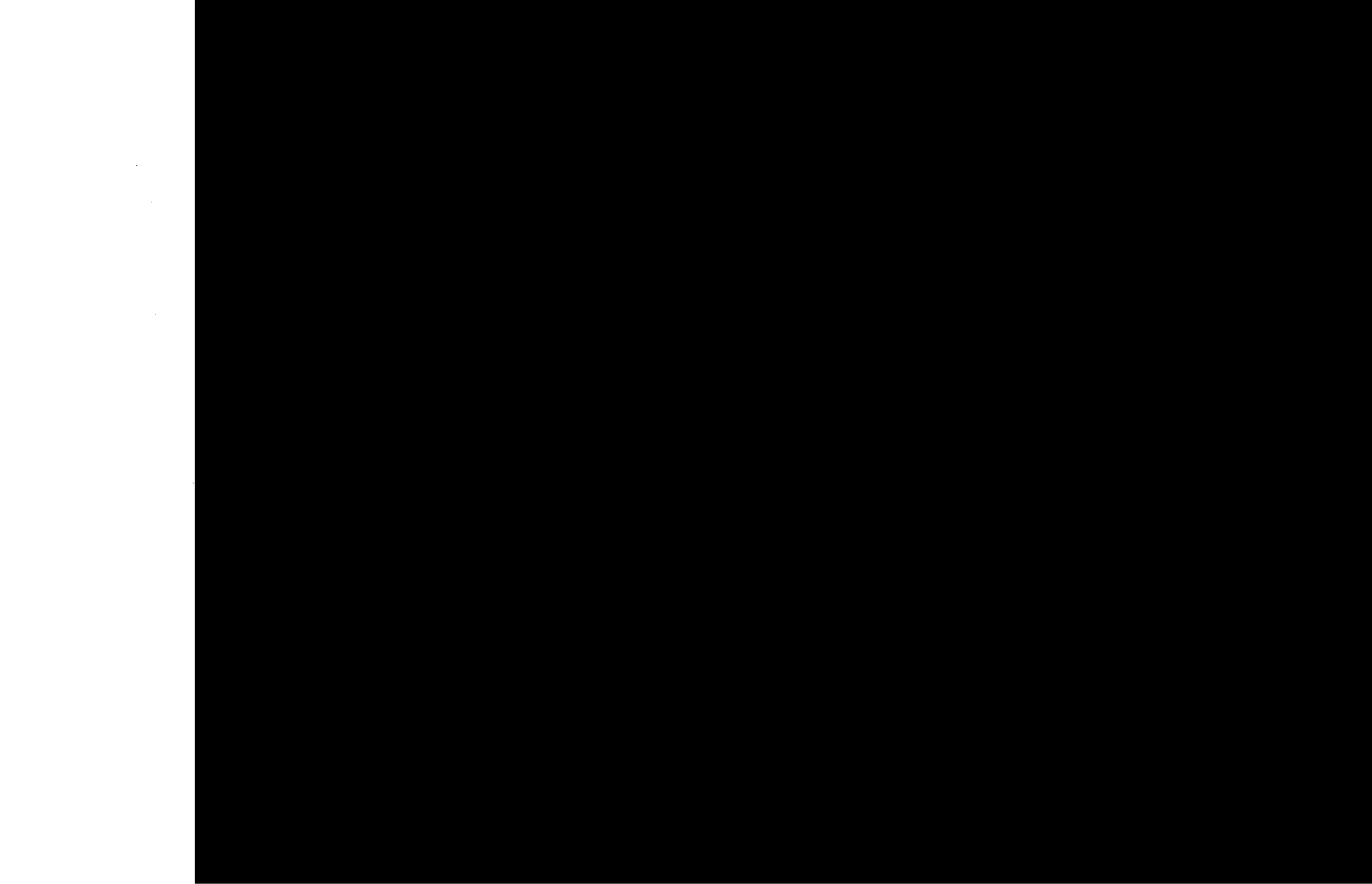
SPILLWAY DESIGN FLOOD ROUTING

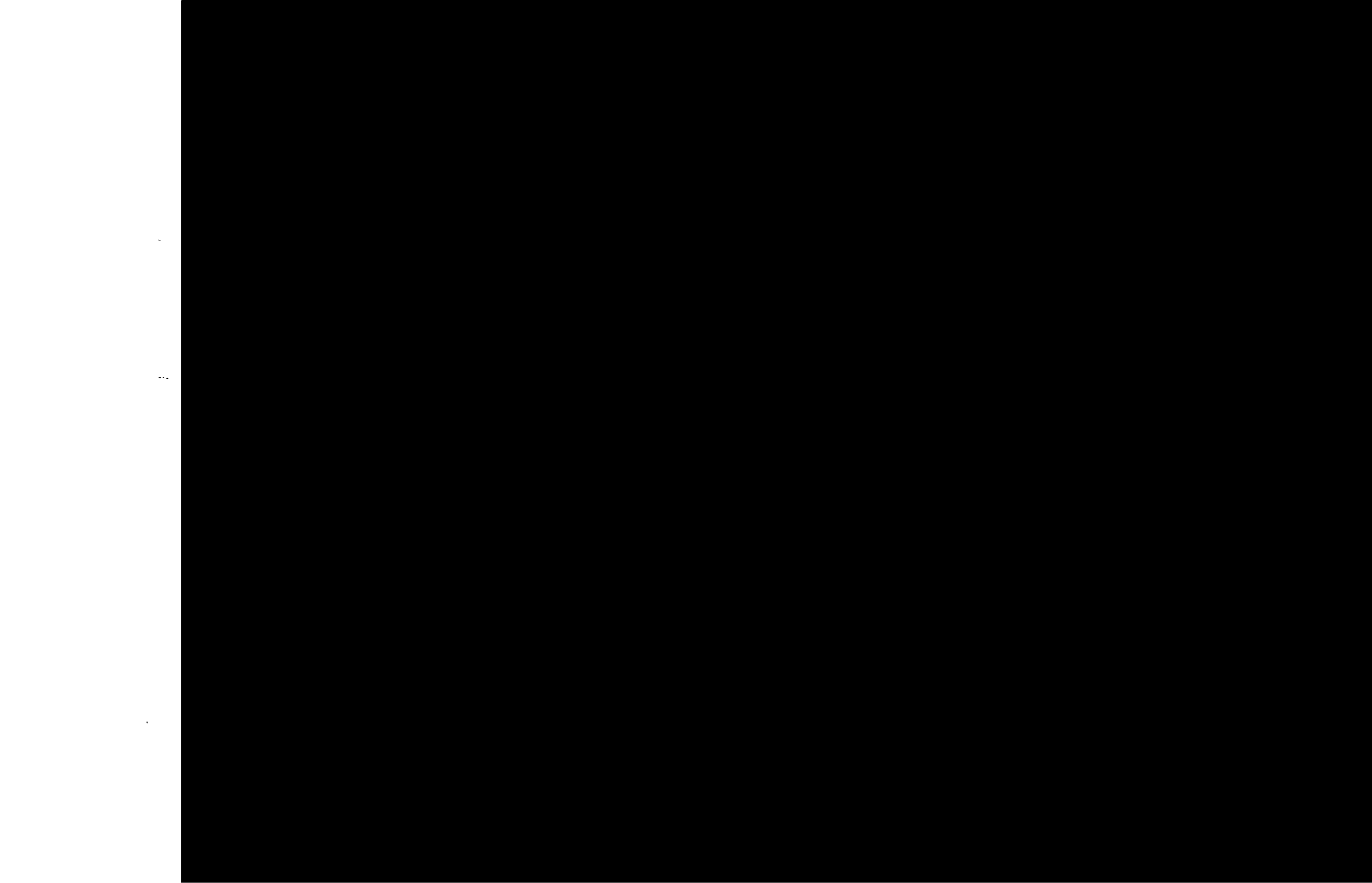
U. S. ARMY ENGINEER DISTRICT, OMAHA
 CORPS OF ENGINEERS OMAHA, NEBRASKA
 SECTION

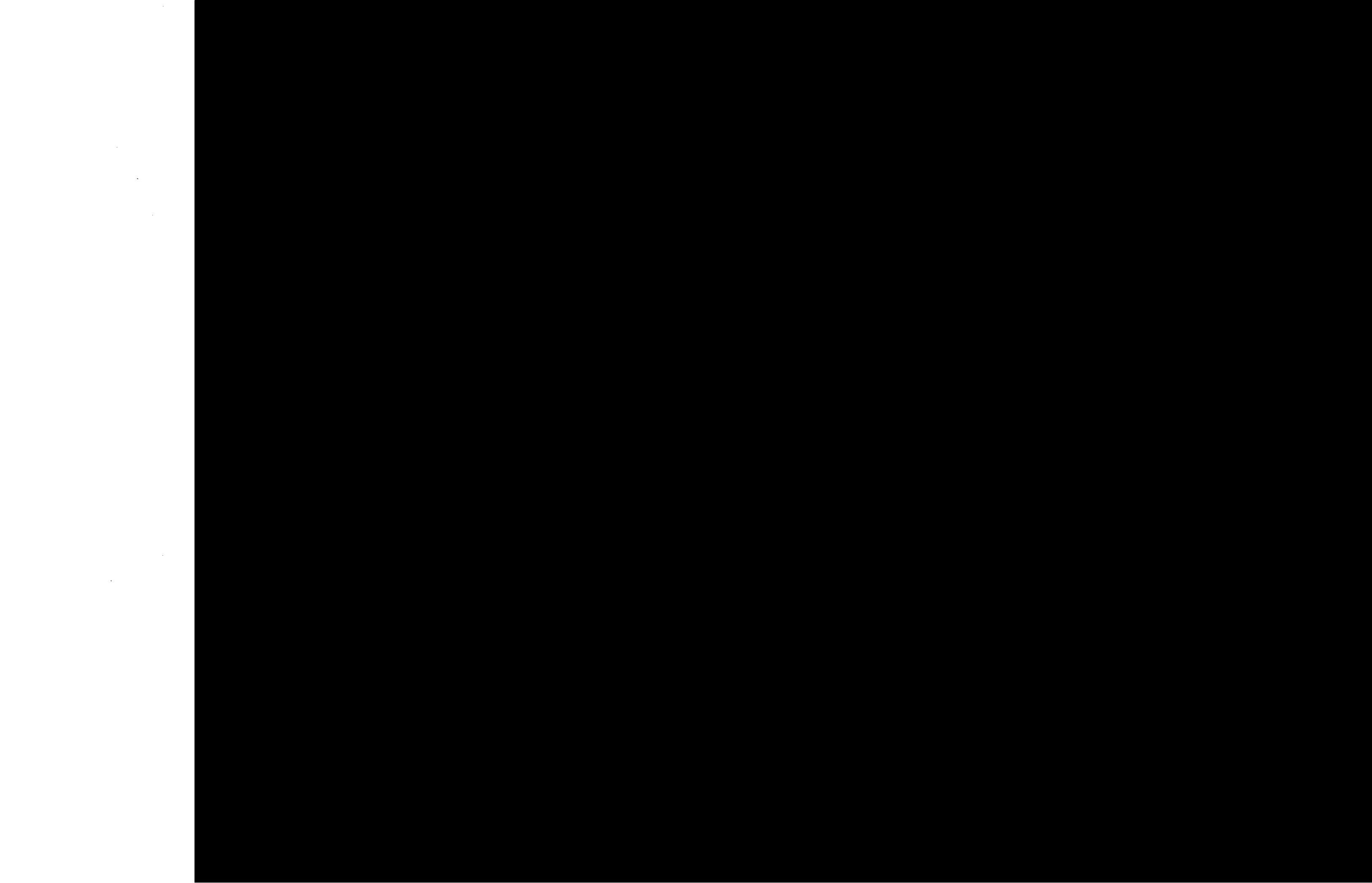
DESIGN MEMO. NO. MPC14



PAPILLION CREEK BASIN
DAM SITE #18 — ZORINSKY LAKE

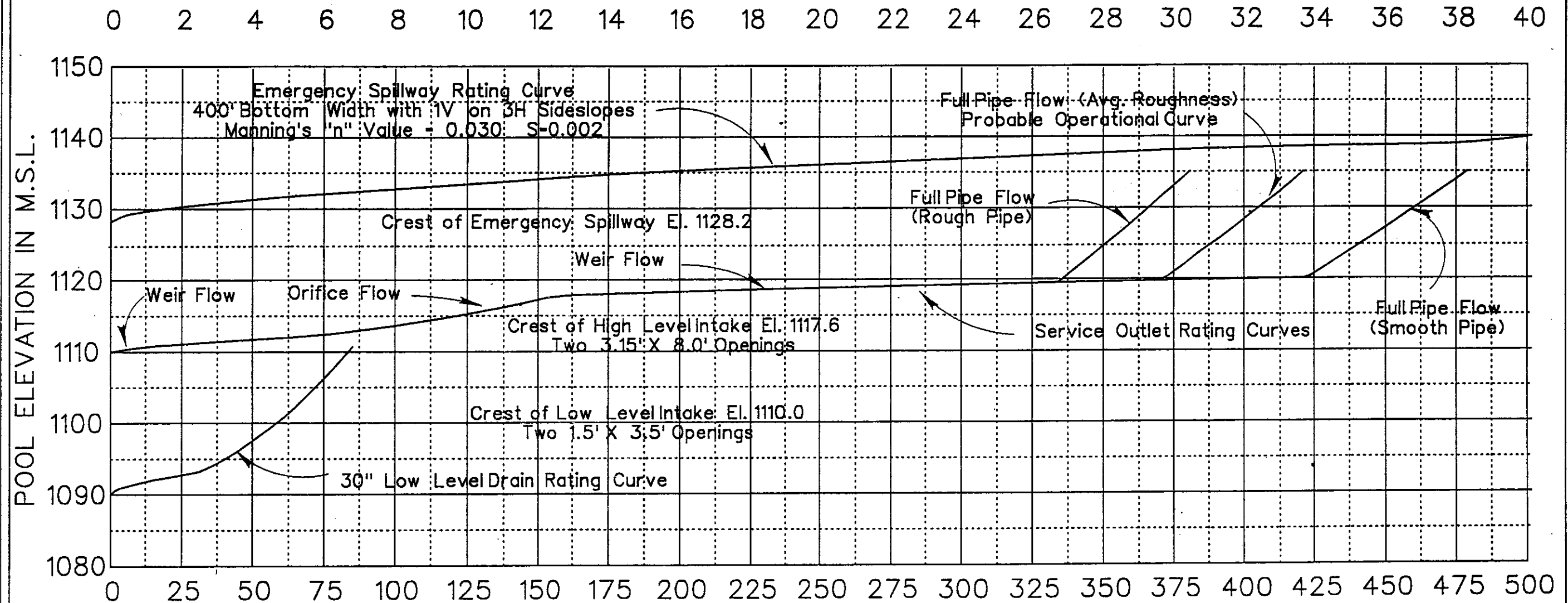






EMERGENCY SPILLWAY RATING CURVE
DISCHARGE IN 1,000 C.F.S.

PREPARED BY: J.T.M.
CHECKED BY: R.L.K.



DISCHARGE IN C.F.S.
SERVICE OUTLET RATING CURVE

PAPILLION CREEK AND TRIBUTARIES LAKES,
NEBRASKA
DAM SITE 18
SERVICE OUTLET AND EMERGENCY
SPILLWAY RATING CURVES

WATER CONTROL MANUAL
MARCH 1991



US Army Corps
of Engineers
Omaha District

PAPIO PROJECT - SITE 18

AREA - CAPACITY TABLES

U.S. ARMY ENGINEER DISTRICT, OMAHA
OMAHA, NEBRASKA

1984

PAPIO CREEK SITE 18

CAPACITY IN ACRE-FT.
(1984 SURVEY)

EFFECTIVE

ELEV	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
1060.0	12	12	12	12	12	12	12	12	12	12
.1	12	12	12	12	12	12	12	13	13	13
.2	13	13	13	13	13	13	13	13	13	13
.3	13	13	13	13	13	13	13	13	13	13
.4	13	13	13	13	13	13	13	13	13	13
.5	13	14	14	14	14	14	14	14	14	14
.6	14	14	14	14	14	14	14	14	14	14
.7	14	14	14	14	14	14	14	14	14	14
.8	14	14	14	14	15	15	15	15	15	15
.9	15	15	15	15	15	15	15	15	15	15
1061.0	15	15	15	15	15	15	15	15	15	15
.1	15	15	15	16	16	16	16	16	16	16
.2	16	16	16	16	16	16	16	16	16	16
.3	16	16	16	16	16	16	16	16	17	17
.4	17	17	17	17	17	17	17	17	17	17
.5	17	17	17	17	17	17	17	17	17	17
.6	17	17	17	18	18	18	18	18	18	18
.7	18	18	18	18	18	18	18	18	18	18
.8	18	18	18	18	18	18	18	18	19	19
.9	19	19	19	19	19	19	19	19	19	19
1062.0	19	19	19	19	19	19	19	19	19	19
.1	19	20	20	20	20	20	20	20	20	20
.2	20	20	20	20	20	20	20	20	20	20
.3	20	21	21	21	21	21	21	21	21	21
.4	21	21	21	21	21	21	21	21	21	21
.5	21	22	22	22	22	22	22	22	22	22
.6	22	22	22	22	22	22	22	22	22	22
.7	22	23	23	23	23	23	23	23	23	23
.8	23	23	23	23	23	23	23	23	23	23
.9	23	24	24	24	24	24	24	24	24	24
1063.0	24	24	24	24	24	24	24	24	24	24
.1	24	25	25	25	25	25	25	25	25	25
.2	25	25	25	25	25	25	25	25	25	25
.3	25	26	26	26	26	26	26	26	26	26
.4	26	26	26	26	26	26	26	26	26	26
.5	26	27	27	27	27	27	27	27	27	27
.6	27	27	27	27	27	27	27	27	27	27
.7	27	28	28	28	28	28	28	28	28	28
.8	28	28	28	28	28	28	28	28	28	28
.9	28	29	29	29	29	29	29	29	29	29
1064.0	29	29	29	29	29	29	29	29	30	30
.1	30	30	30	30	30	30	30	30	30	30
.2	30	30	31	31	31	31	31	31	31	31
.3	31	31	31	31	31	31	32	32	32	32
.4	32	32	32	32	32	32	32	32	32	32
.5	32	33	33	33	33	33	33	33	33	33
.6	33	33	33	33	33	34	34	34	34	34
.7	34	34	34	34	34	34	34	34	34	35
.8	35	35	35	35	35	35	35	35	35	35
.9	35	35	35	36	36	36	36	36	36	36

PAPIO CREEK SITE 18

CAPACITY IN ACRE-FT.
(1984 SURVEY)

EFFECTIVE

ELEV	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
1065.0	36	36	36	36	36	36	36	37	37	37
.1	37	37	37	37	37	37	37	37	37	38
.2	38	38	38	38	38	38	38	38	38	38
.3	38	38	39	39	39	39	39	39	39	39
.4	39	39	39	39	40	40	40	40	40	40
.5	40	40	40	40	40	40	40	41	41	41
.6	41	41	41	41	41	41	41	41	41	42
.7	42	42	42	42	42	42	42	42	42	42
.8	42	42	43	43	43	43	43	43	43	43
.9	43	43	43	43	44	44	44	44	44	44
1066.0	44	44	44	44	44	44	45	45	45	45
.1	45	45	45	45	45	45	45	46	46	46
.2	46	46	46	46	46	46	46	46	47	47
.3	47	47	47	47	47	47	47	47	47	48
.4	48	48	48	48	48	48	48	48	48	48
.5	48	49	49	49	49	49	49	49	49	49
.6	49	49	50	50	50	50	50	50	50	50
.7	50	50	50	51	51	51	51	51	51	51
.8	51	51	51	51	52	52	52	52	52	52
.9	52	52	52	52	52	53	53	53	53	53
1067.0	53	53	53	53	53	53	54	54	54	54
.1	54	54	54	54	54	54	55	55	55	55
.2	55	55	55	55	55	56	56	56	56	56
.3	56	56	56	56	56	56	57	57	57	57
.4	57	57	57	57	57	57	58	58	58	58
.5	58	58	58	58	58	58	59	59	59	59
.6	59	59	59	59	59	59	60	60	60	60
.7	60	60	60	60	60	60	61	61	61	61
.8	61	61	61	61	61	61	62	62	62	62
.9	62	62	62	62	62	62	63	63	63	63
1068.0	63	63	63	63	63	64	64	64	64	64
.1	64	64	64	64	65	65	65	65	65	65
.2	65	65	65	66	66	66	66	66	66	66
.3	66	66	67	67	67	67	67	67	67	67
.4	67	68	68	68	68	68	68	68	68	68
.5	68	69	69	69	69	69	69	69	69	69
.6	70	70	70	70	70	70	70	70	70	71
.7	71	71	71	71	71	71	71	71	72	72
.8	72	72	72	72	72	72	72	73	73	73
.9	73	73	73	73	73	73	74	74	74	74
1069.0	74	74	74	74	74	75	75	75	75	75
.1	75	75	75	76	76	76	76	76	76	76
.2	76	77	77	77	77	77	77	77	77	77
.3	78	78	78	78	78	78	78	78	79	79
.4	79	79	79	79	79	79	80	80	80	80
.5	80	80	80	80	80	81	81	81	81	81
.6	81	81	81	82	82	82	82	82	82	82
.7	82	83	83	83	83	83	83	83	83	83
.8	84	84	84	84	84	84	84	84	85	85
.9	85	85	85	85	85	85	86	86	86	86

PAPIO CREEK SITE 18

CAPACITY IN ACRE-FT.
(1984 SURVEY)

EFFECTIVE

ELEV	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
1070.0	86	86	86	86	87	87	87	87	87	87
.1	87	87	88	88	88	88	88	88	88	88
.2	89	89	89	89	89	89	89	90	90	90
.3	90	90	90	90	90	91	91	91	91	91
.4	91	91	91	92	92	92	92	92	92	92
.5	92	93	93	93	93	93	93	93	94	94
.6	94	94	94	94	94	94	95	95	95	95
.7	95	95	95	95	96	96	96	96	96	96
.8	96	97	97	97	97	97	97	97	97	98
.9	98	98	98	98	98	98	98	99	99	99
1071.0	99	99	99	99	100	100	100	100	100	100
.1	100	100	101	101	101	101	101	101	101	101
.2	102	102	102	102	102	102	102	103	103	103
.3	103	103	103	103	103	104	104	104	104	104
.4	104	104	104	105	105	105	105	105	105	105
.5	105	106	106	106	106	106	106	106	107	107
.6	107	107	107	107	107	107	108	108	108	108
.7	108	108	108	108	109	109	109	109	109	109
.8	109	110	110	110	110	110	110	110	110	111
.9	111	111	111	111	111	111	111	112	112	112
1072.0	112	112	112	112	113	113	113	113	113	113
.1	113	114	114	114	114	114	114	115	115	115
.2	115	115	115	115	116	116	116	116	116	116
.3	116	117	117	117	117	117	117	118	118	118
.4	118	118	118	118	119	119	119	119	119	119
.5	119	120	120	120	120	120	120	121	121	121
.6	121	121	121	121	122	122	122	122	122	122
.7	122	123	123	123	123	123	123	124	124	124
.8	124	124	124	124	125	125	125	125	125	125
.9	125	126	126	126	126	126	126	127	127	127
1073.0	127	127	127	128	128	128	128	128	128	129
.1	129	129	129	129	130	130	130	130	130	130
.2	131	131	131	131	131	132	132	132	132	132
.3	132	133	133	133	133	133	133	134	134	134
.4	134	134	135	135	135	135	135	135	136	136
.5	136	136	136	137	137	137	137	137	137	138
.6	138	138	138	138	139	139	139	139	139	139
.7	140	140	140	140	140	140	141	141	141	141
.8	141	142	142	142	142	142	142	143	143	143
.9	143	143	144	144	144	144	144	144	145	145
1074.0	145	145	145	146	146	146	146	147	147	147
.1	147	147	148	148	148	148	149	149	149	149
.2	149	150	150	150	150	151	151	151	151	151
.3	152	152	152	152	152	153	153	153	153	154
.4	154	154	154	154	155	155	155	155	156	156
.5	156	156	156	157	157	157	157	158	158	158
.6	158	158	159	159	159	159	160	160	160	160
.7	160	161	161	161	161	161	162	162	162	162
.8	163	163	163	163	163	164	164	164	164	165
.9	165	165	165	165	166	166	166	166	167	167

PAPIO CREEK SITE 18

CAPACITY IN ACRE-FT.
(1984 SURVEY)

EFFECTIVE

ELEV	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
1075.0	167	167	167	168	168	168	168	169	169	169
.1	169	170	170	170	170	171	171	171	171	172
.2	172	172	172	173	173	173	173	173	174	174
.3	174	174	175	175	175	175	176	176	176	176
.4	177	177	177	177	178	178	178	178	179	179
.5	179	179	179	180	180	180	180	181	181	181
.6	181	182	182	182	182	183	183	183	183	184
.7	184	184	184	185	185	185	185	185	186	186
.8	186	186	187	187	187	187	188	188	188	188
.9	189	189	189	189	190	190	190	190	191	191
1076.0	191	191	191	192	192	192	192	193	193	193
.1	193	194	194	194	194	195	195	195	195	196
.2	196	196	196	197	197	197	197	197	198	198
.3	198	198	199	199	199	199	200	200	200	200
.4	201	201	201	201	202	202	202	202	203	203
.5	203	203	203	204	204	204	204	205	205	205
.6	205	206	206	206	206	207	207	207	207	208
.7	208	208	208	209	209	209	209	209	210	210
.8	210	210	211	211	211	211	212	212	212	212
.9	213	213	213	213	214	214	214	214	215	215
1077.0	215	215	216	216	216	216	217	217	217	218
.1	218	218	218	219	219	219	220	220	220	221
.2	221	221	221	222	222	222	223	223	223	223
.3	224	224	224	225	225	225	225	226	226	226
.4	227	227	227	227	228	228	228	229	229	229
.5	229	230	230	230	231	231	231	232	232	232
.6	232	233	233	233	234	234	234	234	235	235
.7	235	236	236	236	236	237	237	237	238	238
.8	238	238	239	239	239	240	240	240	241	241
.9	241	241	242	242	242	243	243	243	243	244
1078.0	244	244	245	245	245	246	246	247	247	247
.1	248	248	248	249	249	250	250	250	251	251
.2	251	252	252	253	253	253	254	254	254	255
.3	255	255	256	256	257	257	257	258	258	258
.4	259	259	260	260	260	261	261	261	262	262
.5	262	263	263	264	264	264	265	265	265	266
.6	266	267	267	267	268	268	268	269	269	270
.7	270	270	271	271	271	272	272	272	273	273
.8	274	274	274	275	275	275	276	276	277	277
.9	277	278	278	278	279	279	280	280	280	281
1079.0	281	281	282	282	283	283	284	284	285	285
.1	286	286	287	287	288	288	289	289	290	290
.2	291	291	292	292	293	293	293	294	294	295
.3	295	296	296	297	297	298	298	299	299	300
.4	300	301	301	302	302	303	303	304	304	305
.5	305	305	306	306	307	307	308	308	309	309
.6	310	310	311	311	312	312	313	313	314	314
.7	315	315	316	316	317	317	317	318	318	319
.8	319	320	320	321	321	322	322	323	323	324
.9	324	325	325	326	326	327	327	328	328	329

PAPIO CREEK SITE 18

CAPACITY IN ACRE-FT.
(1984 SURVEY)

EFFECTIVE

ELEV	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
1080.0	329	330	330	331	331	332	332	333	334	334
.1	335	335	336	337	337	338	338	339	339	340
.2	341	341	342	342	343	344	344	345	345	346
.3	346	347	348	348	349	349	350	350	351	352
.4	352	353	353	354	355	355	356	356	357	357
.5	358	359	359	360	360	361	361	362	363	363
.6	364	364	365	366	366	367	367	368	368	369
.7	370	370	371	371	372	372	373	374	374	375
.8	375	376	377	377	378	378	379	379	380	381
.9	381	382	382	383	384	384	385	385	386	386
1081.0	387	388	388	389	390	390	391	392	392	393
.1	393	394	395	395	396	397	397	398	399	399
.2	400	401	401	402	403	403	404	405	405	406
.3	406	407	408	408	409	410	410	411	412	412
.4	413	414	414	415	416	416	417	418	418	419
.5	419	420	421	421	422	423	423	424	425	425
.6	426	427	427	428	429	429	430	431	431	432
.7	432	433	434	434	435	436	436	437	438	438
.8	439	440	440	441	442	442	443	444	444	445
.9	445	446	447	447	448	449	449	450	451	451
1082.0	452	453	453	454	455	456	456	457	458	459
.1	459	460	461	462	462	463	464	465	466	466
.2	467	468	469	469	470	471	472	472	473	474
.3	474	475	476	477	477	478	479	480	480	481
.4	482	483	483	484	485	486	486	487	488	489
.5	489	490	491	492	492	493	494	495	495	496
.6	497	498	498	499	500	501	501	502	503	504
.7	504	505	506	507	507	508	509	510	510	511
.8	512	513	513	514	515	516	516	517	518	519
.9	519	520	521	522	522	523	524	525	525	526
1083.0	527	528	529	530	530	531	532	533	534	535
.1	536	537	537	538	539	540	541	542	543	544
.2	544	545	546	547	548	549	550	550	551	552
.3	553	554	555	556	557	557	558	559	560	561
.4	562	563	564	564	565	566	567	568	569	570
.5	570	571	572	573	574	575	576	577	577	578
.6	579	580	581	582	583	584	584	585	586	587
.7	588	589	590	591	591	592	593	594	595	596
.8	597	597	598	599	600	601	602	603	604	604
.9	605	606	607	608	609	610	611	611	612	613
1084.0	614	615	616	617	618	619	620	621	622	623
.1	624	625	626	627	628	629	630	631	632	633
.2	634	635	636	637	638	639	640	641	642	643
.3	644	645	646	647	648	649	650	651	652	653
.4	654	655	656	657	658	659	660	661	662	663
.5	664	665	666	667	668	669	670	671	672	673
.6	674	675	676	677	678	679	680	681	682	683
.7	684	685	686	687	688	689	690	691	692	693
.8	694	695	696	697	698	699	700	701	702	703
.9	704	705	706	707	708	709	710	711	712	713

PAPIO CREEK SITE 18

CAPACITY IN ACRE-FT.
(1984 SURVEY)

EFFECTIVE

ELEV	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
1085.0	714	715	716	717	719	720	721	722	723	724
.1	725	727	728	729	730	731	732	733	735	736
.2	737	738	739	740	741	743	744	745	746	747
.3	748	749	750	752	753	754	755	756	757	758
.4	760	761	762	763	764	765	766	768	769	770
.5	771	772	773	774	776	777	778	779	780	781
.6	782	784	785	786	787	788	789	790	792	793
.7	794	795	796	797	798	799	801	802	803	804
.8	805	806	807	809	810	811	812	813	814	815
.9	817	818	819	820	821	822	823	825	826	827
1086.0	828	829	830	832	833	834	835	837	838	839
.1	840	842	843	844	845	847	848	849	851	852
.2	853	854	856	857	858	859	861	862	863	864
.3	865	867	868	869	870	872	873	874	875	877
.4	878	879	880	882	883	884	885	887	888	889
.5	890	892	893	894	895	897	898	899	900	902
.6	903	904	905	907	908	909	910	912	913	914
.7	915	917	918	919	920	922	923	924	925	927
.8	928	929	930	932	933	934	935	937	938	939
.9	940	942	943	944	945	947	948	949	950	952
1087.0	953	954	956	957	959	960	961	963	964	965
.1	967	968	970	971	972	974	975	976	978	979
.2	981	982	983	985	986	988	989	990	992	993
.3	994	996	997	999	1000	1001	1003	1004	1005	1007
.4	1008	1010	1011	1012	1014	1015	1016	1018	1019	1021
.5	1022	1023	1025	1026	1028	1029	1030	1032	1033	1034
.6	1036	1037	1039	1040	1041	1043	1044	1045	1047	1048
.7	1050	1051	1052	1054	1055	1056	1058	1059	1061	1062
.8	1063	1065	1066	1068	1069	1070	1072	1073	1074	1076
.9	1077	1079	1080	1081	1083	1084	1085	1087	1088	1090
1088.0	1091	1092	1094	1095	1097	1098	1100	1101	1103	1104
.1	1106	1107	1109	1110	1112	1113	1115	1117	1118	1120
.2	1121	1123	1124	1126	1127	1129	1130	1132	1133	1134
.3	1136	1137	1139	1140	1142	1143	1145	1146	1148	1149
.4	1151	1152	1154	1155	1157	1158	1160	1161	1163	1164
.5	1166	1167	1169	1170	1172	1173	1175	1176	1178	1179
.6	1181	1182	1184	1185	1187	1188	1190	1191	1193	1194
.7	1196	1197	1199	1200	1202	1203	1205	1206	1208	1209
.8	1211	1212	1214	1215	1217	1218	1220	1221	1223	1224
.9	1226	1227	1229	1230	1232	1233	1235	1236	1238	1239
1089.0	1241	1243	1244	1246	1247	1249	1251	1252	1254	1255
.1	1257	1259	1260	1262	1264	1265	1267	1268	1270	1272
.2	1273	1275	1276	1278	1280	1281	1283	1284	1286	1288
.3	1289	1291	1293	1294	1296	1297	1299	1301	1302	1304
.4	1305	1307	1309	1310	1312	1313	1315	1317	1318	1320
.5	1321	1323	1325	1326	1328	1330	1331	1333	1334	1336
.6	1338	1339	1341	1342	1344	1346	1347	1349	1350	1352
.7	1354	1355	1357	1359	1360	1362	1363	1365	1367	1368
.8	1370	1371	1373	1375	1376	1378	1379	1381	1383	1384
.9	1386	1388	1389	1391	1392	1394	1396	1397	1399	1400

PAPIO CREEK SITE 18

CAPACITY IN ACRE-FT.
(1984 SURVEY)

EFFECTIVE

ELEV	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
1090.0	1402	1404	1405	1407	1409	1411	1412	1414	1416	1418
.1	1419	1421	1423	1424	1426	1428	1430	1431	1433	1435
.2	1437	1438	1440	1442	1444	1445	1447	1449	1450	1452
.3	1454	1456	1457	1459	1461	1463	1464	1466	1468	1469
.4	1471	1473	1475	1476	1478	1480	1482	1483	1485	1487
.5	1488	1490	1492	1494	1495	1497	1499	1501	1502	1504
.6	1506	1508	1509	1511	1513	1514	1516	1518	1520	1521
.7	1523	1525	1527	1528	1530	1532	1533	1535	1537	1539
.8	1540	1542	1544	1546	1547	1549	1551	1553	1554	1556
.9	1558	1559	1561	1563	1565	1566	1568	1570	1572	1573
1091.0	1575	1577	1579	1581	1582	1584	1586	1588	1590	1592
.1	1593	1595	1597	1599	1601	1603	1605	1606	1608	1610
.2	1612	1614	1616	1618	1619	1621	1623	1625	1627	1629
.3	1630	1632	1634	1636	1638	1640	1642	1643	1645	1647
.4	1649	1651	1653	1655	1656	1658	1660	1662	1664	1666
.5	1667	1669	1671	1673	1675	1677	1679	1680	1682	1684
.6	1686	1688	1690	1692	1693	1695	1697	1699	1701	1703
.7	1704	1706	1708	1710	1712	1714	1716	1717	1719	1721
.8	1723	1725	1727	1729	1730	1732	1734	1736	1738	1740
.9	1741	1743	1745	1747	1749	1751	1753	1754	1756	1758
1092.0	1760	1762	1764	1766	1768	1770	1772	1774	1776	1778
.1	1780	1782	1784	1786	1788	1790	1792	1793	1795	1797
.2	1799	1801	1803	1805	1807	1809	1811	1813	1815	1817
.3	1819	1821	1823	1825	1827	1829	1831	1833	1835	1837
.4	1839	1841	1843	1845	1847	1849	1851	1853	1855	1857
.5	1858	1860	1862	1864	1866	1868	1870	1872	1874	1876
.6	1878	1880	1882	1884	1886	1888	1890	1892	1894	1896
.7	1898	1900	1902	1904	1906	1908	1910	1912	1914	1916
.8	1918	1920	1922	1924	1925	1927	1929	1931	1933	1935
.9	1937	1939	1941	1943	1945	1947	1949	1951	1953	1955
1093.0	1957	1959	1961	1963	1965	1967	1969	1972	1974	1976
.1	1978	1980	1982	1984	1986	1988	1990	1992	1994	1997
.2	1999	2001	2003	2005	2007	2009	2011	2013	2015	2017
.3	2019	2021	2024	2026	2028	2030	2032	2034	2036	2038
.4	2040	2042	2044	2046	2049	2051	2053	2055	2057	2059
.5	2061	2063	2065	2067	2069	2071	2073	2076	2078	2080
.6	2082	2084	2086	2088	2090	2092	2094	2096	2098	2101
.7	2103	2105	2107	2109	2111	2113	2115	2117	2119	2121
.8	2123	2125	2128	2130	2132	2134	2136	2138	2140	2142
.9	2144	2146	2148	2150	2153	2155	2157	2159	2161	2163
1094.0	2165	2167	2169	2172	2174	2176	2178	2180	2183	2185
.1	2187	2189	2191	2193	2196	2198	2200	2202	2204	2207
.2	2209	2211	2213	2215	2218	2220	2222	2224	2226	2229
.3	2231	2233	2235	2237	2239	2242	2244	2246	2248	2250
.4	2253	2255	2257	2259	2261	2264	2266	2268	2270	2272
.5	2274	2277	2279	2281	2283	2285	2288	2290	2292	2294
.6	2296	2299	2301	2303	2305	2307	2310	2312	2314	2316
.7	2318	2320	2323	2325	2327	2329	2331	2334	2336	2338
.8	2340	2342	2345	2347	2349	2351	2353	2356	2358	2360
.9	2362	2364	2366	2369	2371	2373	2375	2377	2380	2382

PAPIO CREEK SITE 18

CAPACITY IN ACRE-FT.
(1984 SURVEY)

EFFECTIVE

ELEV	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
1095.0	2384	2386	2389	2391	2393	2395	2398	2400	2402	2405
.1	2407	2409	2412	2414	2416	2418	2421	2423	2425	2428
.2	2430	2432	2435	2437	2439	2442	2444	2446	2448	2451
.3	2453	2455	2458	2460	2462	2464	2467	2469	2471	2474
.4	2476	2478	2481	2483	2485	2487	2490	2492	2494	2497
.5	2499	2501	2504	2506	2508	2510	2513	2515	2517	2520
.6	2522	2524	2527	2529	2531	2533	2536	2538	2540	2543
.7	2545	2547	2550	2552	2554	2556	2559	2561	2563	2566
.8	2568	2570	2573	2575	2577	2579	2582	2584	2586	2589
.9	2591	2593	2596	2598	2600	2602	2605	2607	2609	2612
1096.0	2614	2616	2619	2621	2624	2626	2628	2631	2633	2636
.1	2638	2640	2643	2645	2647	2650	2652	2655	2657	2659
.2	2662	2664	2667	2669	2671	2674	2676	2679	2681	2683
.3	2686	2688	2690	2693	2695	2698	2700	2702	2705	2707
.4	2710	2712	2714	2717	2719	2722	2724	2726	2729	2731
.5	2733	2736	2738	2741	2743	2745	2748	2750	2753	2755
.6	2757	2760	2762	2765	2767	2769	2772	2774	2777	2779
.7	2781	2784	2786	2788	2791	2793	2796	2798	2800	2803
.8	2805	2808	2810	2812	2815	2817	2820	2822	2824	2827
.9	2829	2831	2834	2836	2839	2841	2843	2846	2848	2851
1097.0	2853	2856	2858	2861	2863	2866	2868	2871	2873	2876
.1	2878	2881	2883	2886	2888	2891	2893	2896	2898	2901
.2	2903	2906	2908	2911	2913	2916	2919	2921	2924	2926
.3	2929	2931	2934	2936	2939	2941	2944	2946	2949	2951
.4	2954	2956	2959	2961	2964	2966	2969	2971	2974	2976
.5	2979	2982	2984	2987	2989	2992	2994	2997	2999	3002
.6	3004	3007	3009	3012	3014	3017	3019	3022	3024	3027
.7	3029	3032	3034	3037	3039	3042	3045	3047	3050	3052
.8	3055	3057	3060	3062	3065	3067	3070	3072	3075	3077
.9	3080	3082	3085	3087	3090	3092	3095	3097	3100	3102
1098.0	3105	3108	3110	3113	3116	3118	3121	3124	3126	3129
.1	3132	3134	3137	3140	3142	3145	3148	3150	3153	3156
.2	3158	3161	3164	3166	3169	3172	3174	3177	3179	3182
.3	3185	3187	3190	3193	3195	3198	3201	3203	3206	3209
.4	3211	3214	3217	3219	3222	3225	3227	3230	3233	3235
.5	3238	3241	3243	3246	3249	3251	3254	3257	3259	3262
.6	3265	3267	3270	3273	3275	3278	3281	3283	3286	3289
.7	3291	3294	3297	3299	3302	3304	3307	3310	3312	3315
.8	3318	3320	3323	3326	3328	3331	3334	3336	3339	3342
.9	3344	3347	3350	3352	3355	3358	3360	3363	3366	3368
1099.0	3371	3374	3377	3379	3382	3385	3388	3391	3393	3396
.1	3399	3402	3405	3407	3410	3413	3416	3419	3421	3424
.2	3427	3430	3433	3435	3438	3441	3444	3447	3449	3452
.3	3455	3458	3461	3463	3466	3469	3472	3475	3477	3480
.4	3483	3486	3489	3491	3494	3497	3500	3503	3505	3508
.5	3511	3514	3517	3519	3522	3525	3528	3531	3533	3536
.6	3539	3542	3545	3547	3550	3553	3556	3559	3561	3564
.7	3567	3570	3573	3575	3578	3581	3584	3587	3589	3592
.8	3595	3598	3601	3603	3606	3609	3612	3615	3617	3620
.9	3623	3626	3629	3631	3634	3637	3640	3643	3645	3648

PAPIO CREEK SITE 18

CAPACITY IN ACRE-FT.
(1984 SURVEY)

EFFECTIVE

ELEV	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
1100.0	3651	3654	3657	3660	3663	3666	3669	3672	3675	3678
.1	3681	3684	3687	3689	3692	3695	3698	3701	3704	3707
.2	3710	3713	3716	3719	3722	3725	3728	3731	3734	3737
.3	3740	3743	3746	3749	3752	3755	3758	3761	3763	3766
.4	3769	3772	3775	3778	3781	3784	3787	3790	3793	3796
.5	3799	3802	3805	3808	3811	3814	3817	3820	3823	3826
.6	3829	3832	3835	3837	3840	3843	3846	3849	3852	3855
.7	3858	3861	3864	3867	3870	3873	3876	3879	3882	3885
.8	3888	3891	3894	3897	3900	3903	3906	3909	3911	3914
.9	3917	3920	3923	3926	3929	3932	3935	3938	3941	3944
1101.0	3947	3950	3953	3956	3959	3962	3966	3969	3972	3975
.1	3978	3981	3984	3987	3990	3993	3996	4000	4003	4006
.2	4009	4012	4015	4018	4021	4024	4027	4030	4034	4037
.3	4040	4043	4046	4049	4052	4055	4058	4061	4064	4068
.4	4071	4074	4077	4080	4083	4086	4089	4092	4095	4098
.5	4101	4105	4108	4111	4114	4117	4120	4123	4126	4129
.6	4132	4135	4139	4142	4145	4148	4151	4154	4157	4160
.7	4163	4166	4169	4173	4176	4179	4182	4185	4188	4191
.8	4194	4197	4200	4203	4207	4210	4213	4216	4219	4222
.9	4225	4228	4231	4234	4237	4241	4244	4247	4250	4253
1102.0	4256	4259	4262	4266	4269	4272	4275	4279	4282	4285
.1	4288	4292	4295	4298	4301	4305	4308	4311	4314	4318
.2	4321	4324	4327	4331	4334	4337	4340	4343	4347	4350
.3	4353	4356	4360	4363	4366	4369	4373	4376	4379	4382
.4	4386	4389	4392	4395	4399	4402	4405	4408	4412	4415
.5	4418	4421	4424	4428	4431	4434	4437	4441	4444	4447
.6	4450	4454	4457	4460	4463	4467	4470	4473	4476	4480
.7	4483	4486	4489	4493	4496	4499	4502	4505	4509	4512
.8	4515	4518	4522	4525	4528	4531	4535	4538	4541	4544
.9	4548	4551	4554	4557	4561	4564	4567	4570	4574	4577
1103.0	4580	4583	4587	4590	4594	4597	4600	4604	4607	4610
.1	4614	4617	4621	4624	4627	4631	4634	4637	4641	4644
.2	4648	4651	4654	4658	4661	4665	4668	4671	4675	4678
.3	4681	4685	4688	4692	4695	4698	4702	4705	4708	4712
.4	4715	4719	4722	4725	4729	4732	4735	4739	4742	4746
.5	4749	4752	4756	4759	4763	4766	4769	4773	4776	4779
.6	4783	4786	4790	4793	4796	4800	4803	4806	4810	4813
.7	4817	4820	4823	4827	4830	4833	4837	4840	4844	4847
.8	4850	4854	4857	4861	4864	4867	4871	4874	4877	4881
.9	4884	4888	4891	4894	4898	4901	4904	4908	4911	4915
1104.0	4918	4922	4925	4929	4932	4936	4939	4943	4946	4950
.1	4953	4957	4960	4964	4967	4971	4974	4978	4981	4985
.2	4988	4992	4995	4999	5002	5006	5010	5013	5017	5020
.3	5024	5027	5031	5034	5038	5041	5045	5048	5052	5055
.4	5059	5062	5066	5069	5073	5076	5080	5083	5087	5090
.5	5094	5098	5101	5105	5108	5112	5115	5119	5122	5126
.6	5129	5133	5136	5140	5143	5147	5150	5154	5157	5161
.7	5164	5168	5171	5175	5178	5182	5186	5189	5193	5196
.8	5200	5203	5207	5210	5214	5217	5221	5224	5228	5231
.9	5235	5238	5242	5245	5249	5252	5256	5259	5263	5266

PAPIO CREEK SITE 18

CAPACITY IN ACRE-FT.
(1984 SURVEY)

EFFECTIVE

ELEV	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
1105.0	5270	5274	5277	5281	5285	5288	5292	5296	5299	5303
.1	5306	5310	5314	5317	5321	5325	5328	5332	5336	5339
.2	5343	5347	5350	5354	5358	5361	5365	5369	5372	5376
.3	5379	5383	5387	5390	5394	5398	5401	5405	5409	5412
.4	5416	5420	5423	5427	5431	5434	5438	5442	5445	5449
.5	5452	5456	5460	5463	5467	5471	5474	5478	5482	5485
.6	5489	5493	5496	5500	5504	5507	5511	5515	5518	5522
.7	5525	5529	5533	5536	5540	5544	5547	5551	5555	5558
.8	5562	5566	5569	5573	5577	5580	5584	5588	5591	5595
.9	5598	5602	5606	5609	5613	5617	5620	5624	5628	5631
1106.0	5635	5639	5643	5646	5650	5654	5658	5661	5665	5669
.1	5673	5676	5680	5684	5688	5692	5695	5699	5703	5707
.2	5710	5714	5718	5722	5725	5729	5733	5737	5741	5744
.3	5748	5752	5756	5759	5763	5767	5771	5774	5778	5782
.4	5786	5790	5793	5797	5801	5805	5808	5812	5816	5820
.5	5823	5827	5831	5835	5839	5842	5846	5850	5854	5857
.6	5861	5865	5869	5873	5876	5880	5884	5888	5891	5895
.7	5899	5903	5906	5910	5914	5918	5922	5925	5929	5933
.8	5937	5940	5944	5948	5952	5955	5959	5963	5967	5971
.9	5974	5978	5982	5986	5989	5993	5997	6001	6004	6008
1107.0	6012	6016	6020	6024	6028	6032	6036	6039	6043	6047
.1	6051	6055	6059	6063	6067	6071	6075	6079	6083	6086
.2	6090	6094	6098	6102	6106	6110	6114	6118	6122	6126
.3	6130	6134	6137	6141	6145	6149	6153	6157	6161	6165
.4	6169	6173	6177	6181	6184	6188	6192	6196	6200	6204
.5	6208	6212	6216	6220	6224	6228	6232	6235	6239	6243
.6	6247	6251	6255	6259	6263	6267	6271	6275	6279	6282
.7	6286	6290	6294	6298	6302	6306	6310	6314	6318	6322
.8	6326	6330	6333	6337	6341	6345	6349	6353	6357	6361
.9	6365	6369	6373	6377	6380	6384	6388	6392	6396	6400
1108.0	6404	6408	6412	6416	6420	6424	6428	6433	6437	6441
.1	6445	6449	6453	6457	6461	6465	6469	6473	6477	6482
.2	6486	6490	6494	6498	6502	6506	6510	6514	6518	6522
.3	6526	6530	6535	6539	6543	6547	6551	6555	6559	6563
.4	6567	6571	6575	6579	6584	6588	6592	6596	6600	6604
.5	6608	6612	6616	6620	6624	6628	6632	6637	6641	6645
.6	6649	6653	6657	6661	6665	6669	6673	6677	6681	6686
.7	6690	6694	6698	6702	6706	6710	6714	6718	6722	6726
.8	6730	6734	6739	6743	6747	6751	6755	6759	6763	6767
.9	6771	6775	6779	6783	6788	6792	6796	6800	6804	6808
1109.0	6812	6816	6821	6825	6829	6833	6838	6842	6846	6851
.1	6855	6859	6863	6868	6872	6876	6880	6885	6889	6893
.2	6898	6902	6906	6910	6915	6919	6923	6928	6932	6936
.3	6940	6945	6949	6953	6958	6962	6966	6970	6975	6979
.4	6983	6987	6992	6996	7000	7005	7009	7013	7017	7022
.5	7026	7030	7035	7039	7043	7047	7052	7056	7060	7065
.6	7069	7073	7077	7082	7086	7090	7094	7099	7103	7107
.7	7112	7116	7120	7124	7129	7133	7137	7142	7146	7150
.8	7154	7159	7163	7167	7172	7176	7180	7184	7189	7193
.9	7197	7201	7206	7210	7214	7219	7223	7227	7231	7236

PAPIO CREEK SITE 18

CAPACITY IN ACRE-FT.
(1984 SURVEY)

EFFECTIVE

ELEV	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
1110.0	7240	7244	7249	7253	7258	7262	7267	7271	7276	7280
.1	7284	7289	7293	7298	7302	7307	7311	7315	7320	7324
.2	7329	7333	7338	7342	7347	7351	7355	7360	7364	7369
.3	7373	7378	7382	7387	7391	7395	7400	7404	7409	7413
.4	7418	7422	7426	7431	7435	7440	7444	7449	7453	7458
.5	7462	7466	7471	7475	7480	7484	7489	7493	7498	7502
.6	7506	7511	7515	7520	7524	7529	7533	7537	7542	7546
.7	7551	7555	7560	7564	7569	7573	7577	7582	7586	7591
.8	7595	7600	7604	7609	7613	7617	7622	7626	7631	7635
.9	7640	7644	7648	7653	7657	7662	7666	7671	7675	7680
1111.0	7684	7689	7693	7698	7702	7707	7712	7716	7721	7725
.1	7730	7734	7739	7744	7748	7753	7757	7762	7767	7771
.2	7776	7780	7785	7790	7794	7799	7803	7808	7813	7817
.3	7822	7826	7831	7835	7840	7845	7849	7854	7858	7863
.4	7868	7872	7877	7881	7886	7891	7895	7900	7904	7909
.5	7913	7918	7923	7927	7932	7936	7941	7946	7950	7955
.6	7959	7964	7969	7973	7978	7982	7987	7992	7996	8001
.7	8005	8010	8014	8019	8024	8028	8033	8037	8042	8047
.8	8051	8056	8060	8065	8070	8074	8079	8083	8088	8093
.9	8097	8102	8106	8111	8115	8120	8125	8129	8134	8138
1112.0	8143	8148	8153	8157	8162	8167	8172	8176	8181	8186
.1	8191	8196	8200	8205	8210	8215	8219	8224	8229	8234
.2	8239	8243	8248	8253	8258	8263	8267	8272	8277	8282
.3	8286	8291	8296	8301	8306	8310	8315	8320	8325	8329
.4	8334	8339	8344	8349	8353	8358	8363	8368	8372	8377
.5	8382	8387	8392	8396	8401	8406	8411	8415	8420	8425
.6	8430	8435	8439	8444	8449	8454	8458	8463	8468	8473
.7	8478	8482	8487	8492	8497	8501	8506	8511	8516	8521
.8	8525	8530	8535	8540	8545	8549	8554	8559	8564	8568
.9	8573	8578	8583	8588	8592	8597	8602	8607	8611	8616
1113.0	8621	8626	8631	8636	8641	8646	8651	8656	8661	8666
.1	8671	8676	8681	8686	8691	8696	8701	8706	8711	8716
.2	8721	8726	8731	8736	8741	8746	8751	8756	8761	8766
.3	8771	8776	8781	8786	8791	8796	8801	8806	8811	8816
.4	8821	8826	8831	8836	8841	8846	8851	8856	8861	8866
.5	8871	8876	8881	8886	8891	8896	8901	8906	8911	8916
.6	8921	8926	8931	8936	8941	8946	8951	8956	8961	8966
.7	8971	8976	8981	8986	8991	8996	9001	9006	9011	9016
.8	9021	9026	9031	9036	9041	9046	9051	9056	9061	9066
.9	9071	9076	9081	9086	9091	9096	9101	9106	9111	9116
1114.0	9121	9126	9131	9137	9142	9147	9152	9158	9163	9168
.1	9173	9179	9184	9189	9194	9200	9205	9210	9216	9221
.2	9226	9231	9237	9242	9247	9252	9258	9263	9268	9273
.3	9278	9284	9289	9294	9299	9305	9310	9315	9320	9326
.4	9331	9336	9341	9347	9352	9357	9362	9368	9373	9378
.5	9383	9389	9394	9399	9404	9410	9415	9420	9425	9431
.6	9436	9441	9446	9452	9457	9462	9467	9473	9478	9483
.7	9488	9494	9499	9504	9509	9515	9520	9525	9530	9536
.8	9541	9546	9551	9557	9562	9567	9572	9578	9583	9588
.9	9593	9599	9604	9609	9614	9620	9625	9630	9635	9641

PAPIO CREEK SITE 18

CAPACITY IN ACRE-FT.
(1984 SURVEY)

EFFECTIVE

ELEV	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
1115.0	9646	9652	9657	9663	9668	9674	9679	9685	9690	9696
.1	9701	9707	9712	9718	9723	9729	9734	9740	9745	9751
.2	9756	9762	9767	9773	9778	9784	9789	9795	9800	9806
.3	9811	9817	9822	9828	9833	9839	9844	9850	9855	9861
.4	9866	9872	9877	9883	9888	9894	9899	9905	9910	9916
.5	9921	9927	9933	9938	9944	9949	9955	9960	9966	9971
.6	9977	9982	9988	9993	9999	10004	10010	10015	10021	10026
.7	10032	10037	10043	10048	10054	10059	10065	10070	10076	10081
.8	10087	10092	10098	10103	10109	10114	10120	10125	10131	10136
.9	10142	10147	10153	10158	10164	10169	10175	10180	10186	10191
1116.0	10197	10203	10208	10214	10220	10226	10231	10237	10243	10249
.1	10254	10260	10266	10272	10277	10283	10289	10295	10300	10306
.2	10312	10318	10323	10329	10335	10341	10346	10352	10358	10363
.3	10369	10375	10381	10386	10392	10398	10404	10409	10415	10421
.4	10427	10432	10438	10444	10450	10455	10461	10467	10473	10478
.5	10484	10490	10495	10501	10507	10513	10518	10524	10530	10536
.6	10541	10547	10553	10559	10564	10570	10576	10582	10587	10593
.7	10599	10605	10610	10616	10622	10627	10633	10639	10645	10650
.8	10656	10662	10668	10673	10679	10685	10691	10696	10702	10708
.9	10714	10719	10725	10731	10737	10742	10748	10754	10760	10765
1117.0	10771	10777	10783	10789	10795	10801	10807	10813	10819	10825
.1	10831	10837	10843	10849	10855	10861	10867	10872	10878	10884
.2	10890	10896	10902	10908	10914	10920	10926	10932	10938	10944
.3	10950	10956	10962	10968	10974	10980	10986	10992	10998	11004
.4	11010	11016	11022	11028	11034	11040	11046	11052	11058	11064
.5	11069	11075	11081	11087	11093	11099	11105	11111	11117	11123
.6	11129	11135	11141	11147	11153	11159	11165	11171	11177	11183
.7	11189	11195	11201	11207	11213	11219	11225	11231	11237	11243
.8	11249	11255	11261	11267	11272	11278	11284	11290	11296	11302
.9	11308	11314	11320	11326	11332	11338	11344	11350	11356	11362
1118.0	11368	11374	11380	11387	11393	11399	11405	11411	11418	11424
.1	11430	11436	11443	11449	11455	11461	11467	11474	11480	11486
.2	11492	11498	11505	11511	11517	11523	11529	11536	11542	11548
.3	11554	11561	11567	11573	11579	11585	11592	11598	11604	11610
.4	11616	11623	11629	11635	11641	11647	11654	11660	11666	11672
.5	11678	11685	11691	11697	11703	11710	11716	11722	11728	11734
.6	11741	11747	11753	11759	11765	11772	11778	11784	11790	11796
.7	11803	11809	11815	11821	11828	11834	11840	11846	11852	11859
.8	11865	11871	11877	11883	11890	11896	11902	11908	11914	11921
.9	11927	11933	11939	11946	11952	11958	11964	11970	11977	11983
1119.0	11989	11995	12002	12008	12015	12021	12028	12034	12041	12047
.1	12054	12060	12067	12073	12079	12086	12092	12099	12105	12112
.2	12118	12125	12131	12138	12144	12151	12157	12163	12170	12176
.3	12183	12189	12196	12202	12209	12215	12222	12228	12234	12241
.4	12247	12254	12260	12267	12273	12280	12286	12293	12299	12306
.5	12312	12318	12325	12331	12338	12344	12351	12357	12364	12370
.6	12377	12383	12390	12396	12402	12409	12415	12422	12428	12435
.7	12441	12448	12454	12461	12467	12473	12480	12486	12493	12499
.8	12506	12512	12519	12525	12532	12538	12545	12551	12557	12564
.9	12570	12577	12583	12590	12596	12603	12609	12616	12622	12629

PAPIO CREEK SITE 18

CAPACITY IN ACRE-FT.
(1984 SURVEY)

EFFECTIVE

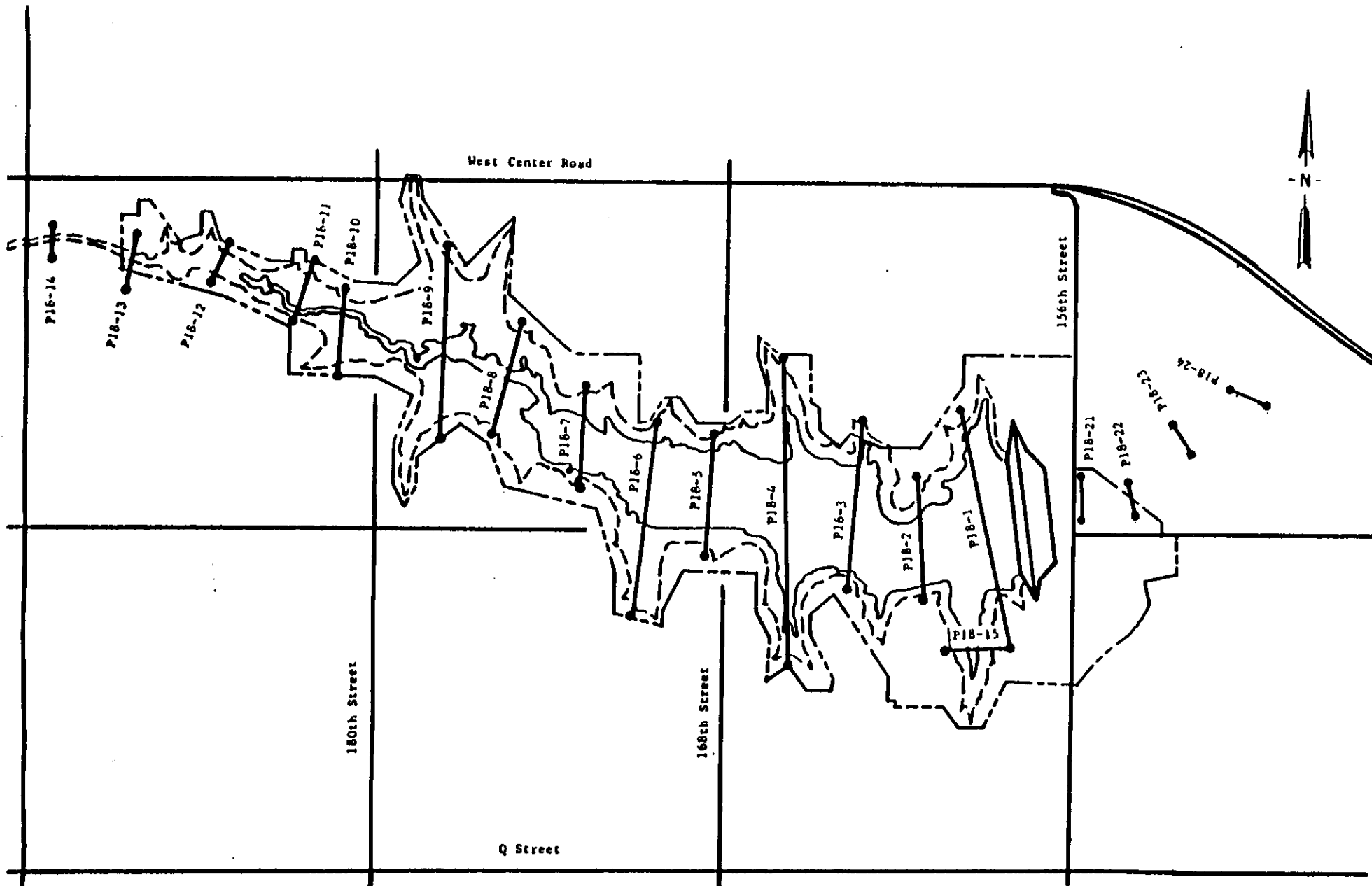
ELEV	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
1120.0	12635	12642	12648	12655	12662	12668	12675	12682	12689	12695
.1	12702	12709	12715	12722	12729	12735	12742	12749	12756	12762
.2	12769	12776	12782	12789	12796	12803	12809	12816	12823	12829
.3	12836	12843	12849	12856	12863	12869	12876	12883	12890	12896
.4	12903	12910	12916	12923	12930	12936	12943	12950	12957	12963
.5	12970	12977	12983	12990	12997	13003	13010	13017	13024	13030
.6	13037	13044	13050	13057	13064	13070	13077	13084	13091	13097
.7	13104	13111	13117	13124	13131	13137	13144	13151	13158	13164
.8	13171	13178	13184	13191	13198	13204	13211	13218	13225	13231
.9	13238	13245	13251	13258	13265	13271	13278	13285	13292	13298
1121.0	13305	13312	13319	13326	13333	13340	13347	13354	13361	13367
.1	13374	13381	13388	13395	13402	13409	13416	13423	13430	13437
.2	13444	13451	13458	13465	13472	13479	13485	13492	13499	13506
.3	13513	13520	13527	13534	13541	13548	13555	13562	13569	13576
.4	13583	13590	13596	13603	13610	13617	13624	13631	13638	13645
.5	13652	13659	13666	13673	13680	13687	13694	13701	13708	13714
.6	13721	13728	13735	13742	13749	13756	13763	13770	13777	13784
.7	13791	13798	13805	13812	13819	13825	13832	13839	13846	13853
.8	13860	13867	13874	13881	13888	13895	13902	13909	13916	13923
.9	13930	13937	13943	13950	13957	13964	13971	13978	13985	13992
1122.0	13999	14006	14013	14021	14028	14035	14042	14049	14056	14064
.1	14071	14078	14085	14092	14100	14107	14114	14121	14128	14135
.2	14143	14150	14157	14164	14171	14179	14186	14193	14200	14207
.3	14214	14222	14229	14236	14243	14250	14257	14265	14272	14279
.4	14286	14293	14301	14308	14315	14322	14329	14336	14344	14351
.5	14358	14365	14372	14380	14387	14394	14401	14408	14415	14423
.6	14430	14437	14444	14451	14459	14466	14473	14480	14487	14494
.7	14502	14509	14516	14523	14530	14537	14545	14552	14559	14566
.8	14573	14581	14588	14595	14602	14609	14616	14624	14631	14638
.9	14645	14652	14660	14667	14674	14681	14688	14695	14703	14710
1123.0	14717	14724	14732	14739	14747	14754	14762	14769	14776	14784
.1	14791	14799	14806	14813	14821	14828	14836	14843	14851	14858
.2	14865	14873	14880	14888	14895	14903	14910	14917	14925	14932
.3	14940	14947	14954	14962	14969	14977	14984	14992	14999	15006
.4	15014	15021	15029	15036	15043	15051	15058	15066	15073	15081
.5	15088	15095	15103	15110	15118	15125	15133	15140	15147	15155
.6	15162	15170	15177	15184	15192	15199	15207	15214	15222	15229
.7	15236	15244	15251	15259	15266	15273	15281	15288	15296	15303
.8	15311	15318	15325	15333	15340	15348	15355	15363	15370	15377
.9	15385	15392	15400	15407	15414	15422	15429	15437	15444	15452
1124.0	15459	15467	15474	15482	15490	15497	15505	15513	15520	15528
.1	15536	15543	15551	15559	15566	15574	15582	15589	15597	15605
.2	15612	15620	15628	15635	15643	15651	15658	15666	15673	15681
.3	15689	15696	15704	15712	15719	15727	15735	15742	15750	15758
.4	15765	15773	15781	15788	15796	15804	15811	15819	15827	15834
.5	15842	15850	15857	15865	15873	15880	15888	15896	15903	15911
.6	15919	15926	15934	15942	15949	15957	15965	15972	15980	15988
.7	15995	16003	16011	16018	16026	16033	16041	16049	16056	16064
.8	16072	16079	16087	16095	16102	16110	16118	16125	16133	16141
.9	16148	16156	16164	16171	16179	16187	16194	16202	16210	16217

PAPIO CREEK SITE 18

CAPACITY IN ACRE-FT.
(1984 SURVEY)

EFFECTIVE

ELEV	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
1125.0	16225	16233	16241	16249	16257	16264	16272	16280	16288	16296
.1	16304	16312	16320	16328	16336	16343	16351	16359	16367	16375
.2	16383	16391	16399	16407	16415	16423	16430	16438	16446	16454
.3	16462	16470	16478	16486	16494	16501	16509	16517	16525	16533
.4	16541	16549	16557	16565	16573	16580	16588	16596	16604	16612
.5	16620	16628	16636	16644	16652	16659	16667	16675	16683	16691
.6	16699	16707	16715	16723	16731	16738	16746	16754	16762	16770
.7	16778	16786	16794	16802	16810	16817	16825	16833	16841	16849
.8	16857	16865	16873	16881	16889	16896	16904	16912	16920	16928
.9	16936	16944	16952	16960	16968	16975	16983	16991	16999	17007
1126.0	17015	17023	17031	17039	17048	17056	17064	17072	17080	17088
.1	17096	17105	17113	17121	17129	17137	17145	17153	17162	17170
.2	17178	17186	17194	17202	17210	17219	17227	17235	17243	17251
.3	17259	17267	17275	17284	17292	17300	17308	17316	17324	17332
.4	17341	17349	17357	17365	17373	17381	17389	17398	17406	17414
.5	17422	17430	17438	17446	17455	17463	17471	17479	17487	17495
.6	17503	17512	17520	17528	17536	17544	17552	17560	17569	17577
.7	17585	17593	17601	17609	17617	17625	17634	17642	17650	17658
.8	17666	17674	17682	17691	17699	17707	17715	17723	17731	17739
.9	17748	17756	17764	17772	17780	17788	17796	17805	17813	17821
1127.0	17829	17837	17846	17854	17863	17871	17879	17888	17896	17904
.1	17913	17921	17930	17938	17946	17955	17963	17971	17980	17988
.2	17997	18005	18013	18022	18030	18039	18047	18055	18064	18072
.3	18080	18089	18097	18106	18114	18122	18131	18139	18147	18156
.4	18164	18173	18181	18189	18198	18206	18214	18223	18231	18240
.5	18248	18256	18265	18273	18282	18290	18298	18307	18315	18323
.6	18332	18340	18349	18357	18365	18374	18382	18390	18399	18407
.7	18416	18424	18432	18441	18449	18457	18466	18474	18483	18491
.8	18499	18508	18516	18525	18533	18541	18550	18558	18566	18575
.9	18583	18592	18600	18608	18617	18625	18633	18642	18650	18659
1128.0	18667	18676	18684	18693	18702	18710	18719	18727	18736	18745
.1	18753	18762	18771	18779	18788	18796	18805	18814	18822	18831
.2	18840	18848	18857	18865	18874	18883	18891	18900	18909	18917
.3	18926	18935	18943	18952	18960	18969	18978	18986	18995	19004
.4	19012	19021	19029	19038	19047	19055	19064	19073	19081	19090
.5	19098	19107	19116	19124	19133	19142	19150	19159	19168	19176
.6	19185	19193	19202	19211	19219	19228	19237	19245	19254	19262
.7	19271	19280	19288	19297	19306	19314	19323	19332	19340	19349
.8	19357	19366	19375	19383	19392	19401	19409	19418	19426	19435
.9	19444	19452	19461	19470	19478	19487	19495	19504	19513	19521
1129.0	19530	19539	19548	19557	19565	19574	19583	19592	19601	19610
.1	19619	19627	19636	19645	19654	19663	19672	19681	19689	19698
.2	19707	19716	19725	19734	19743	19752	19760	19769	19778	19787
.3	19796	19805	19814	19822	19831	19840	19849	19858	19867	19876
.4	19884	19893	19902	19911	19920	19929	19938	19946	19955	19964
.5	19973	19982	19991	20000	20008	20017	20026	20035	20044	20053
.6	20062	20070	20079	20088	20097	20106	20115	20124	20132	20141
.7	20150	20159	20168	20177	20186	20194	20203	20212	20221	20230
.8	20239	20248	20257	20265	20274	20283	20292	20301	20310	20319
.9	20327	20336	20345	20354	20363	20372	20381	20389	20398	20407



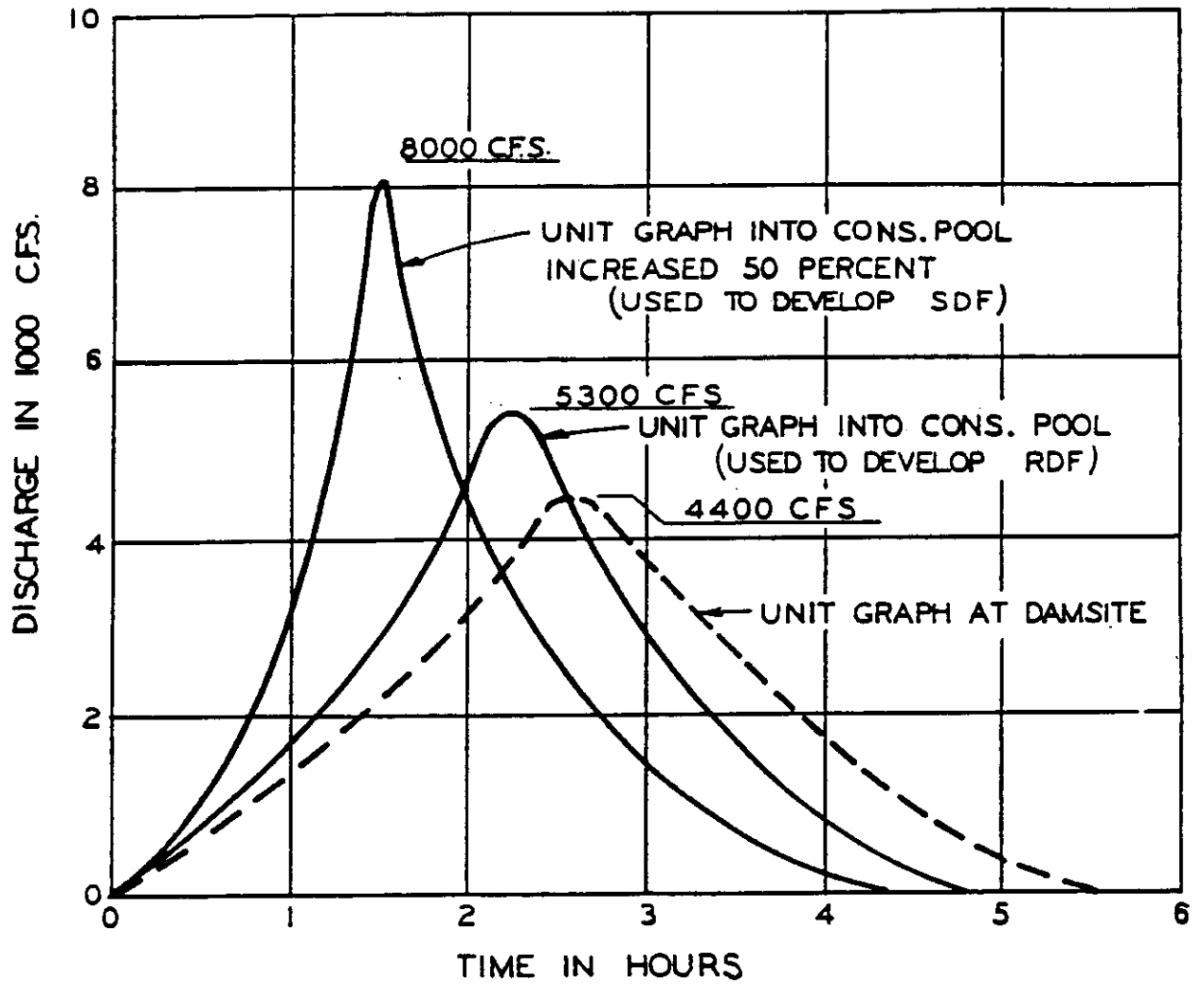
LEGEND

- Project Boundary
- ====+==== Multipurpose Pool (1110.0 ft, m.s.l.)
- Top of Flood Control Pool (1128.2 ft, m.s.l.)

SCALE: 1 inch = 2000 feet

PAPILLION CREEK AND TRIBUTARIES LAKES, NE

**SITE 18
SEDIMENTATION STUDIES
LOCATION OF SEDIMENT RANGES**



PAPILLION CREEK AND TRIBUTARIES LAKES, NEBRASKA
SITE 18

1-HOUR UNIT HYDROGRAPHS
 D.A.=16.4 MI²

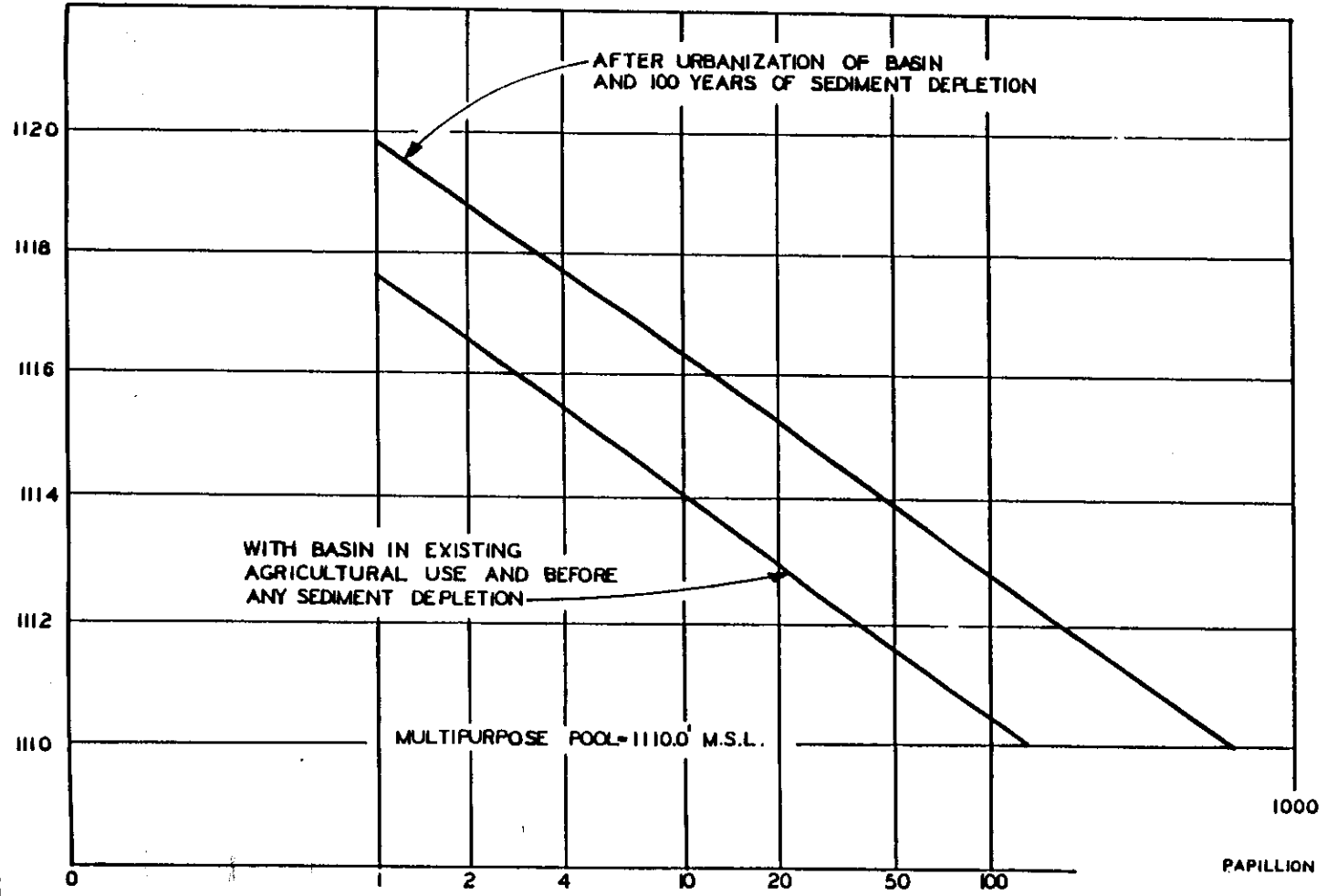
U.S. ARMY ENGINEER DISTRICT, OMAHA
 CORPS OF ENGINEERS OMAHA, NEBRASKA

SEP. 1981

PLATE 34

POOL ELEVATION IN FEET M.S.L.

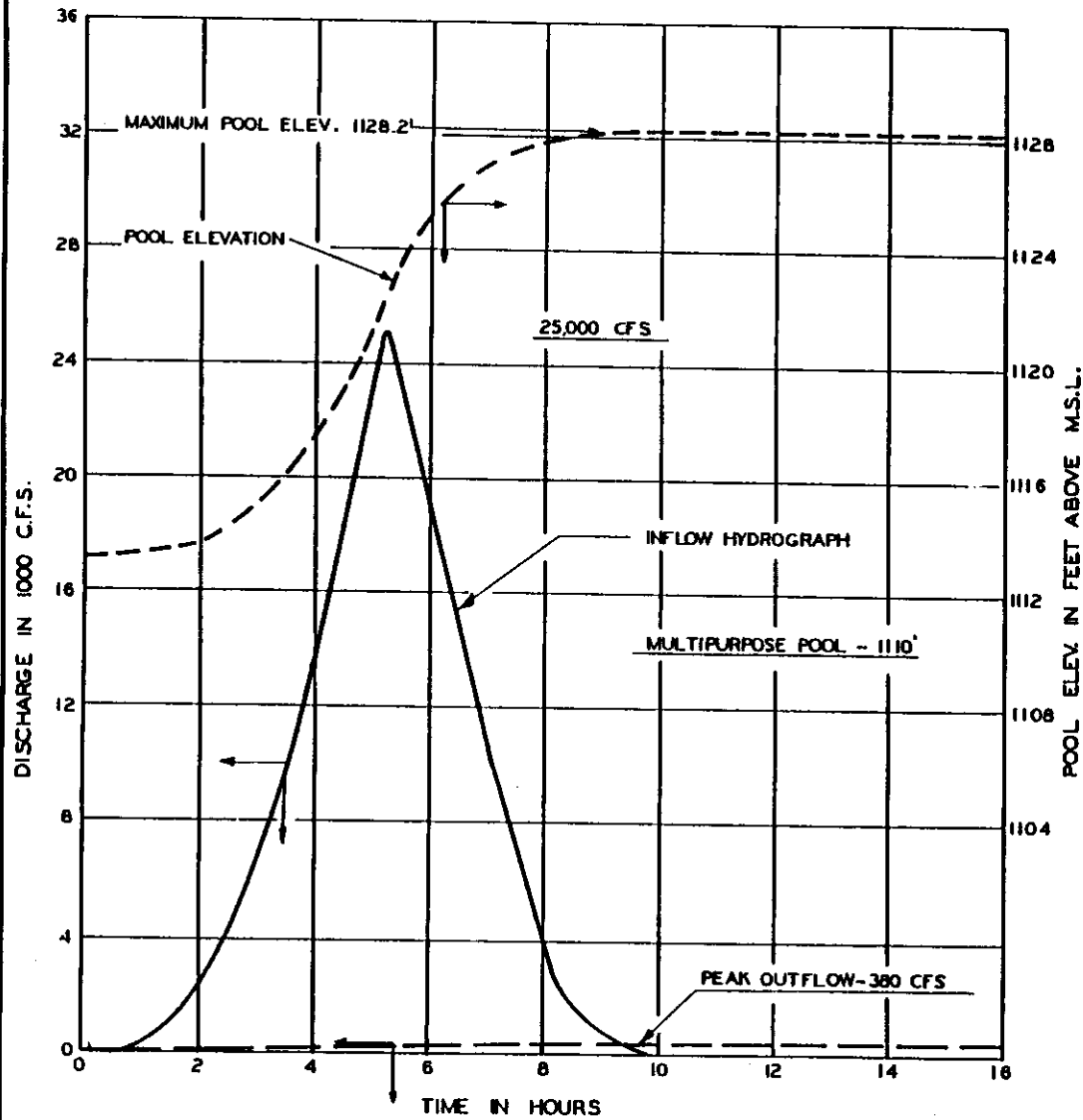
PLATE 35



NUMBER OF EVENTS EQUALED OR EXCEEDED PER 100 YEARS

PAPILLION CREEK AND TRIBUTARIES LAKES, NEBRASKA
SITE 18

POOL ELEVATION FREQUENCY CURVE
ABOVE MULTI-PURPOSE POOL
U.S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS OMAHA, NEBRASKA
SEP. 1981



Reservoir Design Flood Storage Accumulation Summary

0 to 60 hours	Inflow	= 1,130 a. f.
	Outflow	= 385 a. f.
	Storage	= 745 a. f.
60 to 70 hours	Inflow	= 6,760 a. f.
	Outflow	= 370 a. f.
	Storage	= 6,390 a. f.
70 to 96 hours	Inflow	= 490 a. f.
	Outflow	= 800 a. f.
	Storage	= - 310 a. f.
Maximum Storage = 745 + 6,390 = 7,135 a. f.		

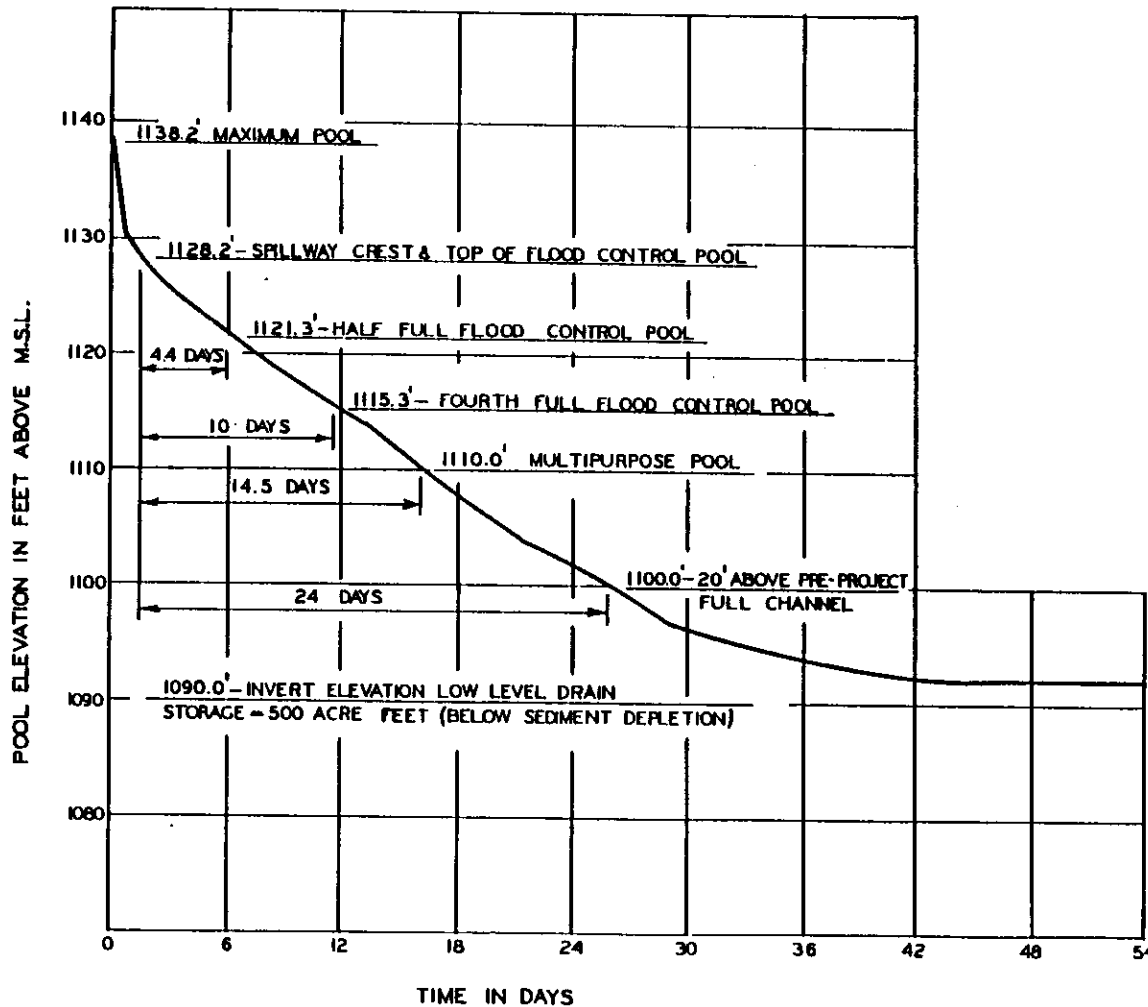
NOTES:

- ① Hydrograph shown represents the maximum 6-hour runoff (60 to 66 hours)
- ② Antecedent runoff from 0 to 60 hours raised the pool from 1110.0 ft. to 1113.2 ft.

PAPILLION CREEK AND TRIBUTARIES LAKES, NEBRASKA
SITE 18

RESERVOIR DESIGN FLOOD ROUTING

U.S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS OMAHA, NEBRASKA
SEP. 1981



EMERGENCY DRAWDOWN OPERATION

Drawdown from top of flood control pool is accomplished through the ungated outlet.

When the pool level reaches elevation 1113.0', the gate on the low level outlet is assumed to be open.

DRAWDOWN SUMMARY - REFERENCE ER-1110-2-50

Pool is lowered to elevation 1100.0' in 24 days, at which time the pool level is 20' above pre-project full channel.

Evacuation of multipurpose pool to elevation 1092.0' is accomplished in 38 days. At this pool level, reservoir Inflow = outflow = 9.0 cfs*. Storage remaining is 500 a.f.**

* Average May through August stream flow.

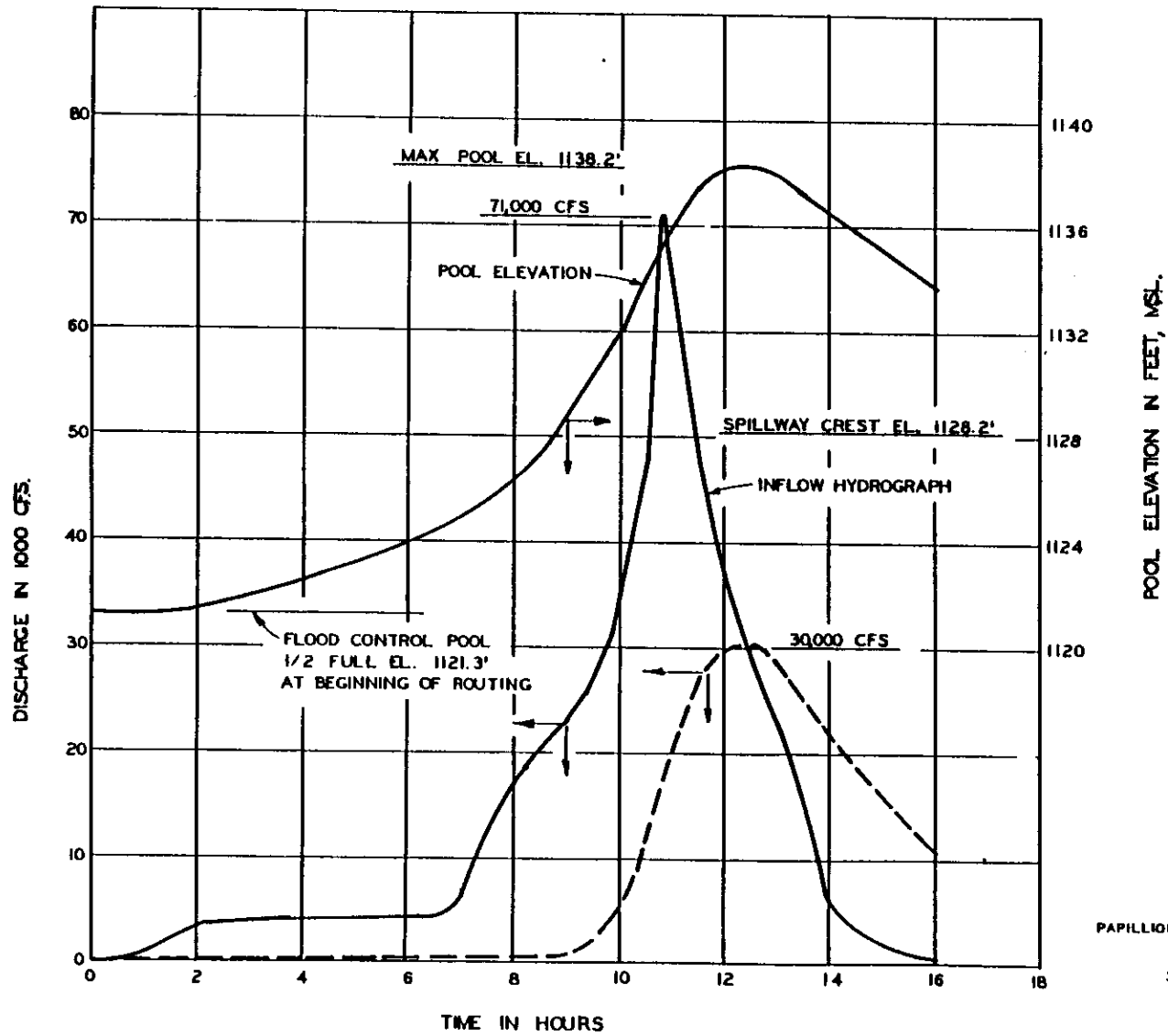
** Before sediment depletion.

PAPILLION CREEK AND TRIBUTARIES LAKES, NEBRASKA

SITE 10

POOL DRAWN DOWN CHARACTERISTICS

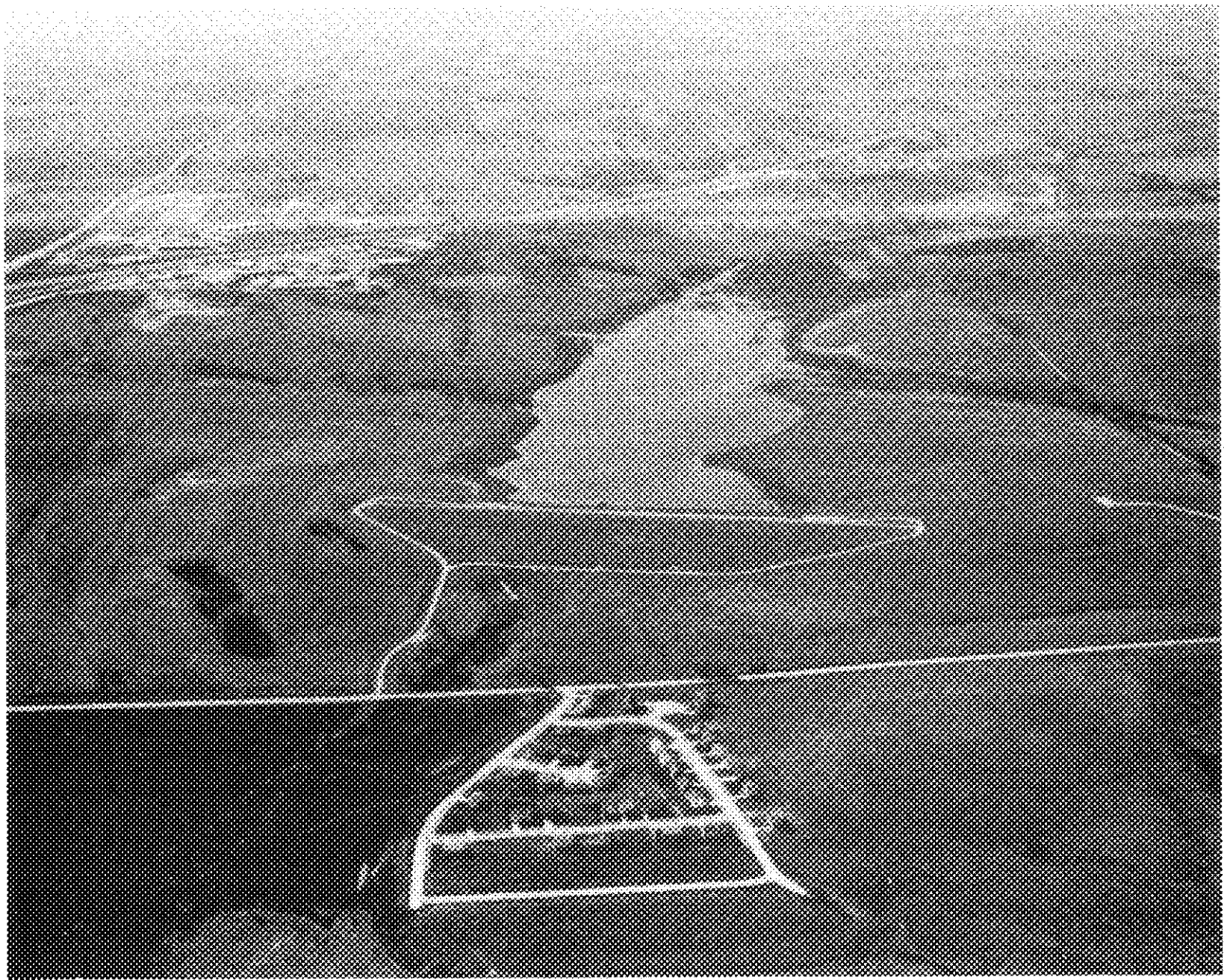
U.S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS OMAHA, NEBRASKA
SEP. 1981



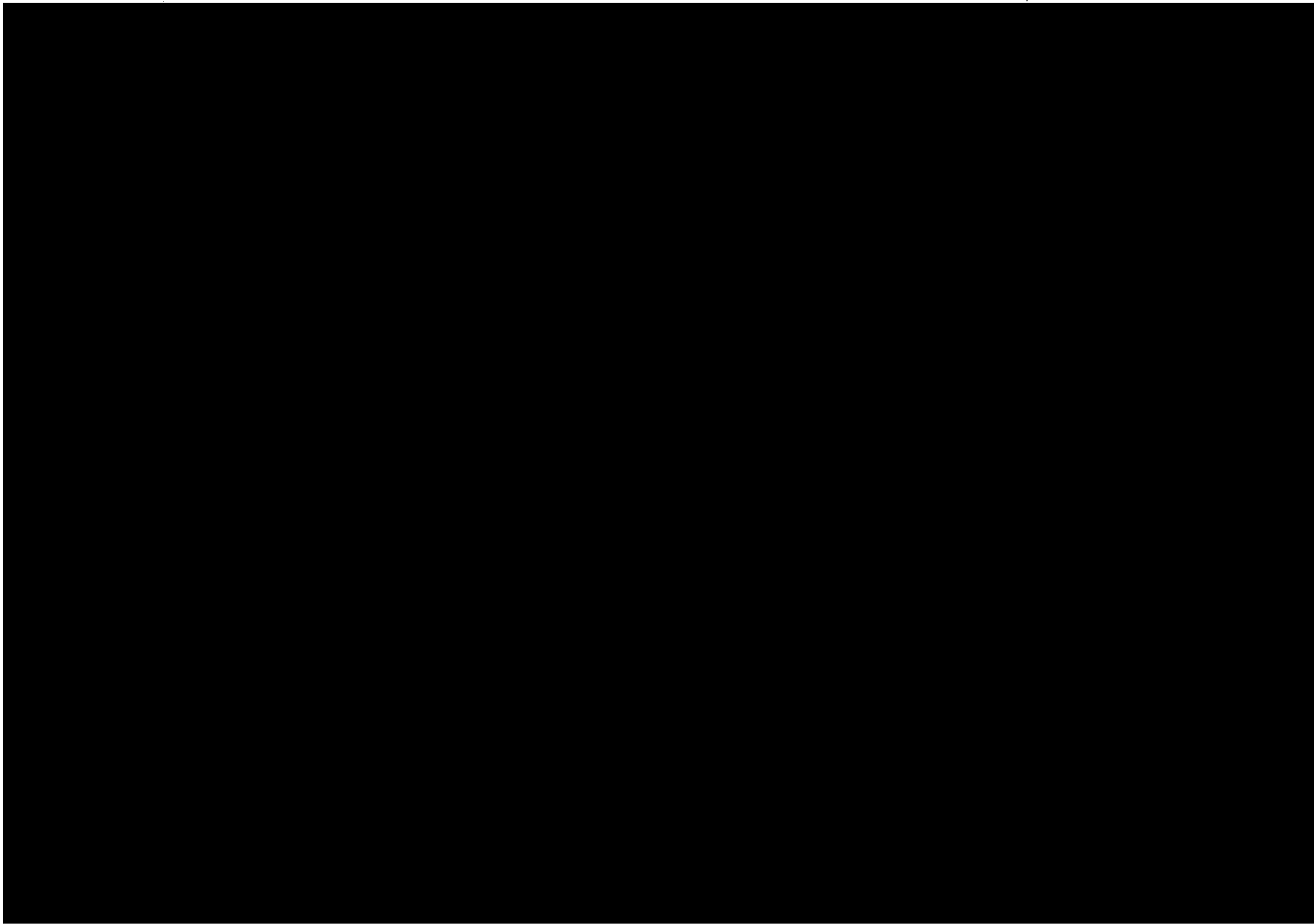
PAPILLION CREEK AND TRIBUTARIES LAKES, NEBRASKA
SITE 18

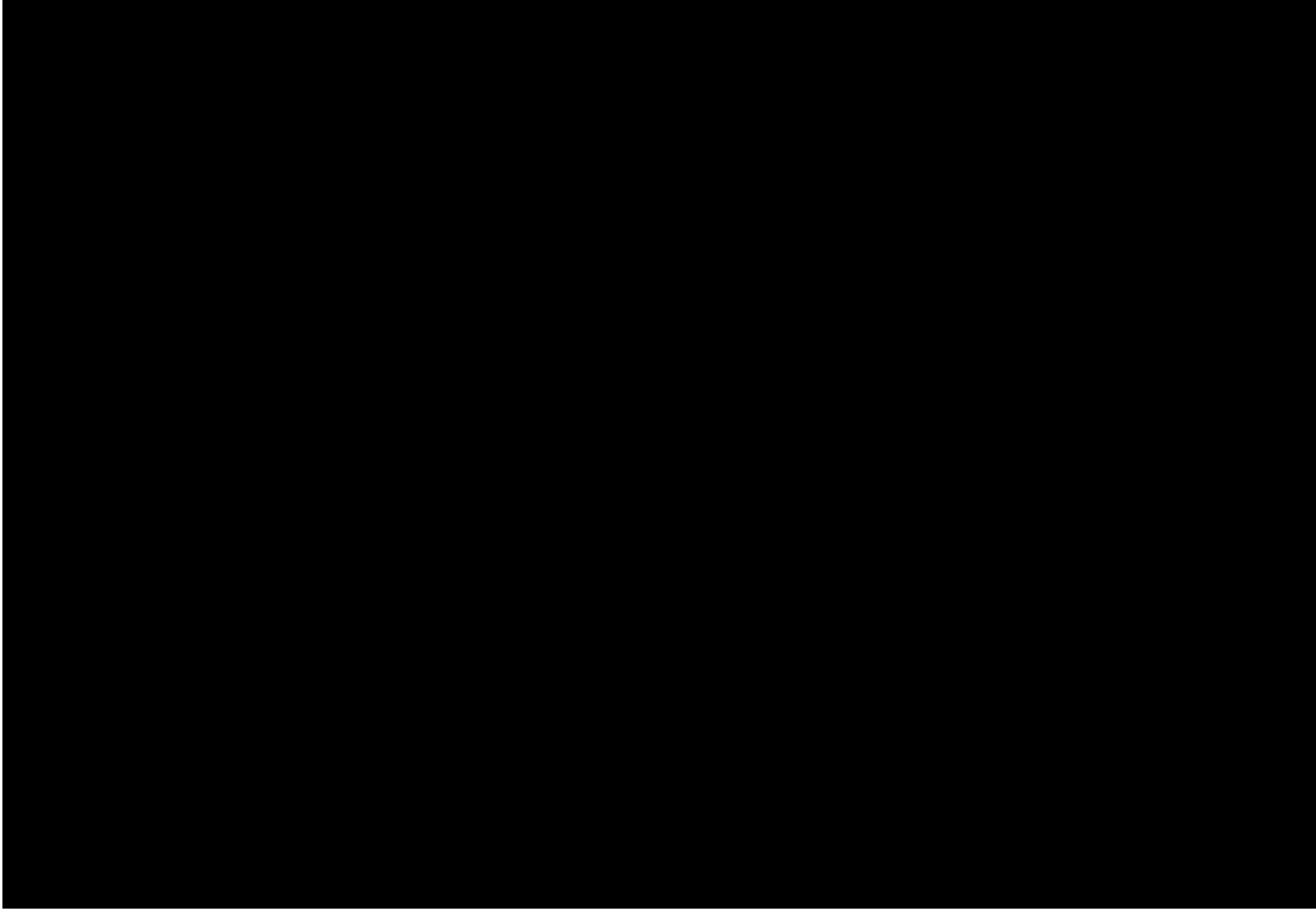
SPILLWAY DESIGN FLOOD ROUTING

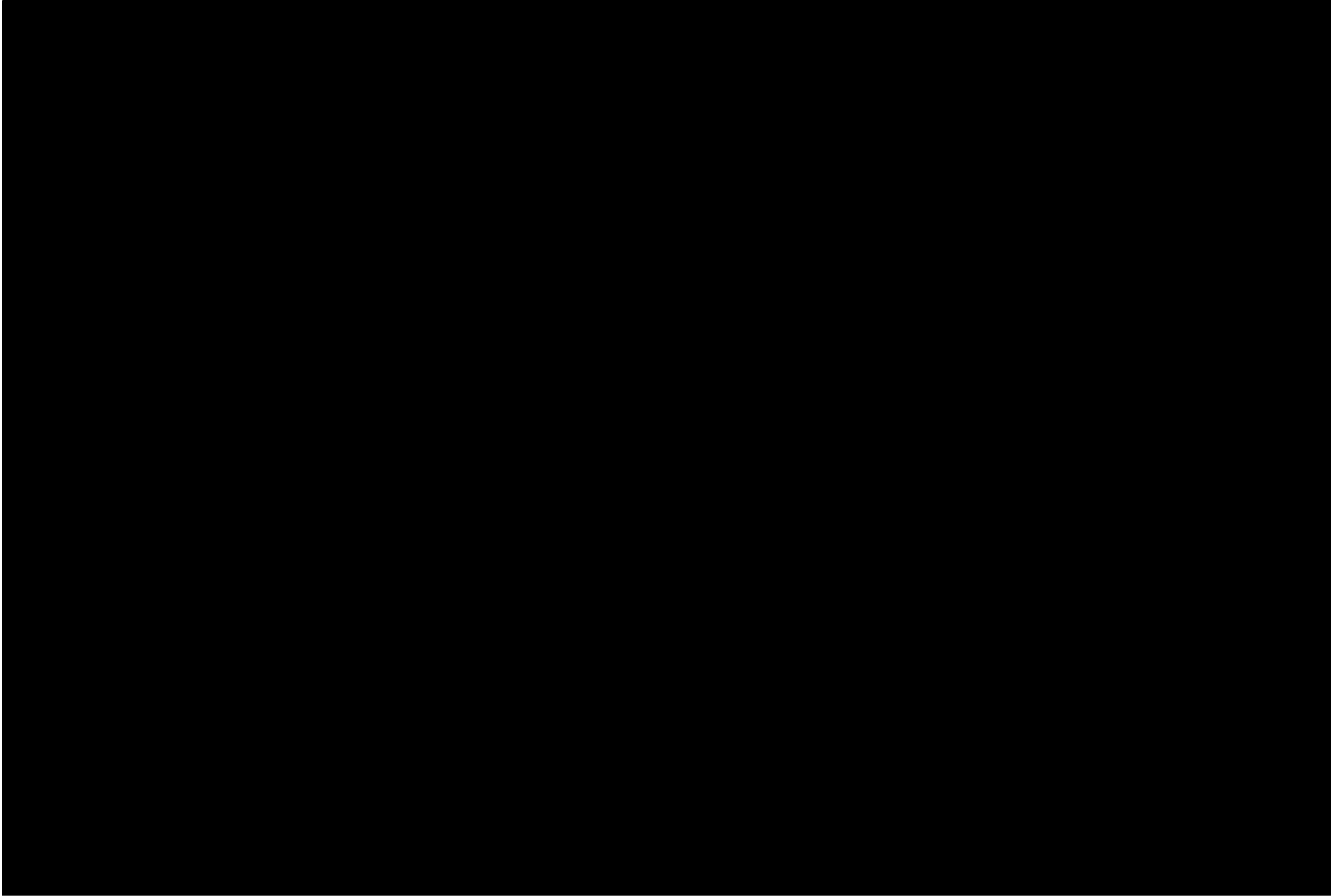
U.S. ARMY ENGINEER DISTRICT, OMAHA
 CORPS OF ENGINEERS OMAHA, NEBRASKA
 SEP. 1981



PAPILLION CREEK BASIN
DAM SITE #20

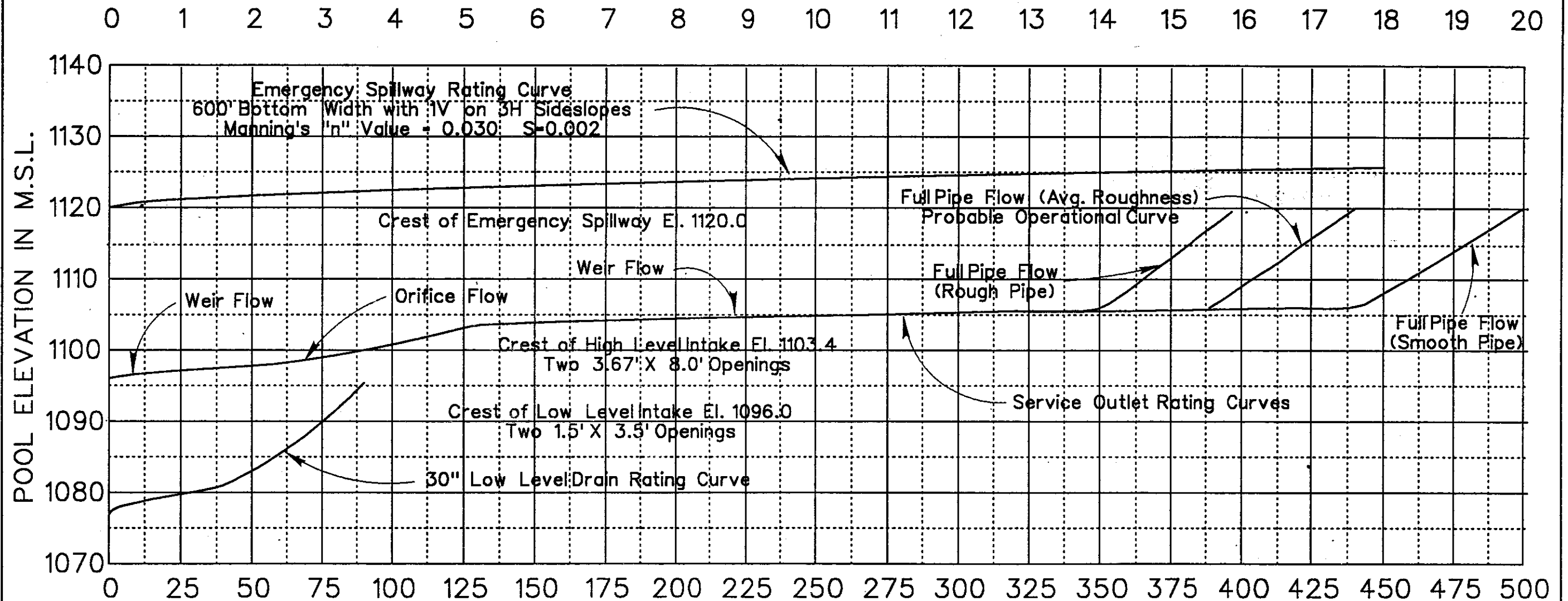






EMERGENCY SPILLWAY RATING CURVE
DISCHARGE IN 1,000 C.F.S.

PREPARED BY: J.T.M.
CHECKED BY: R.L.K.



DISCHARGE IN C.F.S.
SERVICE OUTLET RATING CURVE

PAPILLION CREEK AND TRIBUTARIES LAKES,
NEBRASKA
DAM SITE 20
SERVICE OUTLET AND EMERGENCY
SPILLWAY RATING CURVES

WATER CONTROL MANUAL
MARCH 1991



US Army Corps
of Engineers
Omaha District

PAPIO PROJECT - SITE 20

AREA - CAPACITY TABLES

U.S. ARMY ENGINEER DISTRICT, OMAHA
OMAHA, NEBRASKA

OCTOBER 1986

PLATE 43

PAPIO CREEK SITE 20

CAPACITY IN ACRE-FT.
(1984 SURVEY)

ELEV	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
1065.0	21	21	21	21	21	21	21	21	21	21
.1	21	21	21	22	22	22	22	22	22	22
.2	22	22	22	22	22	22	22	22	22	22
.3	22	22	22	22	22	22	22	22	23	23
.4	23	23	23	23	23	23	23	23	23	23
.5	23	23	23	23	23	23	23	23	23	23
.6	23	23	23	24	24	24	24	24	24	24
.7	24	24	24	24	24	24	24	24	24	24
.8	24	24	24	24	24	24	24	24	25	25
.9	25	25	25	25	25	25	25	25	25	25
1066.0	25	25	25	25	25	25	25	25	25	25
.1	25	25	25	26	26	26	26	26	26	26
.2	26	26	26	26	26	26	26	26	26	26
.3	26	26	26	26	26	26	26	26	27	27
.4	27	27	27	27	27	27	27	27	27	27
.5	27	27	27	27	27	27	27	27	27	27
.6	27	27	27	28	28	28	28	28	28	28
.7	28	28	28	28	28	28	28	28	28	28
.8	28	28	28	28	28	28	28	28	29	29
.9	29	29	29	29	29	29	29	29	29	29
1067.0	29	29	29	29	29	29	29	29	29	29
.1	29	30	30	30	30	30	30	30	30	30
.2	30	30	30	30	30	30	30	30	30	30
.3	30	31	31	31	31	31	31	31	31	31
.4	31	31	31	31	31	31	31	31	31	31
.5	31	32	32	32	32	32	32	32	32	32
.6	32	32	32	32	32	32	32	32	32	32
.7	32	33	33	33	33	33	33	33	33	33
.8	33	33	33	33	33	33	33	33	33	33
.9	33	34	34	34	34	34	34	34	34	34
1068.0	34	34	34	34	34	34	35	35	35	35
.1	35	35	35	35	35	35	35	36	36	36
.2	36	36	36	36	36	36	36	36	37	37
.3	37	37	37	37	37	37	37	37	37	37
.4	38	38	38	38	38	38	38	38	38	38
.5	38	39	39	39	39	39	39	39	39	39
.6	39	39	40	40	40	40	40	40	40	40
.7	40	40	40	41	41	41	41	41	41	41
.8	41	41	41	41	42	42	42	42	42	42
.9	42	42	42	42	42	43	43	43	43	43
1069.0	43	43	43	43	44	44	44	44	44	44
.1	44	44	45	45	45	45	45	45	45	45
.2	46	46	46	46	46	46	46	46	47	47
.3	47	47	47	47	47	47	48	48	48	48
.4	48	48	48	48	49	49	49	49	49	49
.5	49	50	50	50	50	50	50	50	50	50
.6	51	51	51	51	51	51	52	52	52	52
.7	52	52	52	52	53	53	53	53	53	53
.8	53	54	54	54	54	54	54	54	54	54
.9	55	55	55	55	55	55	55	56	56	56

PAPIO CREEK SITE 20

CAPACITY IN ACRE-FT.
(1984 SURVEY)

ELEV	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
1070.0	56	56	56	57	57	57	57	57	58	58
.1	58	58	58	58	59	59	59	59	59	60
.2	60	60	60	60	61	61	61	61	61	62
.3	62	62	62	62	62	63	63	63	63	63
.4	64	64	64	64	64	65	65	65	65	65
.5	65	66	66	66	66	66	67	67	67	67
.6	67	68	68	68	68	68	69	69	69	69
.7	69	69	70	70	70	70	70	71	71	71
.8	71	71	72	72	72	72	72	73	73	73
.9	73	73	73	74	74	74	74	74	75	75
1071.0	75	75	75	76	76	76	76	77	77	77
.1	77	77	78	78	78	78	79	79	79	79
.2	79	80	80	80	80	81	81	81	81	81
.3	82	82	82	82	82	83	83	83	83	84
.4	84	84	84	84	85	85	85	85	86	86
.5	86	86	86	87	87	87	87	88	88	88
.6	88	88	89	89	89	89	90	90	90	90
.7	90	91	91	91	91	91	92	92	92	92
.8	93	93	93	93	93	94	94	94	94	95
.9	95	95	95	95	96	96	96	96	97	97
1072.0	97	97	98	98	98	98	99	99	99	99
.1	100	100	100	100	101	101	101	101	102	102
.2	102	102	103	103	103	104	104	104	104	105
.3	105	105	105	106	106	106	106	107	107	107
.4	107	108	108	108	108	109	109	109	109	110
.5	110	110	111	111	111	111	112	112	112	112
.6	113	113	113	113	114	114	114	114	115	115
.7	115	115	116	116	116	116	117	117	117	118
.8	118	118	118	119	119	119	119	120	120	120
.9	120	121	121	121	121	122	122	122	122	123
1073.0	123	123	124	124	124	124	125	125	125	126
.1	126	126	127	127	127	127	128	128	128	129
.2	129	129	130	130	130	131	131	131	131	132
.3	132	132	133	133	133	133	134	134	134	135
.4	135	135	136	136	136	136	137	137	137	138
.5	138	138	139	139	139	139	140	140	140	141
.6	141	141	142	142	142	142	143	143	143	144
.7	144	144	145	145	145	145	146	146	146	147
.8	147	147	148	148	148	148	149	149	149	150
.9	150	150	151	151	151	151	152	152	152	153
1074.0	153	153	154	154	154	155	155	155	156	156
.1	156	157	157	157	157	158	158	158	159	159
.2	159	160	160	160	161	161	161	162	162	162
.3	163	163	163	164	164	164	165	165	165	165
.4	166	166	166	167	167	167	168	168	168	169
.5	169	169	170	170	170	171	171	171	172	172
.6	172	173	173	173	173	174	174	174	175	175
.7	175	176	176	176	177	177	177	178	178	178
.8	179	179	179	180	180	180	181	181	181	181
.9	182	182	182	183	183	183	184	184	184	185

PAPIO CREEK SITE 20

CAPACITY IN ACRE-FT.
(1984 SURVEY)

ELEV	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
1075.0	185	185	186	186	186	187	187	187	188	188
.1	188	189	189	189	190	190	190	191	191	191
.2	192	192	192	193	193	193	194	194	194	195
.3	195	195	196	196	196	197	197	197	198	198
.4	198	199	199	199	200	200	200	201	201	201
.5	201	202	202	202	203	203	203	204	204	204
.6	205	205	205	206	206	206	207	207	207	208
.7	208	208	209	209	209	210	210	210	211	211
.8	211	212	212	212	213	213	213	214	214	214
.9	215	215	215	216	216	216	217	217	217	218
1076.0	218	218	219	219	219	220	220	220	221	221
.1	221	222	222	222	223	223	223	224	224	224
.2	225	225	225	226	226	227	227	227	228	228
.3	228	229	229	229	230	230	230	231	231	231
.4	232	232	232	233	233	233	234	234	234	235
.5	235	235	236	236	236	237	237	237	238	238
.6	238	239	239	239	240	240	240	241	241	241
.7	242	242	242	243	243	243	244	244	245	245
.8	245	246	246	246	247	247	247	248	248	248
.9	249	249	249	250	250	250	251	251	251	252
1077.0	252	252	253	253	254	254	254	255	255	255
.1	256	256	257	257	257	258	258	258	259	259
.2	260	260	260	261	261	262	262	262	263	263
.3	263	264	264	265	265	265	266	266	266	267
.4	267	268	268	268	269	269	269	270	270	271
.5	271	271	272	272	273	273	273	274	274	274
.6	275	275	276	276	276	277	277	277	278	278
.7	279	279	279	280	280	280	281	281	282	282
.8	282	283	283	284	284	284	285	285	285	286
.9	286	287	287	287	288	288	288	289	289	290
1078.0	290	290	291	291	292	292	293	293	294	294
.1	294	295	295	296	296	297	297	298	298	299
.2	299	299	300	300	301	301	302	302	303	303
.3	303	304	304	305	305	306	306	307	307	308
.4	308	308	309	309	310	310	311	311	312	312
.5	312	313	313	314	314	315	315	316	316	317
.6	317	317	318	318	319	319	320	320	321	321
.7	321	322	322	323	323	324	324	325	325	326
.8	326	326	327	327	328	328	329	329	330	330
.9	330	331	331	332	332	333	333	334	334	335
1079.0	335	336	336	337	337	338	338	339	339	340
.1	340	341	341	342	343	343	344	344	345	345
.2	346	346	347	347	348	349	349	350	350	351
.3	351	352	352	353	353	354	354	355	355	356
.4	357	357	358	358	359	359	360	360	361	361
.5	362	363	363	364	364	365	365	366	366	367
.6	367	368	368	369	370	370	371	371	372	372
.7	373	373	374	374	375	375	376	377	377	378
.8	378	379	379	380	380	381	381	382	383	383
.9	384	384	385	385	386	386	387	387	388	388

PAPIO CREEK SITE 20

CAPACITY IN ACRE-FT.
(1984 SURVEY)

ELEV	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
1080.0	389	390	390	391	391	392	393	393	394	394
.1	395	396	396	397	398	398	399	399	400	401
.2	401	402	402	403	404	404	405	405	406	407
.3	407	408	409	409	410	410	411	412	412	413
.4	413	414	415	415	416	416	417	418	418	419
.5	419	420	421	421	422	423	423	424	424	425
.6	426	426	427	427	428	429	429	430	430	431
.7	432	432	433	434	434	435	435	436	437	437
.8	438	438	439	440	440	441	441	442	443	443
.9	444	445	445	446	446	447	448	448	449	449
1081.0	450	451	451	452	453	453	454	455	455	456
.1	457	457	458	459	459	460	461	461	462	463
.2	463	464	465	465	466	467	467	468	469	469
.3	470	471	472	472	473	473	474	475	475	476
.4	477	477	478	479	479	480	481	481	482	483
.5	483	484	485	486	486	487	488	488	489	490
.6	490	491	492	492	493	494	494	495	496	496
.7	497	498	498	499	500	500	501	502	502	503
.8	504	504	505	506	506	507	508	508	509	510
.9	510	511	512	512	513	514	514	515	516	516
1082.0	517	518	518	519	520	521	521	522	523	524
.1	524	525	526	527	527	528	529	530	531	531
.2	532	533	534	534	535	536	537	537	538	539
.3	539	540	541	542	542	543	544	545	545	546
.4	547	548	548	549	550	551	551	552	553	554
.5	554	555	556	557	557	558	559	560	560	561
.6	562	563	563	564	565	566	566	567	568	569
.7	569	570	571	572	572	573	574	575	575	576
.8	577	578	578	579	580	581	581	582	583	584
.9	584	585	586	587	587	588	589	590	590	591
1083.0	592	593	594	595	595	596	597	598	599	600
.1	601	601	602	603	604	605	606	607	607	608
.2	609	610	611	612	613	614	614	615	616	617
.3	618	619	620	620	621	622	623	624	625	626
.4	626	627	628	629	630	631	632	632	633	634
.5	635	636	637	638	638	639	640	641	642	643
.6	644	644	645	646	647	648	649	650	650	651
.7	652	653	654	655	656	656	657	658	659	660
.8	661	662	663	663	664	665	666	667	668	669
.9	669	670	671	672	673	674	675	675	676	677
1084.0	678	679	680	681	682	683	684	685	686	687
.1	688	689	690	691	692	693	694	695	696	697
.2	698	699	700	701	702	703	704	705	706	707
.3	708	709	710	711	712	713	714	715	716	717
.4	718	719	720	721	722	723	724	725	726	727
.5	728	730	731	732	733	734	735	736	737	738
.6	739	740	741	742	743	744	745	746	747	748
.7	749	750	751	752	753	754	755	756	757	758
.8	759	760	761	762	763	764	765	766	767	768
.9	769	770	771	772	773	774	775	776	777	778

PAPIO CREEK SITE 20

CAPACITY IN ACRE-FT.
(1984 SURVEY)

ELEV	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
1085.0	779	780	781	782	784	785	786	787	788	789
.1	791	792	793	794	795	796	798	799	800	801
.2	802	803	805	806	807	808	809	810	811	813
.3	814	815	816	817	818	820	821	822	823	824
.4	825	827	828	829	830	831	832	834	835	836
.5	837	838	839	840	842	843	844	845	846	847
.6	849	850	851	852	853	854	856	857	858	859
.7	860	861	863	864	865	866	867	868	869	871
.8	872	873	874	875	876	878	879	880	881	882
.9	883	885	886	887	888	889	890	892	893	894
1086.0	895	896	898	899	900	901	903	904	905	907
.1	908	909	910	912	913	914	915	917	918	919
.2	921	922	923	924	926	927	928	930	931	932
.3	933	935	936	937	939	940	941	942	944	945
.4	946	947	949	950	951	953	954	955	956	958
.5	959	960	962	963	964	965	967	968	969	971
.6	972	973	974	976	977	978	979	981	982	983
.7	985	986	987	988	990	991	992	994	995	996
.8	997	999	1000	1001	1003	1004	1005	1006	1008	1009
.9	1010	1011	1013	1014	1015	1017	1018	1019	1020	1022
1087.0	1023	1024	1026	1027	1029	1030	1031	1033	1034	1036
.1	1037	1038	1040	1041	1043	1044	1045	1047	1048	1050
.2	1051	1052	1054	1055	1057	1058	1059	1061	1062	1064
.3	1065	1066	1068	1069	1071	1072	1073	1075	1076	1078
.4	1079	1080	1082	1083	1085	1086	1087	1089	1090	1092
.5	1093	1094	1096	1097	1099	1100	1101	1103	1104	1106
.6	1107	1108	1110	1111	1113	1114	1115	1117	1118	1120
.7	1121	1122	1124	1125	1127	1128	1129	1131	1132	1134
.8	1135	1136	1138	1139	1141	1142	1143	1145	1146	1148
.9	1149	1150	1152	1153	1155	1156	1157	1159	1160	1162
1088.0	1163	1165	1166	1168	1169	1171	1172	1174	1175	1177
.1	1178	1180	1181	1183	1184	1186	1187	1189	1191	1192
.2	1194	1195	1197	1198	1200	1201	1203	1204	1206	1207
.3	1209	1210	1212	1213	1215	1217	1218	1220	1221	1223
.4	1224	1226	1227	1229	1230	1232	1233	1235	1236	1238
.5	1239	1241	1243	1244	1246	1247	1249	1250	1252	1253
.6	1255	1256	1258	1259	1261	1262	1264	1266	1267	1269
.7	1270	1272	1273	1275	1276	1278	1279	1281	1282	1284
.8	1285	1287	1288	1290	1292	1293	1295	1296	1298	1299
.9	1301	1302	1304	1305	1307	1308	1310	1311	1313	1314
1089.0	1316	1318	1319	1321	1323	1324	1326	1328	1329	1331
.1	1332	1334	1336	1337	1339	1341	1342	1344	1346	1347
.2	1349	1351	1352	1354	1356	1357	1359	1361	1362	1364
.3	1365	1367	1369	1370	1372	1374	1375	1377	1379	1380
.4	1382	1384	1385	1387	1389	1390	1392	1394	1395	1397
.5	1398	1400	1402	1403	1405	1407	1408	1410	1412	1413
.6	1415	1417	1418	1420	1422	1423	1425	1427	1428	1430
.7	1431	1433	1435	1436	1438	1440	1441	1443	1445	1446
.8	1448	1450	1451	1453	1455	1456	1458	1460	1461	1463
.9	1464	1466	1468	1469	1471	1473	1474	1476	1478	1479

PAPIO CREEK SITE 20

CAPACITY IN ACRE-FT.
(1984 SURVEY)

ELEV	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
1090.0	1481	1483	1485	1486	1488	1490	1492	1493	1495	1497
.1	1499	1500	1502	1504	1506	1508	1509	1511	1513	1515
.2	1516	1518	1520	1522	1523	1525	1527	1529	1531	1532
.3	1534	1536	1538	1539	1541	1543	1545	1546	1548	1550
.4	1552	1554	1555	1557	1559	1561	1562	1564	1566	1568
.5	1569	1571	1573	1575	1577	1578	1580	1582	1584	1585
.6	1587	1589	1591	1593	1594	1596	1598	1600	1601	1603
.7	1605	1607	1608	1610	1612	1614	1616	1617	1619	1621
.8	1623	1624	1626	1628	1630	1631	1633	1635	1637	1639
.9	1640	1642	1644	1646	1647	1649	1651	1653	1654	1656
1091.0	1658	1660	1662	1664	1666	1667	1669	1671	1673	1675
.1	1677	1679	1681	1683	1684	1686	1688	1690	1692	1694
.2	1696	1698	1700	1701	1703	1705	1707	1709	1711	1713
.3	1715	1717	1718	1720	1722	1724	1726	1728	1730	1732
.4	1734	1735	1737	1739	1741	1743	1745	1747	1749	1751
.5	1752	1754	1756	1758	1760	1762	1764	1766	1768	1770
.6	1771	1773	1775	1777	1779	1781	1783	1785	1787	1788
.7	1790	1792	1794	1796	1798	1800	1802	1804	1805	1807
.8	1809	1811	1813	1815	1817	1819	1821	1822	1824	1826
.9	1828	1830	1832	1834	1836	1838	1839	1841	1843	1845
1092.0	1847	1849	1851	1853	1855	1857	1859	1861	1863	1865
.1	1867	1869	1871	1873	1875	1877	1879	1881	1883	1885
.2	1887	1889	1891	1893	1895	1897	1899	1901	1903	1905
.3	1907	1909	1911	1913	1915	1917	1919	1921	1923	1925
.4	1927	1929	1931	1933	1935	1937	1939	1941	1943	1945
.5	1947	1950	1952	1954	1956	1958	1960	1962	1964	1966
.6	1968	1970	1972	1974	1976	1978	1980	1982	1984	1986
.7	1988	1990	1992	1994	1996	1998	2000	2002	2004	2006
.8	2008	2010	2012	2014	2016	2018	2020	2022	2024	2026
.9	2028	2030	2032	2034	2036	2038	2040	2042	2044	2046
1093.0	2048	2050	2052	2054	2057	2059	2061	2063	2065	2067
.1	2069	2071	2074	2076	2078	2080	2082	2084	2086	2088
.2	2091	2093	2095	2097	2099	2101	2103	2106	2108	2110
.3	2112	2114	2116	2118	2120	2123	2125	2127	2129	2131
.4	2133	2135	2137	2140	2142	2144	2146	2148	2150	2152
.5	2154	2157	2159	2161	2163	2165	2167	2169	2172	2174
.6	2176	2178	2180	2182	2184	2186	2189	2191	2193	2195
.7	2197	2199	2201	2203	2206	2208	2210	2212	2214	2216
.8	2218	2221	2223	2225	2227	2229	2231	2233	2235	2238
.9	2240	2242	2244	2246	2248	2250	2252	2255	2257	2259
1094.0	2261	2263	2265	2268	2270	2272	2274	2277	2279	2281
.1	2283	2286	2288	2290	2292	2295	2297	2299	2302	2304
.2	2306	2308	2311	2313	2315	2317	2320	2322	2324	2326
.3	2328	2331	2333	2335	2337	2340	2342	2344	2346	2349
.4	2351	2353	2355	2358	2360	2362	2364	2367	2369	2371
.5	2373	2376	2378	2380	2382	2385	2387	2389	2391	2394
.6	2396	2398	2400	2403	2405	2407	2409	2412	2414	2416
.7	2418	2421	2423	2425	2427	2430	2432	2434	2436	2439
.8	2441	2443	2445	2448	2450	2452	2454	2457	2459	2461
.9	2463	2466	2468	2470	2472	2475	2477	2479	2481	2484

PAPIO CREEK SITE 20

CAPACITY IN ACRE-FT.
(1984 SURVEY)

ELEV	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
1095.0	2486	2488	2491	2493	2495	2498	2500	2503	2505	2507
.1	2510	2512	2514	2517	2519	2521	2524	2526	2528	2531
.2	2533	2536	2538	2540	2543	2545	2547	2550	2552	2554
.3	2557	2559	2562	2564	2566	2569	2571	2573	2576	2578
.4	2580	2583	2585	2587	2590	2592	2595	2597	2599	2602
.5	2604	2606	2609	2611	2613	2616	2618	2621	2623	2625
.6	2628	2630	2632	2635	2637	2639	2642	2644	2646	2649
.7	2651	2654	2656	2658	2661	2663	2665	2668	2670	2672
.8	2675	2677	2680	2682	2684	2687	2689	2691	2694	2696
.9	2698	2701	2703	2705	2708	2710	2713	2715	2717	2720
1096.0	2722	2724	2727	2729	2732	2734	2737	2739	2742	2744
.1	2747	2749	2752	2754	2756	2759	2761	2764	2766	2769
.2	2771	2774	2776	2779	2781	2784	2786	2788	2791	2793
.3	2796	2798	2801	2803	2806	2808	2811	2813	2815	2818
.4	2820	2823	2825	2828	2830	2833	2835	2838	2840	2843
.5	2845	2847	2850	2852	2855	2857	2860	2862	2865	2867
.6	2870	2872	2875	2877	2879	2882	2884	2887	2889	2892
.7	2894	2897	2899	2902	2904	2906	2909	2911	2914	2916
.8	2919	2921	2924	2926	2929	2931	2934	2936	2938	2941
.9	2943	2946	2948	2951	2953	2956	2958	2961	2963	2966
1097.0	2968	2971	2973	2976	2978	2981	2984	2986	2989	2991
.1	2994	2996	2999	3002	3004	3007	3009	3012	3015	3017
.2	3020	3022	3025	3028	3030	3033	3035	3038	3041	3043
.3	3046	3048	3051	3053	3056	3059	3061	3064	3066	3069
.4	3072	3074	3077	3079	3082	3085	3087	3090	3092	3095
.5	3097	3100	3103	3105	3108	3110	3113	3116	3118	3121
.6	3123	3126	3129	3131	3134	3136	3139	3142	3144	3147
.7	3149	3152	3154	3157	3160	3162	3165	3167	3170	3173
.8	3175	3178	3180	3183	3186	3188	3191	3193	3196	3199
.9	3201	3204	3206	3209	3211	3214	3217	3219	3222	3224
1098.0	3227	3230	3232	3235	3238	3241	3243	3246	3249	3251
.1	3254	3257	3260	3262	3265	3268	3270	3273	3276	3278
.2	3281	3284	3287	3289	3292	3295	3297	3300	3303	3306
.3	3308	3311	3314	3316	3319	3322	3325	3327	3330	3333
.4	3335	3338	3341	3344	3346	3349	3352	3354	3357	3360
.5	3362	3365	3368	3371	3373	3376	3379	3381	3384	3387
.6	3390	3392	3395	3398	3400	3403	3406	3409	3411	3414
.7	3417	3419	3422	3425	3428	3430	3433	3436	3438	3441
.8	3444	3447	3449	3452	3455	3457	3460	3463	3465	3468
.9	3471	3474	3476	3479	3482	3484	3487	3490	3493	3495
1099.0	3498	3501	3504	3507	3509	3512	3515	3518	3521	3524
.1	3526	3529	3532	3535	3538	3541	3544	3546	3549	3552
.2	3555	3558	3561	3564	3566	3569	3572	3575	3578	3581
.3	3583	3586	3589	3592	3595	3598	3601	3603	3606	3609
.4	3612	3615	3618	3621	3623	3626	3629	3632	3635	3638
.5	3640	3643	3646	3649	3652	3655	3658	3660	3663	3666
.6	3669	3672	3675	3678	3680	3683	3686	3689	3692	3695
.7	3697	3700	3703	3706	3709	3712	3715	3717	3720	3723
.8	3726	3729	3732	3735	3737	3740	3743	3746	3749	3752
.9	3754	3757	3760	3763	3766	3769	3772	3774	3777	3780

PAPIO CREEK SITE 20

CAPACITY IN ACRE-FT.
(1984 SURVEY)

ELEV	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
1100.0	3783	3786	3789	3792	3795	3798	3801	3804	3807	3810
.1	3813	3816	3819	3822	3825	3828	3831	3834	3837	3840
.2	3843	3846	3849	3852	3855	3858	3860	3863	3866	3869
.3	3872	3875	3878	3881	3884	3887	3890	3893	3896	3899
.4	3902	3905	3908	3911	3914	3917	3920	3923	3926	3929
.5	3932	3935	3938	3941	3944	3947	3950	3953	3956	3959
.6	3962	3965	3968	3971	3974	3977	3980	3983	3986	3989
.7	3992	3995	3998	4001	4004	4006	4009	4012	4015	4018
.8	4021	4024	4027	4030	4033	4036	4039	4042	4045	4048
.9	4051	4054	4057	4060	4063	4066	4069	4072	4075	4078
1101.0	4081	4084	4087	4090	4093	4096	4100	4103	4106	4109
.1	4112	4115	4118	4121	4124	4127	4131	4134	4137	4140
.2	4143	4146	4149	4152	4155	4159	4162	4165	4168	4171
.3	4174	4177	4180	4183	4186	4189	4193	4196	4199	4202
.4	4205	4208	4211	4214	4217	4220	4224	4227	4230	4233
.5	4236	4239	4242	4245	4248	4251	4255	4258	4261	4264
.6	4267	4270	4273	4276	4279	4282	4286	4289	4292	4295
.7	4298	4301	4304	4307	4310	4313	4317	4320	4323	4326
.8	4329	4332	4335	4338	4341	4344	4348	4351	4354	4357
.9	4360	4363	4366	4369	4372	4375	4379	4382	4385	4388
1102.0	4391	4394	4397	4401	4404	4407	4410	4414	4417	4420
.1	4423	4427	4430	4433	4436	4439	4443	4446	4449	4452
.2	4456	4459	4462	4465	4469	4472	4475	4478	4481	4485
.3	4488	4491	4494	4498	4501	4504	4507	4511	4514	4517
.4	4520	4523	4527	4530	4533	4536	4540	4543	4546	4549
.5	4552	4556	4559	4562	4565	4569	4572	4575	4578	4582
.6	4585	4588	4591	4594	4598	4601	4604	4607	4611	4614
.7	4617	4620	4624	4627	4630	4633	4636	4640	4643	4646
.8	4649	4653	4656	4659	4662	4666	4669	4672	4675	4678
.9	4682	4685	4688	4691	4695	4698	4701	4704	4708	4711
1103.0	4714	4717	4721	4724	4727	4731	4734	4738	4741	4744
.1	4748	4751	4754	4758	4761	4765	4768	4771	4775	4778
.2	4781	4785	4788	4792	4795	4798	4802	4805	4808	4812
.3	4815	4818	4822	4825	4829	4832	4835	4839	4842	4845
.4	4849	4852	4856	4859	4862	4866	4869	4872	4876	4879
.5	4882	4886	4889	4893	4896	4899	4903	4906	4909	4913
.6	4916	4920	4923	4926	4930	4933	4936	4940	4943	4947
.7	4950	4953	4957	4960	4963	4967	4970	4973	4977	4980
.8	4984	4987	4990	4994	4997	5000	5004	5007	5011	5014
.9	5017	5021	5024	5027	5031	5034	5038	5041	5044	5048
1104.0	5051	5055	5058	5062	5065	5069	5072	5076	5079	5083
.1	5086	5090	5093	5097	5100	5104	5107	5111	5114	5118
.2	5121	5125	5128	5132	5135	5139	5142	5146	5149	5153
.3	5156	5160	5163	5167	5170	5174	5177	5181	5184	5188
.4	5191	5195	5198	5202	5205	5209	5212	5216	5219	5223
.5	5226	5230	5234	5237	5241	5244	5248	5251	5255	5258
.6	5262	5265	5269	5272	5276	5279	5283	5286	5290	5293
.7	5297	5300	5304	5307	5311	5314	5318	5321	5325	5328
.8	5332	5335	5339	5342	5346	5349	5353	5356	5360	5363
.9	5367	5370	5374	5377	5381	5384	5388	5391	5395	5398

PAPIO CREEK SITE 20

CAPACITY IN ACRE-FT.
(1984 SURVEY)

ELEV	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
1105.0	5402	5406	5409	5413	5417	5420	5424	5428	5431	5435
.1	5438	5442	5446	5449	5453	5457	5460	5464	5468	5471
.2	5475	5479	5482	5486	5490	5493	5497	5501	5504	5508
.3	5511	5515	5519	5522	5526	5530	5533	5537	5541	5544
.4	5548	5552	5555	5559	5563	5566	5570	5574	5577	5581
.5	5584	5588	5592	5595	5599	5603	5606	5610	5614	5617
.6	5621	5625	5628	5632	5636	5639	5643	5647	5650	5654
.7	5657	5661	5665	5668	5672	5676	5679	5683	5687	5690
.8	5694	5698	5701	5705	5709	5712	5716	5720	5723	5727
.9	5730	5734	5738	5741	5745	5749	5752	5756	5760	5763
1106.0	5767	5771	5775	5778	5782	5786	5790	5793	5797	5801
.1	5805	5808	5812	5816	5820	5824	5827	5831	5835	5839
.2	5842	5846	5850	5854	5857	5861	5865	5869	5873	5876
.3	5880	5884	5888	5891	5895	5899	5903	5906	5910	5914
.4	5918	5922	5925	5929	5933	5937	5940	5944	5948	5952
.5	5955	5959	5963	5967	5971	5974	5978	5982	5986	5989
.6	5993	5997	6001	6005	6008	6012	6016	6020	6023	6027
.7	6031	6035	6038	6042	6046	6050	6054	6057	6061	6065
.8	6069	6072	6076	6080	6084	6087	6091	6095	6099	6103
.9	6106	6110	6114	6118	6121	6125	6129	6133	6136	6140
1107.0	6144	6148	6152	6156	6160	6164	6168	6171	6175	6179
.1	6183	6187	6191	6195	6199	6203	6207	6211	6215	6218
.2	6222	6226	6230	6234	6238	6242	6246	6250	6254	6258
.3	6262	6266	6269	6273	6277	6281	6285	6289	6293	6297
.4	6301	6305	6309	6313	6316	6320	6324	6328	6332	6336
.5	6340	6344	6348	6352	6356	6360	6364	6367	6371	6375
.6	6379	6383	6387	6391	6395	6399	6403	6407	6411	6414
.7	6418	6422	6426	6430	6434	6438	6442	6446	6450	6454
.8	6458	6462	6465	6469	6473	6477	6481	6485	6489	6493
.9	6497	6501	6505	6509	6512	6516	6520	6524	6528	6532
1108.0	6536	6540	6544	6548	6552	6556	6561	6565	6569	6573
.1	6577	6581	6585	6589	6593	6597	6601	6606	6610	6614
.2	6618	6622	6626	6630	6634	6638	6642	6646	6651	6655
.3	6659	6663	6667	6671	6675	6679	6683	6687	6691	6696
.4	6700	6704	6708	6712	6716	6720	6724	6728	6732	6736
.5	6740	6745	6749	6753	6757	6761	6765	6769	6773	6777
.6	6781	6785	6790	6794	6798	6802	6806	6810	6814	6818
.7	6822	6826	6830	6835	6839	6843	6847	6851	6855	6859
.8	6863	6867	6871	6875	6880	6884	6888	6892	6896	6900
.9	6904	6908	6912	6916	6920	6925	6929	6933	6937	6941
1109.0	6945	6949	6954	6958	6962	6966	6971	6975	6979	6983
.1	6988	6992	6996	7001	7005	7009	7013	7018	7022	7026
.2	7030	7035	7039	7043	7047	7052	7056	7060	7065	7069
.3	7073	7077	7082	7086	7090	7094	7099	7103	7107	7112
.4	7116	7120	7124	7129	7133	7137	7141	7146	7150	7154
.5	7158	7163	7167	7171	7176	7180	7184	7188	7193	7197
.6	7201	7205	7210	7214	7218	7223	7227	7231	7235	7240
.7	7244	7248	7252	7257	7261	7265	7270	7274	7278	7282
.8	7287	7291	7295	7299	7304	7308	7312	7316	7321	7325
.9	7329	7334	7338	7342	7346	7351	7355	7359	7363	7368

PAPIO CREEK SITE 20

CAPACITY IN ACRE-FT.
(1984 SURVEY)

ELEV	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
1110.0	7372	7376	7381	7385	7390	7394	7399	7403	7408	7412
.1	7416	7421	7425	7430	7434	7439	7443	7447	7452	7456
.2	7461	7465	7470	7474	7479	7483	7487	7492	7496	7501
.3	7505	7510	7514	7519	7523	7527	7532	7536	7541	7545
.4	7550	7554	7558	7563	7567	7572	7576	7581	7585	7590
.5	7594	7598	7603	7607	7612	7616	7621	7625	7630	7634
.6	7638	7643	7647	7652	7656	7661	7665	7669	7674	7678
.7	7683	7687	7692	7696	7701	7705	7709	7714	7718	7723
.8	7727	7732	7736	7741	7745	7749	7754	7758	7763	7767
.9	7772	7776	7780	7785	7789	7794	7798	7803	7807	7812
1111.0	7816	7821	7825	7830	7834	7839	7843	7848	7853	7857
.1	7862	7866	7871	7876	7880	7885	7889	7894	7898	7903
.2	7908	7912	7917	7921	7926	7931	7935	7940	7944	7949
.3	7953	7958	7963	7967	7972	7976	7981	7985	7990	7995
.4	7999	8004	8008	8013	8018	8022	8027	8031	8036	8040
.5	8045	8050	8054	8059	8063	8068	8072	8077	8082	8086
.6	8091	8095	8100	8105	8109	8114	8118	8123	8127	8132
.7	8137	8141	8146	8150	8155	8159	8164	8169	8173	8178
.8	8182	8187	8192	8196	8201	8205	8210	8214	8219	8224
.9	8228	8233	8237	8242	8247	8251	8256	8260	8265	8269
1112.0	8274	8279	8284	8288	8293	8298	8303	8307	8312	8317
.1	8322	8326	8331	8336	8341	8346	8350	8355	8360	8365
.2	8369	8374	8379	8384	8388	8393	8398	8403	8408	8412
.3	8417	8422	8427	8431	8436	8441	8446	8450	8455	8460
.4	8465	8470	8474	8479	8484	8489	8493	8498	8503	8508
.5	8512	8517	8522	8527	8532	8536	8541	8546	8551	8555
.6	8560	8565	8570	8575	8579	8584	8589	8594	8598	8603
.7	8608	8613	8617	8622	8627	8632	8637	8641	8646	8651
.8	8656	8660	8665	8670	8675	8679	8684	8689	8694	8699
.9	8703	8708	8713	8718	8722	8727	8732	8737	8741	8746
1113.0	8751	8756	8761	8766	8771	8776	8781	8786	8791	8796
.1	8801	8806	8811	8816	8821	8826	8831	8836	8841	8846
.2	8851	8856	8861	8866	8871	8876	8880	8885	8890	8895
.3	8900	8905	8910	8915	8920	8925	8930	8935	8940	8945
.4	8950	8955	8960	8965	8970	8975	8980	8985	8990	8995
.5	9000	9005	9010	9015	9020	9025	9030	9035	9040	9045
.6	9050	9055	9060	9065	9070	9075	9080	9085	9090	9095
.7	9100	9105	9110	9115	9120	9124	9129	9134	9139	9144
.8	9149	9154	9159	9164	9169	9174	9179	9184	9189	9194
.9	9199	9204	9209	9214	9219	9224	9229	9234	9239	9244
1114.0	9249	9254	9259	9265	9270	9275	9280	9286	9291	9296
.1	9301	9307	9312	9317	9322	9328	9333	9338	9343	9349
.2	9354	9359	9364	9370	9375	9380	9385	9390	9396	9401
.3	9406	9411	9417	9422	9427	9432	9438	9443	9448	9453
.4	9459	9464	9469	9474	9480	9485	9490	9495	9501	9506
.5	9511	9516	9521	9527	9532	9537	9542	9548	9553	9558
.6	9563	9569	9574	9579	9584	9590	9595	9600	9605	9611
.7	9616	9621	9626	9632	9637	9642	9647	9652	9658	9663
.8	9668	9673	9679	9684	9689	9694	9700	9705	9710	9715
.9	9721	9726	9731	9736	9742	9747	9752	9757	9763	9768

PAPIO CREEK SITE 20

CAPACITY IN ACRE-FT.
(1984 SURVEY)

ELEV	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
1115.0	9773	9778	9784	9789	9795	9800	9806	9811	9817	9822
.1	9828	9833	9839	9844	9850	9855	9861	9866	9872	9877
.2	9883	9888	9894	9899	9905	9910	9915	9921	9926	9932
.3	9937	9943	9948	9954	9959	9965	9970	9976	9981	9987
.4	9992	9998	10003	10009	10014	10020	10025	10031	10036	10042
.5	10047	10052	10058	10063	10069	10074	10080	10085	10091	10096
.6	10102	10107	10113	10118	10124	10129	10135	10140	10146	10151
.7	10157	10162	10168	10173	10179	10184	10189	10195	10200	10206
.8	10211	10217	10222	10228	10233	10239	10244	10250	10255	10261
.9	10266	10272	10277	10283	10288	10294	10299	10305	10310	10316
1116.0	10321	10327	10332	10338	10344	10350	10355	10361	10367	10372
.1	10378	10384	10390	10395	10401	10407	10412	10418	10424	10429
.2	10435	10441	10447	10452	10458	10464	10469	10475	10481	10487
.3	10492	10498	10504	10509	10515	10521	10527	10532	10538	10544
.4	10549	10555	10561	10567	10572	10578	10584	10589	10595	10601
.5	10606	10612	10618	10624	10629	10635	10641	10646	10652	10658
.6	10664	10669	10675	10681	10686	10692	10698	10704	10709	10715
.7	10721	10726	10732	10738	10744	10749	10755	10761	10766	10772
.8	10778	10784	10789	10795	10801	10806	10812	10818	10823	10829
.9	10835	10841	10846	10852	10858	10863	10869	10875	10881	10886
1117.0	10892	10898	10904	10910	10916	10922	10928	10934	10940	10945
.1	10951	10957	10963	10969	10975	10981	10987	10993	10999	11005
.2	11011	11017	11023	11029	11035	11041	11046	11052	11058	11064
.3	11070	11076	11082	11088	11094	11100	11106	11112	11118	11124
.4	11130	11136	11141	11147	11153	11159	11165	11171	11177	11183
.5	11189	11195	11201	11207	11213	11219	11225	11231	11237	11242
.6	11248	11254	11260	11266	11272	11278	11284	11290	11296	11302
.7	11308	11314	11320	11326	11332	11337	11343	11349	11355	11361
.8	11367	11373	11379	11385	11391	11397	11403	11409	11415	11421
.9	11427	11433	11438	11444	11450	11456	11462	11468	11474	11480
1118.0	11486	11492	11498	11505	11511	11517	11523	11529	11535	11542
.1	11548	11554	11560	11566	11572	11579	11585	11591	11597	11603
.2	11609	11616	11622	11628	11634	11640	11646	11653	11659	11665
.3	11671	11677	11683	11690	11696	11702	11708	11714	11720	11727
.4	11733	11739	11745	11751	11757	11764	11770	11776	11782	11788
.5	11794	11801	11807	11813	11819	11825	11832	11838	11844	11850
.6	11856	11862	11869	11875	11881	11887	11893	11899	11906	11912
.7	11918	11924	11930	11936	11943	11949	11955	11961	11967	11973
.8	11980	11986	11992	11998	12004	12010	12017	12023	12029	12035
.9	12041	12047	12054	12060	12066	12072	12078	12084	12091	12097
1119.0	12103	12109	12116	12122	12129	12135	12141	12148	12154	12161
.1	12167	12173	12180	12186	12193	12199	12205	12212	12218	12225
.2	12231	12237	12244	12250	12257	12263	12269	12276	12282	12289
.3	12295	12301	12308	12314	12321	12327	12333	12340	12346	12353
.4	12359	12365	12372	12378	12385	12391	12397	12404	12410	12417
.5	12423	12429	12436	12442	12449	12455	12461	12468	12474	12481
.6	12487	12493	12500	12506	12513	12519	12525	12532	12538	12545
.7	12551	12557	12564	12570	12577	12583	12589	12596	12602	12609
.8	12615	12621	12628	12634	12641	12647	12653	12660	12666	12673
.9	12679	12685	12692	12698	12705	12711	12717	12724	12730	12737

PAPIO CREEK SITE 20

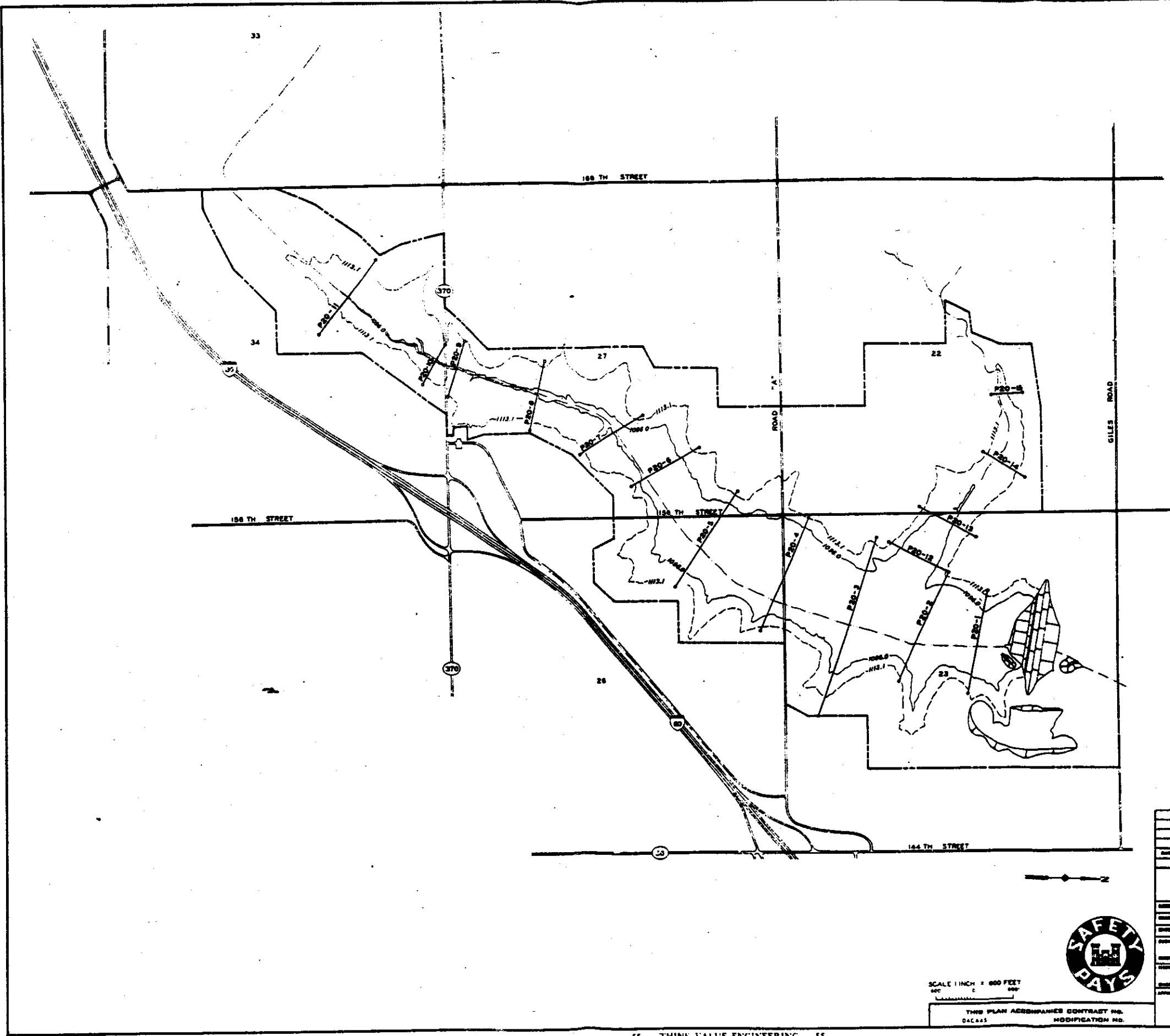
CAPACITY IN ACRE-FT.
(1984 SURVEY)

ELEV	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
1120.0	12743	12750	12756	12763	12769	12776	12783	12789	12796	12802
.1	12809	12816	12822	12829	12836	12842	12849	12855	12862	12869
.2	12875	12882	12888	12895	12902	12908	12915	12921	12928	12935
.3	12941	12948	12955	12961	12968	12974	12981	12988	12994	13001
.4	13007	13014	13021	13027	13034	13040	13047	13054	13060	13067
.5	13073	13080	13087	13093	13100	13107	13113	13120	13126	13133
.6	13140	13146	13153	13159	13166	13173	13179	13186	13192	13199
.7	13206	13212	13219	13226	13232	13239	13245	13252	13259	13265
.8	13272	13278	13285	13292	13298	13305	13311	13318	13325	13331
.9	13338	13345	13351	13358	13364	13371	13378	13384	13391	13397
1121.0	13404	13411	13418	13424	13431	13438	13445	13452	13459	13465
.1	13472	13479	13486	13493	13499	13506	13513	13520	13527	13534
.2	13540	13547	13554	13561	13568	13575	13581	13588	13595	13602
.3	13609	13615	13622	13629	13636	13643	13650	13656	13663	13670
.4	13677	13684	13690	13697	13704	13711	13718	13725	13731	13738
.5	13745	13752	13759	13765	13772	13779	13786	13793	13800	13806
.6	13813	13820	13827	13834	13840	13847	13854	13861	13868	13875
.7	13881	13888	13895	13902	13909	13915	13922	13929	13936	13943
.8	13950	13956	13963	13970	13977	13984	13991	13997	14004	14011
.9	14018	14025	14031	14038	14045	14052	14059	14066	14072	14079
1122.0	14086	14093	14100	14107	14114	14121	14128	14135	14142	14149
.1	14156	14164	14171	14178	14185	14192	14199	14206	14213	14220
.2	14227	14234	14241	14248	14255	14262	14269	14276	14283	14290
.3	14297	14305	14312	14319	14326	14333	14340	14347	14354	14361
.4	14368	14375	14382	14389	14396	14403	14410	14417	14424	14431
.5	14438	14446	14453	14460	14467	14474	14481	14488	14495	14502
.6	14509	14516	14523	14530	14537	14544	14551	14558	14565	14572
.7	14579	14587	14594	14601	14608	14615	14622	14629	14636	14643
.8	14650	14657	14664	14671	14678	14685	14692	14699	14706	14713
.9	14720	14728	14735	14742	14749	14756	14763	14770	14777	14784
1123.0	14791	14798	14806	14813	14820	14828	14835	14842	14850	14857
.1	14864	14872	14879	14886	14894	14901	14908	14916	14923	14930
.2	14938	14945	14952	14960	14967	14975	14982	14989	14997	15004
.3	15011	15019	15026	15033	15041	15048	15055	15063	15070	15077
.4	15085	15092	15099	15107	15114	15121	15129	15136	15143	15151
.5	15158	15165	15173	15180	15187	15195	15202	15209	15217	15224
.6	15231	15239	15246	15253	15261	15268	15275	15283	15290	15297
.7	15305	15312	15319	15327	15334	15341	15349	15356	15364	15371
.8	15378	15386	15393	15400	15408	15415	15422	15430	15437	15444
.9	15452	15459	15466	15474	15481	15488	15496	15503	15510	15518
1124.0	15525	15533	15540	15548	15556	15563	15571	15579	15586	15594
.1	15602	15609	15617	15625	15632	15640	15648	15655	15663	15671
.2	15678	15686	15694	15701	15709	15717	15724	15732	15739	15747
.3	15755	15762	15770	15778	15785	15793	15801	15808	15816	15824
.4	15831	15839	15847	15854	15862	15870	15877	15885	15893	15900
.5	15908	15916	15923	15931	15939	15946	15954	15962	15969	15977
.6	15985	15992	16000	16008	16015	16023	16031	16038	16046	16054
.7	16061	16069	16077	16084	16092	16099	16107	16115	16122	16130
.8	16138	16145	16153	16161	16168	16176	16184	16191	16199	16207
.9	16214	16222	16230	16237	16245	16253	16260	16268	16276	16283

PAPIO CREEK SITE 20

CAPACITY IN ACRE-FT.
(1984 SURVEY)

ELEV	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
1125.0	16291	16299	16307	16315	16323	16331	16339	16347	16355	16363
.1	16371	16379	16387	16395	16403	16411	16419	16426	16434	16442
.2	16450	16458	16466	16474	16482	16490	16498	16506	16514	16522
.3	16530	16538	16546	16554	16562	16570	16578	16586	16594	16602
.4	16610	16618	16626	16634	16642	16650	16658	16666	16674	16682
.5	16689	16697	16705	16713	16721	16729	16737	16745	16753	16761
.6	16769	16777	16785	16793	16801	16809	16817	16825	16833	16841
.7	16849	16857	16865	16873	16881	16889	16897	16905	16913	16921
.8	16929	16937	16945	16953	16960	16968	16976	16984	16992	17000
.9	17008	17016	17024	17032	17040	17048	17056	17064	17072	17080
1126.0	17088	17096	17105	17113	17121	17129	17138	17146	17154	17162
.1	17171	17179	17187	17196	17204	17212	17220	17229	17237	17245
.2	17253	17262	17270	17278	17286	17295	17303	17311	17320	17328
.3	17336	17344	17353	17361	17369	17377	17386	17394	17402	17411
.4	17419	17427	17435	17444	17452	17460	17468	17477	17485	17493
.5	17501	17510	17518	17526	17535	17543	17551	17559	17568	17576
.6	17584	17592	17601	17609	17617	17626	17634	17642	17650	17659
.7	17667	17675	17683	17692	17700	17708	17717	17725	17733	17741
.8	17750	17758	17766	17774	17783	17791	17799	17807	17816	17824
.9	17832	17841	17849	17857	17865	17874	17882	17890	17898	17907
1127.0	17915	17924	17932	17941	17949	17958	17966	17975	17983	17992
.1	18000	18009	18018	18026	18035	18043	18052	18060	18069	18077
.2	18086	18095	18103	18112	18120	18129	18137	18146	18154	18163
.3	18171	18180	18189	18197	18206	18214	18223	18231	18240	18248
.4	18257	18266	18274	18283	18291	18300	18308	18317	18325	18334
.5	18342	18351	18360	18368	18377	18385	18394	18402	18411	18419
.6	18428	18437	18445	18454	18462	18471	18479	18488	18496	18505
.7	18513	18522	18531	18539	18548	18556	18565	18573	18582	18590
.8	18599	18608	18616	18625	18633	18642	18650	18659	18667	18676
.9	18684	18693	18702	18710	18719	18727	18736	18744	18753	18761
1128.0	18770	18779	18788	18797	18805	18814	18823	18832	18841	18850
.1	18858	18867	18876	18885	18894	18903	18912	18920	18929	18938
.2	18947	18956	18965	18974	18982	18991	19000	19009	19018	19027
.3	19035	19044	19053	19062	19071	19080	19089	19097	19106	19115
.4	19124	19133	19142	19151	19159	19168	19177	19186	19195	19204
.5	19212	19221	19230	19239	19248	19257	19266	19274	19283	19292
.6	19301	19310	19319	19328	19336	19345	19354	19363	19372	19381
.7	19389	19398	19407	19416	19425	19434	19443	19451	19460	19469
.8	19478	19487	19496	19505	19513	19522	19531	19540	19549	19558
.9	19566	19575	19584	19593	19602	19611	19620	19628	19637	19646
1129.0	19655	19664	19673	19682	19692	19701	19710	19719	19728	19737
.1	19746	19756	19765	19774	19783	19792	19801	19810	19820	19829
.2	19838	19847	19856	19865	19874	19884	19893	19902	19911	19920
.3	19929	19938	19947	19957	19966	19975	19984	19993	20002	20011
.4	20021	20030	20039	20048	20057	20066	20075	20085	20094	20103
.5	20112	20121	20130	20139	20149	20158	20167	20176	20185	20194
.6	20203	20213	20222	20231	20240	20249	20258	20267	20277	20286
.7	20295	20304	20313	20322	20331	20340	20350	20359	20368	20377
.8	20386	20395	20404	20414	20423	20432	20441	20450	20459	20468
.9	20478	20487	20496	20505	20514	20523	20532	20542	20551	20560



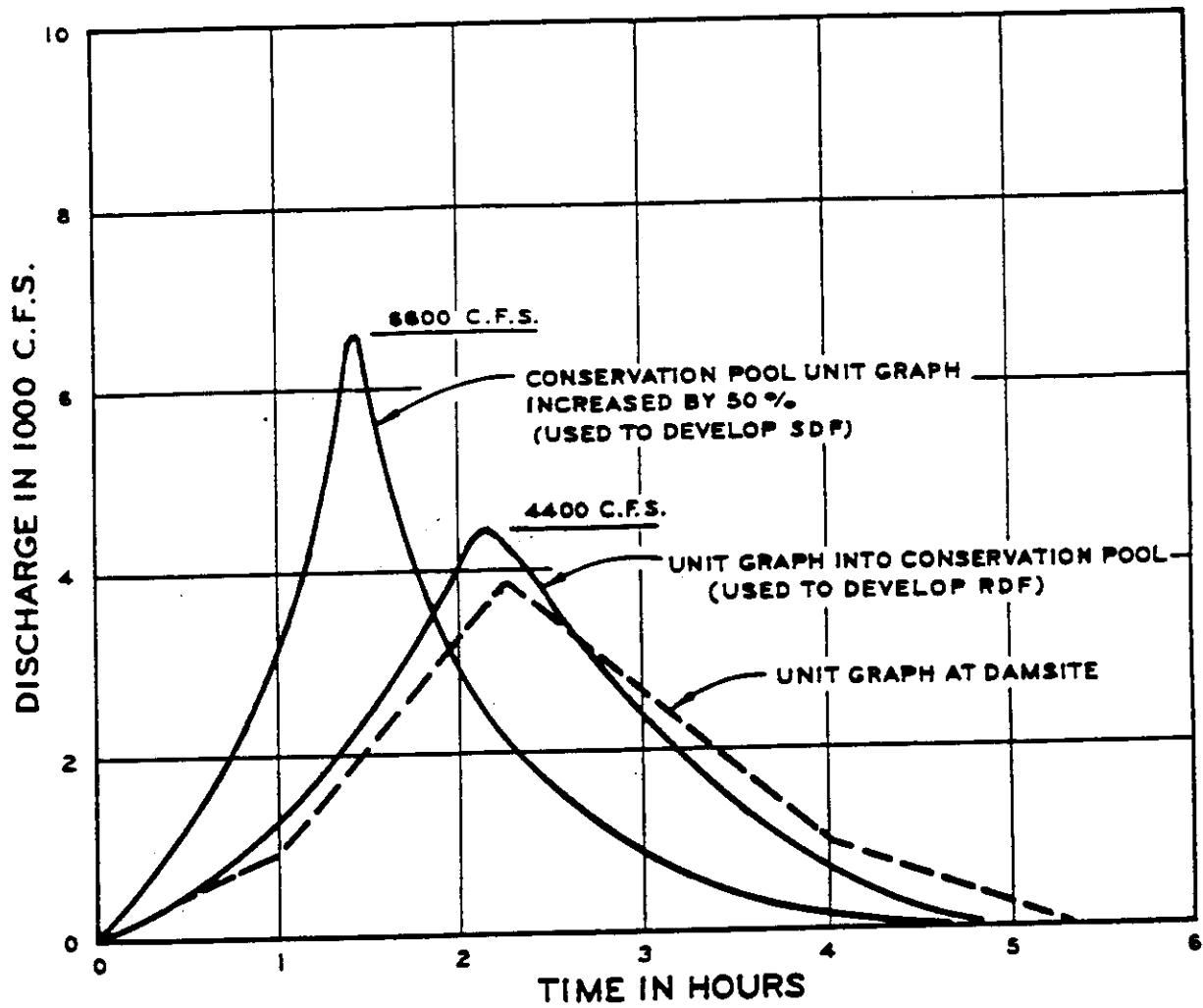
- LEGEND:**
- Multipurpose Pool Elevation
 - S. P. F. Pool Elevation
 - - - - - Project Boundary
 - ==== Paved Roads
 - ==== Gravel Surfaced Roads

DATE		DRAWN		CHECKED	
DESIGNED		SCALE		SHEET NO.	
U. S. ARMY ENGINEER DISTRICT, OMAHA CORPS OF ENGINEERS OMAHA, NEBRASKA					
PROJECT NO.		PAPILLON CREEK AND TRIBUTARIES LAKES, NEBRASKA SITE 20 SEDIMENTATION STUDIES LOCATION OF SEDIMENT RANGE			
DRAWN BY		DATE		DEC. 1962	
CHECKED BY		SCALE AS SHOWN		SHEET NO. 04CA43	
APPROVED BY		DRAWN		CHECKED	
DATE		SCALE		SHEET NO.	

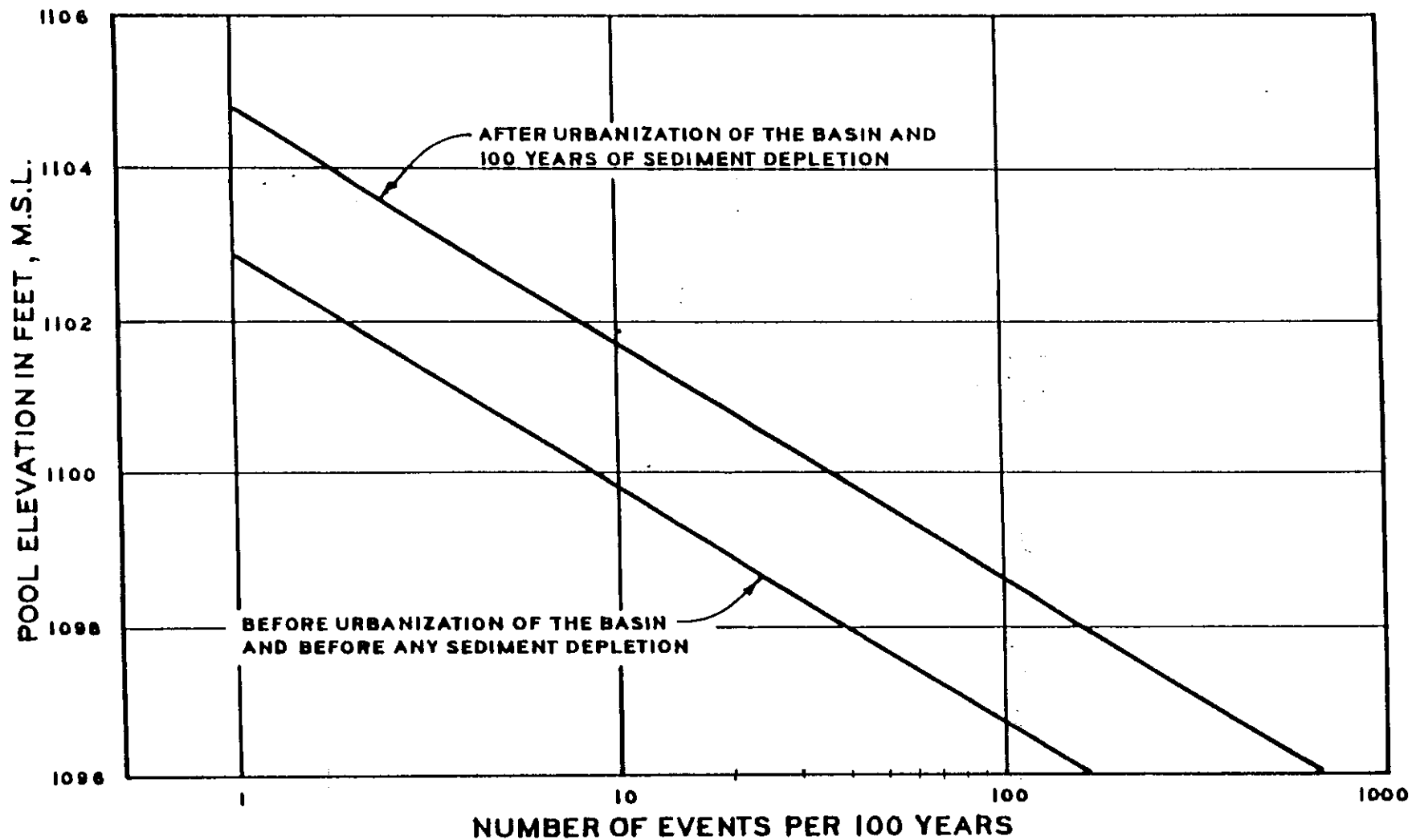


SCALE 1 INCH = 600 FEET
500' 0' 100'

THIS PLAN ACCOMPANIES CONTRACT NO. 04CA43
MODIFICATION NO.



PAPILLION CREEK AND TRIBUTARIES LAKES, NEBR.
SITE 20
 1-HOUR UNIT HYDROGRAPHS
 D.A.=13.1 MI²
 U. S. ARMY ENGINEER DISTRICT, OMAHA
 CORPS OF ENGINEERS OMAHA, NEBRASKA
 JAN. 1981



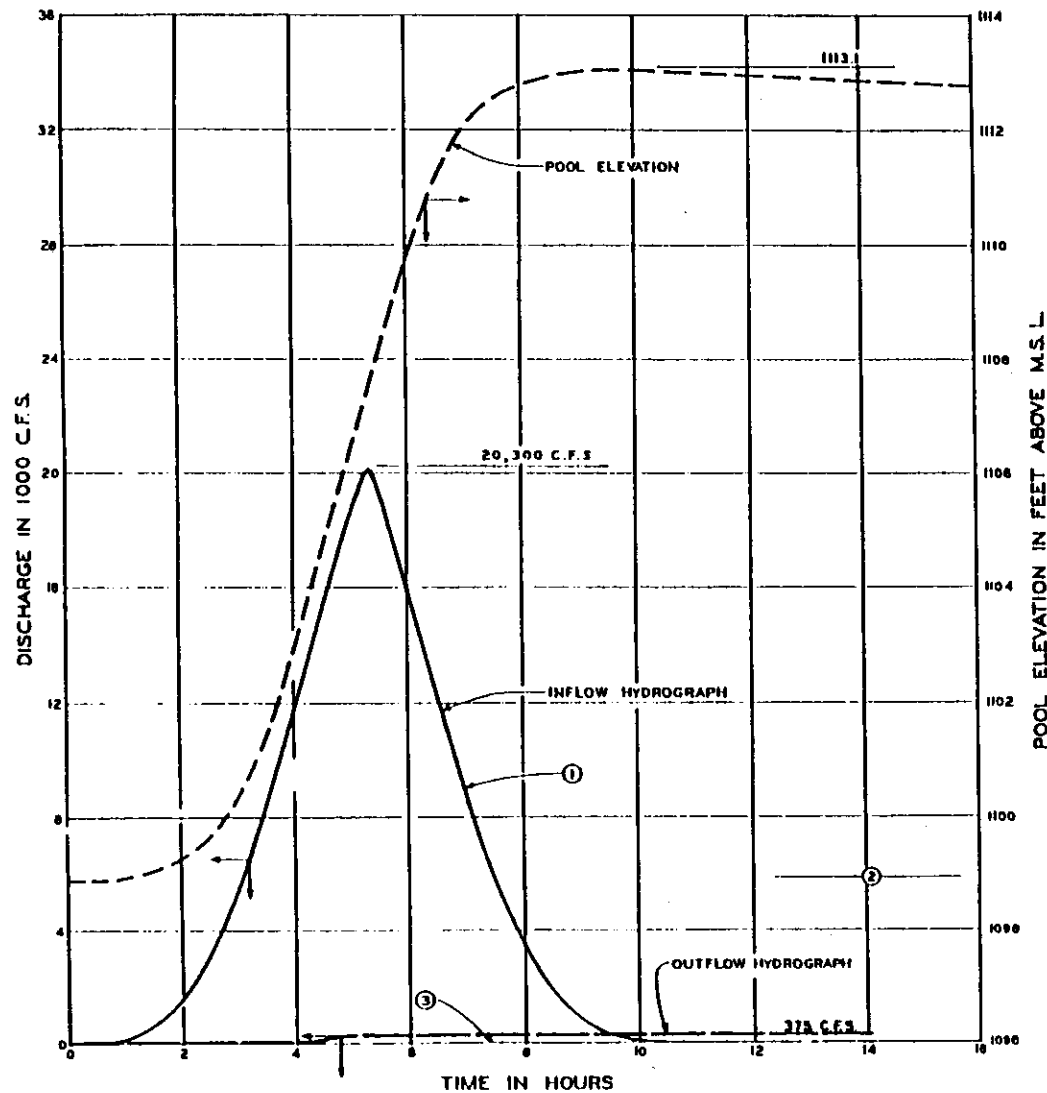
PAPILLION CREEK AND TRIBUTARIES LAKES, NEBR.

SITE 20

POOL-ELEVATION FREQUENCY CURVES
ABOVE MULTIPURPOSE POOL

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS OMAHA, NEBRASKA

JAN. 1961



LEGEND:

- ① This hydrograph represents the maximum 6 hours of runoff (60 to 66 hours)
- ② Antecedent runoff from 0 to 60 hours raised the pool from 1096.0 ft. to 1099.0 ft.
- ③ Multipurpose pool elevation 1096.0 ft.

NOTE: Reservoir design flood storage accumulation summary. All values include base flow.

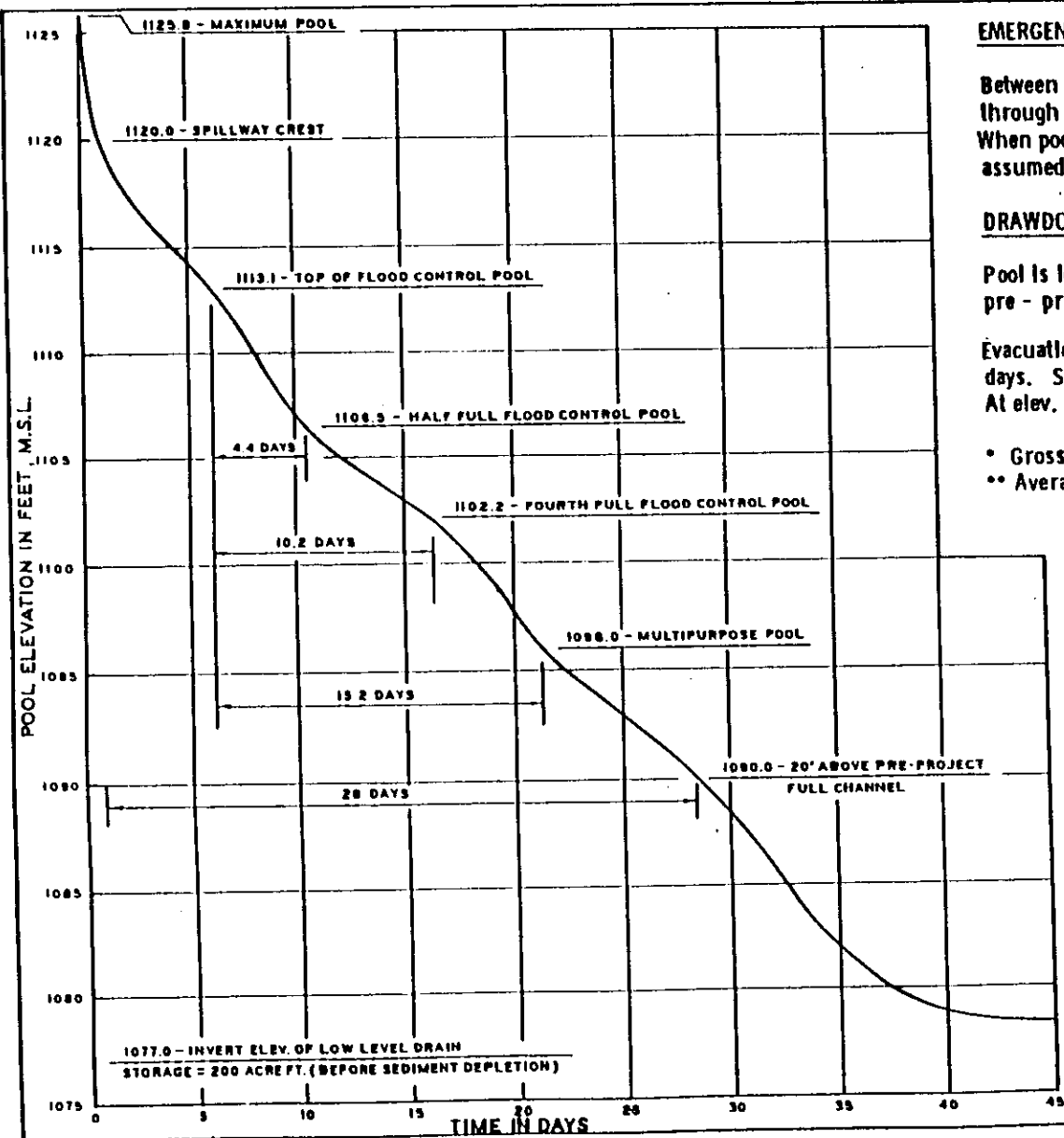
From 0 to 60 hours	Inflow	- 748 A.F.
	Outflow	- 115 A.F.
	Storage	- 633 A.F.

From 60 to 70 hours	Inflow	- 5458 A.F.
	Outflow	- 268 A.F.
	Storage	- 5190 A.F.

From 70 to 96 hours	Inflow	- 318 A.F.
	Outflow	- 679 A.F.
	Storage	- 361 A.F.

Maximum Storage = 633 + 5190 = 5823 A.F.

PAPILLION CREEK AND TRIBUTARIES LAKES, NEBR.
SITE 20
 RESERVOIR DESIGN FLOOD ROUTING
 U S ARMY ENGINEER DISTRICT, OMAHA
 CORPS OF ENGINEERS OMAHA, NEBRASKA
 JAN. 1961



EMERGENCY DRAWDOWN OPERATION

Between spillway crest and multipurpose pool, drawdown is accomplished through ungated outlet. When pool elevation reaches 1099.0', the gate on the low level outlet is assumed to be opened.

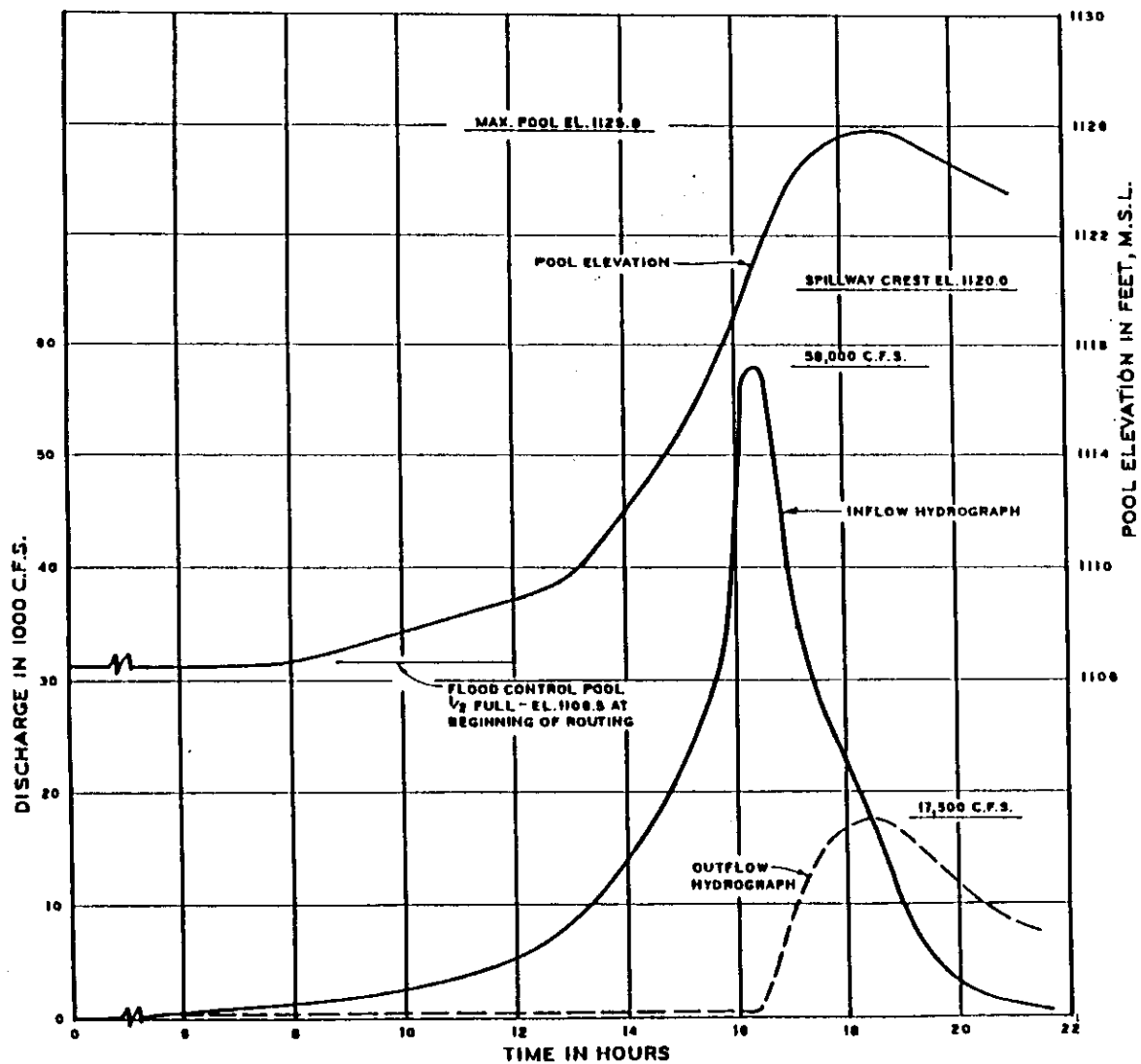
DRAWDOWN SUMMARY - Reference ER-1110-2-50

Pool is lowered to 1090.0' in 28 days, at which level the pool is 20' above pre-project full channel.

Evacuation of multipurpose pool to elevation 1078.3' is accomplished in 25 days. Storage remaining in pool at elevation 1078.3' is 300 A. F. At elev. 1078.3' Inflow - outflow = 7.3 C. F. S. **

- * Gross storage before sediment depletion.
- ** Average May through August flow.

PAPILLION CREEK AND TRIBUTARIES LAKES, NEBR.
SITE 20
RESERVOIR DRAWDOWN
 U. S. ARMY ENGINEER DISTRICT, OMAHA
 CORPS OF ENGINEERS OMAHA, NEBRASKA
 JAN. 1981



PAPILLION CREEK AND TRIBUTARIES LAKES, NEBR.
SITE 20
 SPILLWAY DESIGN FLOOD ROUTING
 U. S. ARMY ENGINEER DISTRICT, OMAHA
 CORPS OF ENGINEERS OMAHA, NEBRASKA
 JAN. 1931

**U.S. ARMY ENGINEER DISTRICT, OMAHA
EXECUTIVE OFFICE**

COL S H Bornhoff
Rm 5425 Ext 3900
CDR Dist Engr
(CEMRO-DE)

R F Roungh
Rm 5425 Ext 3928
Dep Dist Engr
(CEMRO-DC)

LTC D E Needham
Rm 5425 Ext 3901
Dep CDR/Dep Dist Engr
(CEMRO-DH)

MAJ J L Whisler, Jr.
Rm 5425 Ext 3903
Dep CDR/Dep Dist Engr
(CEMRO-DM)

MAJ P M Rojko (USAF)
Rm 5425 Ext 3198
Asst CDR/Asst Dist Engr
(CEMRO-AF)

H C Rudloff
Rm 5425 Ext 3902
Executive Assistant
(CEMRO-EX)

215 N 17th St, Omaha, NE 68102-4978
Commercial: 402-221 + Extension

Page 3

ADMINISTRATIVE SUPPORT

MRD Contract Audit Office (Omaha Dist)

K M Ponoc Contract Auditor
Rm 810 Ext 3882 (CEMRO-AO-O)

Page 3

SUPPORT SERVICES

Missouri River Division
Kansas City District
USA Dist Recruit Battalion (2)
Cornhusker AAP

SPECIAL ASSISTANTS

S J Moore Actg Value Engineer
Rm 4307 Ext 3908 (CEMRO-ED-V)

D M Cheever Equal Emp Mgr
Rm 3402 Ext 3911 (CEMRO-EE)

Page 6
Page 3

BOARDS AND COMMITTEES

A-E Liability Review Board
A-E Preselection and Selection Boards
Affirmative Action Committee
Automation Security Committee
Black Employment Program Committee
Contract Termination Team
Contract Review Board
Dispute Analysis Board
EEO and Human Relations Committee
Federal Women's Program Committee
Health Promotion Council
Hispanic Employment Program Committee
Incentive Awards Committee

Information Systems Priority Review Committee
Occupational Safety and Health Committees
Omaha District Crisis Mgt Team
Omaha District Dam Safety Committee
Omaha District 501 Committee
Omaha District Training Committee
Plant Replacement & Improvement Program Committee
Program and Budget Advisory Committee
Project Review Board
Selection Committee for Gallery of Distinguished Civilian Employees

RESOURCE MANAGEMENT OFFICE

T E Pond Chief
Rm 6425B Ext 3222 (CEMRO-RM)

Page 3

INTERNAL REVIEW OFFICE

C E Rynazewski Actg Chief
Rm 812 Ext 3035 (CEMRO-IR)

Page 4

OFFICE OF COUNSEL

G M Henningsen Dist Counsel
Rm 2327 Ext 4055 (CEMRO-DC)

Page 4

PERSONNEL OFFICE

F J Watson Pers Officer
Rm 3002 Ext 4071 (CEMRO-PO)

Page 4

SECURITY AND LAW ENFORCEMENT OFFICE

Vacant S&LE Mgr
Rm 6016 Ext 3914 (CEMRO-SE)

Page 4

PUBLIC AFFAIRS OFFICE

B M White Chief
Rm 5413 Ext 3916 (CEMRO-PA)

Page 4

LOGISTICS MANAGEMENT OFFICE

N J Kolbe Chief
Rm 1610A Ext 3241 (CEMRO-LM)

Page 4

SAFETY AND OCCUPATIONAL HEALTH OFFICE

A F Lanzante Safety Mgr
Rm 6408 Ext 4051 (CEMRO-SO)

Page 4

INFORMATION MANAGEMENT OFC

G E Rosenbaugh Actg Chief
Rm 5027A Ext 3092 (CEMRO-IM)

Page 5

ENGINEERING DIVISION

T R Kall Chief
Rm 5426 Ext 4401 (CEMRO-ED)

C W Paukert Asst Chief
Rm 5426 Ext 4400 (CEMRO-ED)

Page 6

REAL ESTATE DIVISION

G D Blair Chief
Rm 2102 Ext 4321 (CEMRO-RE)

Page 11

CONSTRUCTION DIVISION

J H Simon Chief
Rm 6426 Ext 4121 (CEMRO-CP)

R J Vodicka Actg Asst Chief
Rm 6426 Ext 4241 (CEMRO-CD)

Page 12

OPERATIONS DIVISION

D F Owens Chief
Rm 7427 Ext 4135 (CEMRO-OP)

K L Holman Asst Chief
Rm 7427 Ext 4213 (CEMRO-OP)

Page 14

PLANNING DIVISION

K S Cooper Chief
Rm 7001 Ext 4575 (CEMRO-PD)

H N Thelen Asst Chief
Rm 7003 Ext 4576 (CEMRO-PD)

Page 18

CONTRACTING DIVISION

D G Robinson Chief
Rm 1614 Ext 4100 (CEMRO-CT)

K D Williams Actg Asst Chief
Rm 1604 Ext 4110 (CEMRO-CT)

K D Williams Dep for S&E
Rm 1604 Ext 4110 (CEMRO-CT-DB)

Page 19

PROGRAMS AND PROJECT MANAGEMENT DIVISION

R F Roungh Chief
Rm 5425 Ext 3928 (CEMRO-DP)

Page 20

VALUE ENGINEERING OFC

S J Moore Actg Value Engr
Rm 4307 Ext 3929 (CEMRO-ED-V)

Page 6

COST ENGINEERING BRANCH

J C Scripser Chief
Rm 4402 Ext 4452 (CEMRO-ED-C)

Page 6

DRAFTING BRANCH

G C Stephenson Chief
Rm 4021 Ext 4511 (CEMRO-ED-A)

Page 6

SPECIAL PROJECTS BRANCH

J E Trout Chief
Rm 2319 Ext 3151 (CEMRO-ED-S)

Page 6

DESIGN BRANCH

G D Hussey Chief
Rm 4410 Ext 4437 (CEMRO-ED-D)

Page 7

MILITARY BRANCH

J L Sack Chief
Rm 5412 Ext 4529 (CEMRO-ED-M)

Page 8

ENV (SUPERFUND) BR

S L Canlock Chief
6th Flr Ext 7675 (CEMRO-ED-E)

Page 9

GEO TECHNICAL BR

J W Monzingo Chief
Rm 5008 Ext 4481 (CEMRO-ED-G)

Page 10

HYDROLOGIC ENGINEERING BR

J D Rose Chief
Rm 3427 Ext 4417 (CEMRO-ED-H)

Page 10

PLANNING & CONTROL BRANCH

E A Silvers Chief
Rm 2301 Ext 4391 (CEMRO-RE-P)

Page 11

APPRAISAL BRANCH

E A Yoder Chief
Rm 2124 Ext 4343 (CEMRO-RE-E)

Page 11

ACQUISITION BRANCH

L G Larson Chief
Rm 2010 Ext 4328 (CEMRO-RE-A)

Page 11

MANAGEMENT & DISPOSAL BR

R R Bourne Chief
Rm 2106 Ext 4351 (CEMRO-RE-M)

Page 11

CONTRACT ADMIN BRANCH

J A Birkett Chief
Rm 6424 Ext 4247 (CEMRO-CD-C)

Page 12

QUALITY ASSURANCE BRANCH

J M Woods Chief
Rm 6402 Ext 4151 (CEMRO-CD-Q)

Page 12

PROGRAM EXECUTION BRANCH

J E Rose Chief
Rm 7425 Ext 4138 (CEMRO-OP-E)

Page 14

NATURAL RESOURCES MGT BR

T H Schaefer, Jr. Chief
Rm 7413 Ext 4139 (CEMRO-OP-N)

Page 14

REGULATORY BRANCH

R D Gorton Chief
Rm 8018 Ext 4211 (CEMRO-OP-R)

Page 14

MAINTENANCE ENGINEERING BR

S R Earl Chief
Rm 7425 Ext 4167 (CEMRO-OP-M)

Page 14

HYDROPOWER BR

T F Pfeiffer Chief
Rm 7427 Ext 4144 (CEMRO-OP-H)

Page 14

PLAN FORMULATION BR

R L Buss Chief
Rm 7027 Ext 4472 (CEMRO-PD-P)

Page 18

ENVIRONMENTAL ANAL BR

G E Mick Chief
Rm 7027 Ext 4598 (CEMRO-PD-M)

Page 18

FLOOD PLAIN MGT SVCS BR

L S Buss Chief
Rm 7027 Ext 4596 (CEMRO-PD-F)

Page 18

ECONOMICS & SOCIAL ANAL BR

R P Miner Chief
Rm 7027 Ext 3135 (CEMRO-PD-E)

Page 18

SPECIAL STUDIES BRANCH

R R Roza Jr Chief
Rm 7027 Ext 4574 (CEMRO-PD-A)

Page 18

ADVERTISING & AWARDS BRANCH

C L Vanatta Chief
Rm 1602 Ext 4239 (CEMRO-CT-A)

Page 19

CONTRACTS BRANCH

D A Daubman Chief
Rm 1614 Ext 4113 (CEMRO-CT-C)

Page 19

PROCUREMENT BRANCH

N F Herman Chief
Rm 1614 Ext 4119 (CEMRO-CT-P)

Page 19

EMERGENCY MANAGEMENT DIV

P F Pishilo Actg Chief
Rm 6016 Ext 4148 (CEMRO-EM)

Page 20

APPROVED:

Stewart H. Bornhoff

STEWART H BORNHOFF
Colonel, Corps of Engineers
Commander and District Engineer

15 February 1991

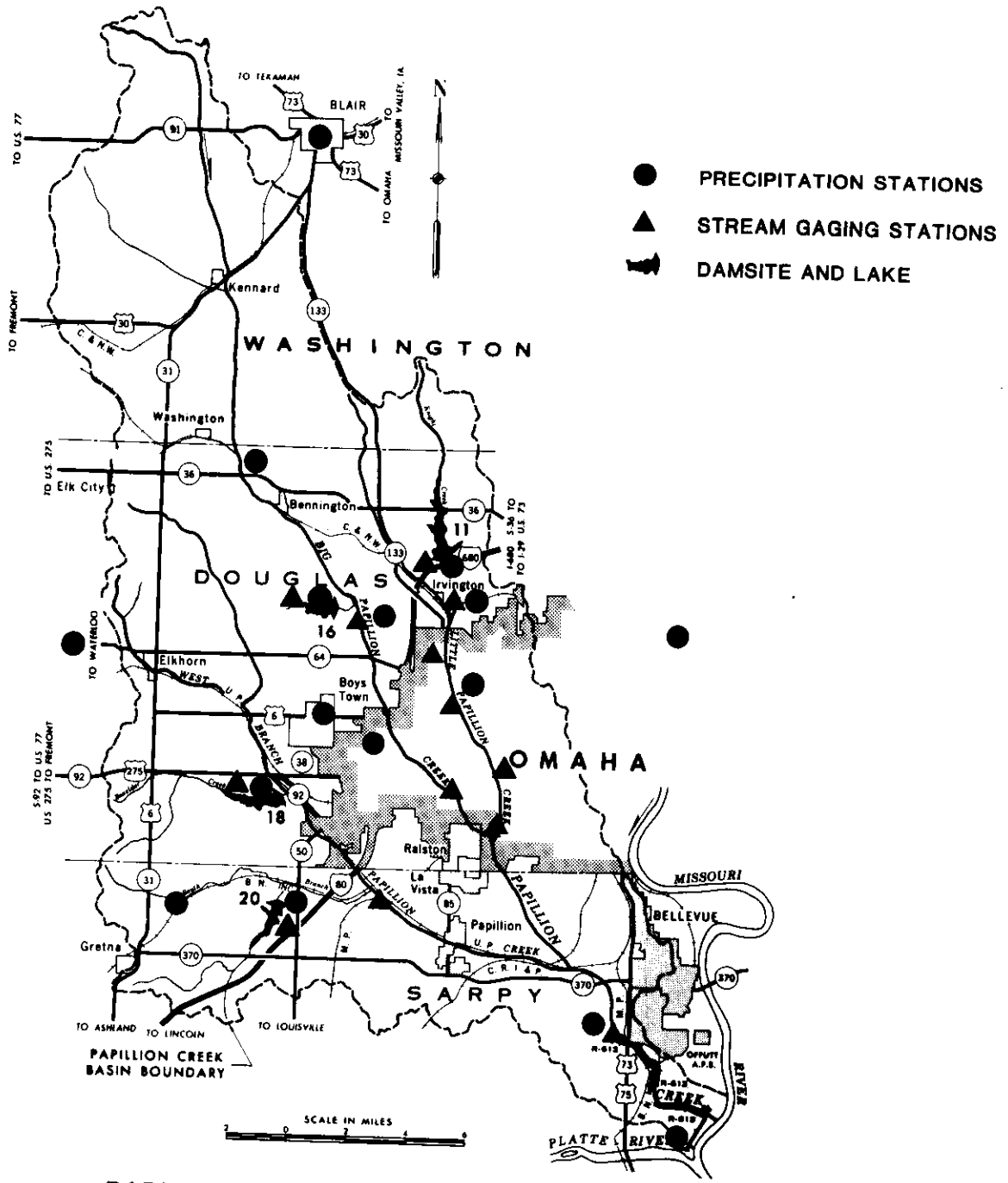
FIELD OFFICES
(SEE REVERSE SIDE)

1/ Dual assignment
2/ Dual assignment
* Brandeis Bldg

DISTRICT OFFICE

PLATE 50

PLATE 50



PAPILLION CREEK DRAINAGE AREA

MONTHLY RESERVOIR OPERATION

RCS MRDED-R-2*

RESERVOIR-G. CUNNINGHAM LAKE-11

RIVER- PAPIO CREEK

MISSOURI RIVER DIVISION

U.S. ARMY ENGINEER DISTRICT, OMAHA

* RES. ELEV. *EST. EVAP.* MEAN DISCHARGE 12MN TO 12MN IN CFS

*OCT *FT. ABV. MSL *
1990 12MN * CFS *

OUTFLOW * INFLOW *

Day	Res. Elev.	Est. Evap.	Outflow	Inflow
1	1120.4	*	0**	1
2	1120.4	*	0	4
3	1120.4	*	0	8
4	1120.4**	*	0	9**
5	1120.4	*	0	1
6	1120.4	*	0	1
7	1120.4	*	0	1
8	1120.4	*	0	1
9	1120.4	*	0	1
10	1120.4	*	0	1
11	1120.3	*	0	1
12	1120.3	*	0	1
13	1120.3	*	0	3
14	1120.3	*	0	1
15	1120.3	*	0	1
16	1120.3	*	0	1
17	1120.3	*	0	1
18	1120.3	*	0	1
19	1120.3	*	0	1
20	1120.3	*	0	1
21	1120.3	*	0	0*
22	1120.3	*	0	0
23	1120.3	*	0	0
24	1120.3	*	0	0
25	1120.3	*	0	0
26	1120.2	*	0	0
27	1120.2	*	0	0
28	1120.2	*	0	0
29	1120.2	*	0	0
30	1120.2*	*	0	0
31	1120.2	*	0	0

*TOTAL (DSF) 75 0 39 *
 *TOTAL (AC-FT) 147 0 77 *
 *MEAN (CFS) 0 1 *

- * 1. GROSS STORAGE 31 OCT 2974 A.F. *
- * 2. CHANGE IN STORAGE DURING OCT -70 A.F. *
- * 3. AVERAGE EST. EVAPORATION *
- * 4. OCTOBER PRECIPITATION *

*MRD FORM 0168 MAX ** MIN * PROVISIONAL *