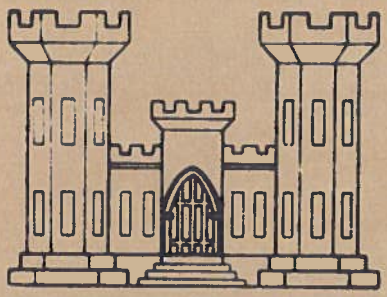
JOHN MEADOR

FLOOD CONTROL
MISSISSIPPI RIVER AND TRIBUTARIES

REFINED 1973 MR&T
PROJECT FLOOD FLOWLINE



U.S. ARMY ENGINEER DISTRICT, VICKSBURG
CORPS OF ENGINEERS
VICKSBURG, MISSISSIPPI

NOVEMBER 1978

REFINED 1973 MR&T PROJECT FLOOD FLOWLINE

VICKSBURG DISTRICT

In accordance with instructions contained in LMVED-H, letter dated 4 June 1974, subject, "Plan of Study, Review of Mississippi River Project Flood Flowline," the Vicksburg District has performed a mathematical analysis of the MR&T Flowline on the Mississippi River.

The 1956 Mississippi River Project Design Flowline was derived based on 1950 channel and overbank conditions. The carrying capacity of the Mississippi River within the Vicksburg Dictrict was most efficient during the time of this flowline determination. The increase in carrying capacity was due to the cutoff program conducted on the river in the 1940's that reduced stages as much as 16 feet at Arkansas City, Arkansas, and 10 feet at Vicksburg, Mississippi. Subsequent to the 1956 flowline determination, it was noted by rating curve comparison that the carrying capacity was decreasing. However, the 1973 flood clearly indicated that the channel deterioration was sufficient to influence a change in the Project Design Flowline.

Subsequent to the 1973 flood, the 1956 Project Flowline was adjusted upward based on observed rating curves at the major gaging stations on the river. The purpose of this study was to refine this adjusted flowline with a detailed mathematical analysis.

After the 1973 flood receded, channel and overbank cross-sections were surveyed at approximately two mile intervals. This cross-sectional data was used in Hydrologic Engineering Center computer program, HEC-II,

"Water Surface Profiles" along with the highwater profile of the 1973 flood. The math model was calibrated to the 1973 flood to calculate a steady state profile of the Project Flood.

The Mississippi Basin Model in Clinton, Mississippi, was also used to obtain a steady state profile of the Project Flood. The physical model is more capable than a math model of showing the effect on the Project Flowline of dikes, expansions, contractions, superelevation, and other local anomalies. The steady state profile from the math model was adjusted in reaches where the physical model showed adjustment was necessary.

The stage-discharge relationship on the Mississippi River is not unique. The river will carry a certain discharge at a lower stage when it is rising than when it is falling. This phenomenon is known as the dynamic "loop" effect. When the Mississippi River peaks and then begins to recede and then starts to rise again, the second rise is higher than the first rise for a given discharge. The 1973 flood was a flood of several crests and recessions. It was obvious that the Project Flood could be the result of several small storms which would cause the river to have multiple crests and recessions. A study was conducted using an unsteady flow program to determine the magnitude of the adjustment that needed to be added to the steady state flowline to allow for the dynamic "loop" effect. The results of this study, one-foot adjustment for all locations, are shown on the accompanying tables.

Since the Mississippi River has lost channel carrying capacity over the last 25 years, a study was conducted to determine the adjustment

that needed to be added to the steady state flowline to allow for any future channel deterioration. The study consisted of an analysis of specific gage records, an analysis of overbank sedimentation, an analysis of the basin hydrology, and an analysis of the channel geometry. The adjustments for future deterioration to be added to the steady state flowline are shown on the accompanying tables.

At the extreme north end of the District, the 1956 Project Flowline is higher than the steady state flowline with its adjustments. Along this reach, Mississippi levee station 0+00 through 800+00, the flowline is adjusted to the 1956 Project Flowline.

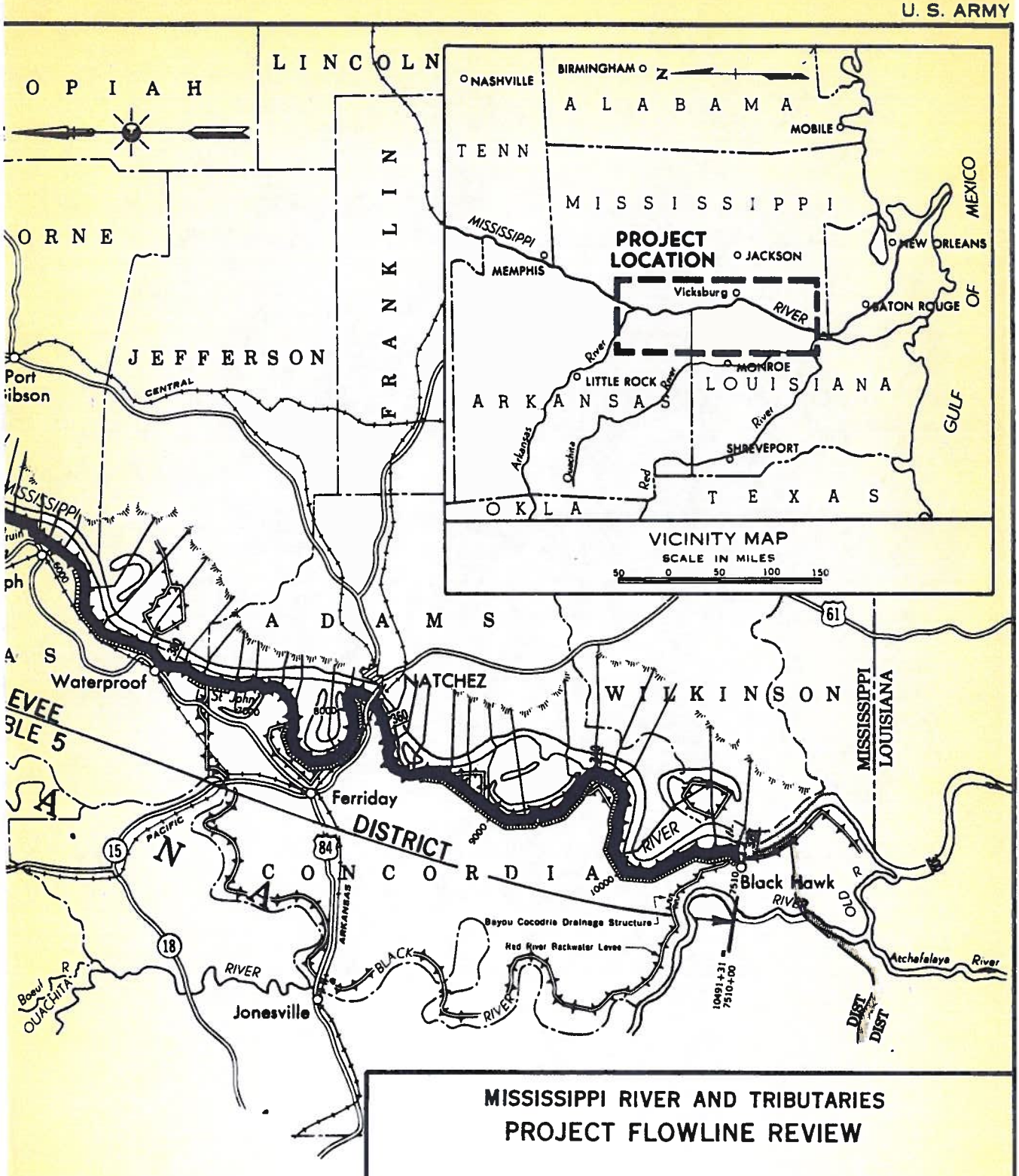
This steady state flowline with all of its adjustments is called the Refined 1973 MR&T Project Flood Flowline.

The accompanying tables represent the final results of all studies concerned with the Refined 1973 MR&T Project Flood Flowline. The map preceding the tables shows the portion of the Mississippi River included in this study and the Levee Districts that govern each reach of levee. Table 1 shows the Project Flood discharges on the Mississippi River. Table 2 shows the Refined 1973 MR&T Project Flood Flowline elevations at the major gaging stations. Table 3 shows the Project Flowline elevations in the Red River Backwater Area from Jonesville to Black Hawk. Tables 4, 5, and 6 show the Refined 1973 MR&T Project Flood Flowline elevations in Arkansas, Louisiana, and Mississippi, respectively. These elevations are listed by 1962 river mile and levee station. The adjustments for "loop" effect and future deterioration are also shown on Tables 4,5, and 6.

The Refined 1973 MR&T Project Flood Flowline should be used for all design purposes except in the case of the Yazoo Backwater Levee. The Yazoo

Backwater Levee should be designed based on the Refined 1973 MR&T Project Flood Flowline less the adjustment for future deterioration.

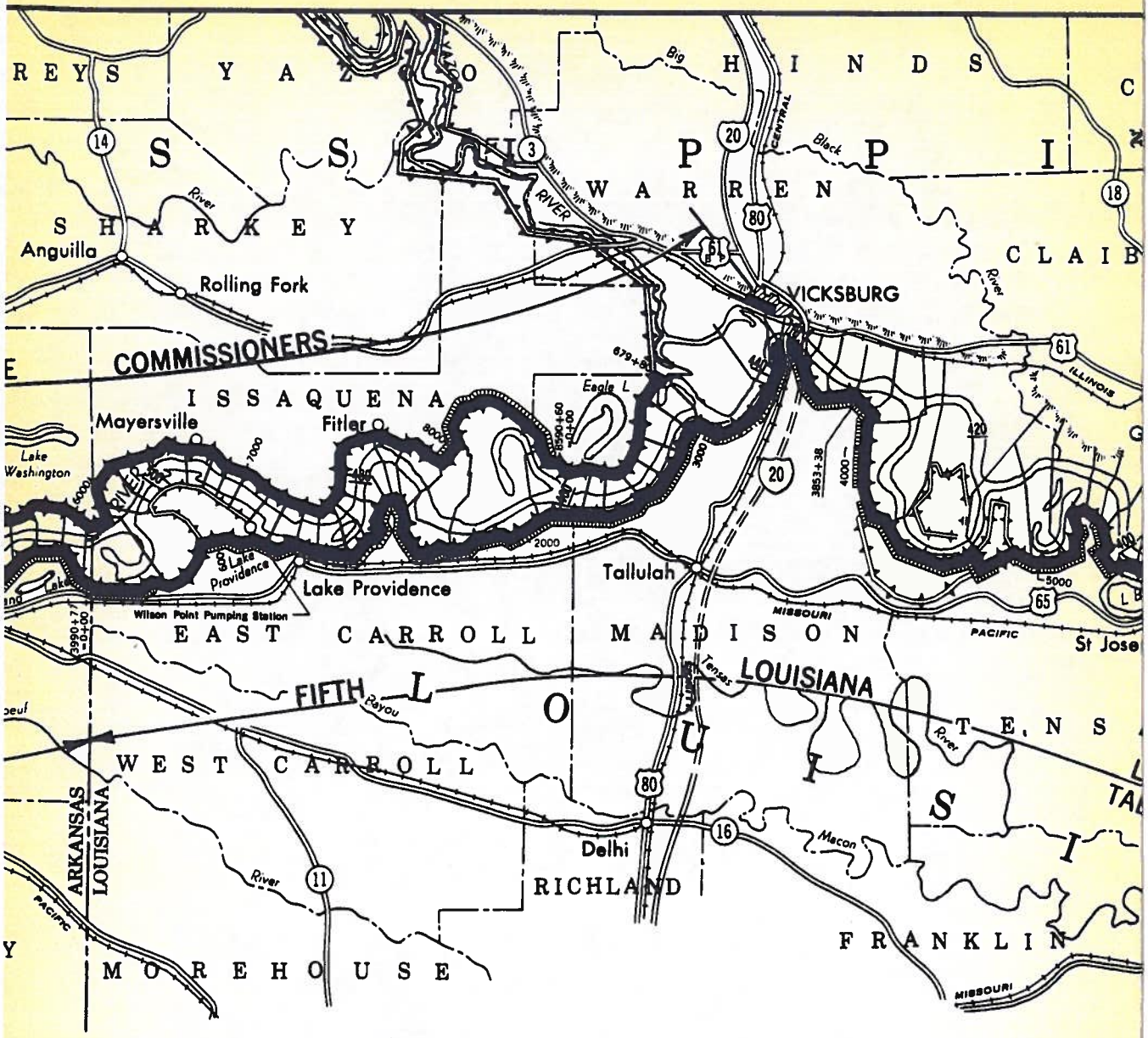
U. S. ARMY



MISSISSIPPI RIVER AND TRIBUTARIES
PROJECT FLOWLINE REVIEW

MISSISSIPPI RIVER
LEVEE DISTRICTS

U. S. ARMY ENGINEER DISTRICT, VICKSBURG
CORPS OF ENGINEERS



LEGEND

- Mississippi River Levees
- Levee not in Project or outside of District
- Hill Line
- Miles above Head of Passes (1962 Mileage)
- Gravel road on Levee

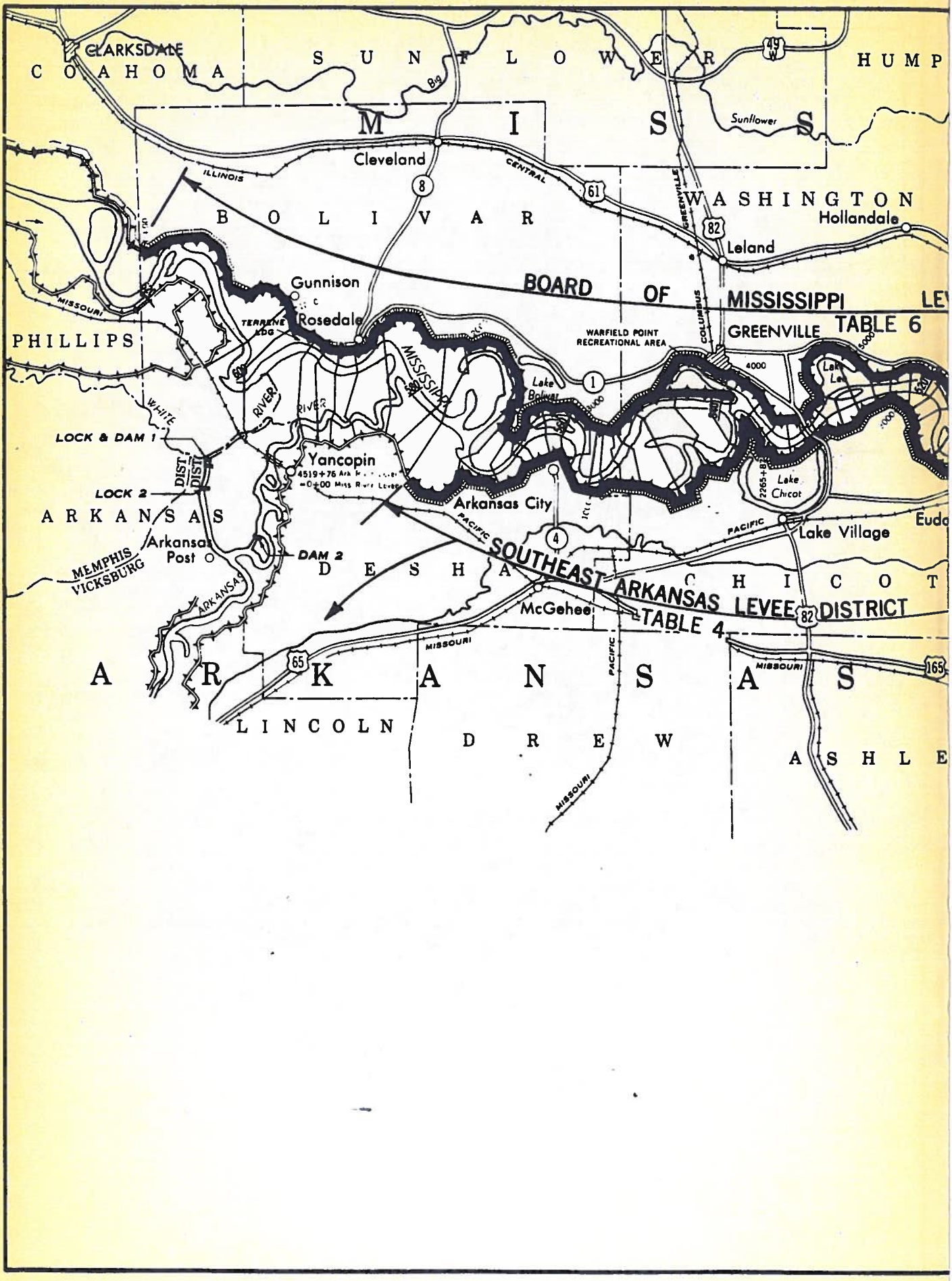

CLARKSDALE
COAHOMA
SUNFLOWER
HUMP
MISSISSIPPI
Big
Sunflower
Cleveland
ILLINOIS CENTRAL
8
61
49W
WASHINGTON
BOLIVAR
Hollandale
Leland
82
GREENVILLE
Gunnison
Rosedale
BOARD OF MISSISSIPPI LEVEE
TABLE 6
MISSOURI
PHILLIPS
TERRENE LOG
WARFIELD POINT RECREATIONAL AREA
COLUMBUS
GREENVILLE
4000
5000
Lake Lee
Lake Bolivar
1
WHITE RIVER
MISSISSIPPI RIVER
LOCK & DAM 1
DIST
DIST
Yancopin
4519+76 Ark. River Levee
=0+00 Miss. River Levee
LOCK 2
ARKANSAS
Arkansas Post
DAM 2
Arkansas City
Lake Chicot
2265+81
Lake Village
Eudo
PACIFIC
4
MEMPHIS
VICKSBURG
DESHA
CHICOT
SOUTHEAST ARKANSAS LEVEE DISTRICT
TABLE 4
ARKANSAS
McGehee
82
65
MISSOURI
PACIFIC
165
ARKANSAS
LINCOLN
DREW
ASHLE

TABLE 1

MISSISSIPPI RIVER
PROJECT DESIGN FLOOD DISCHARGES

Memphis - Vicksburg District Boundary to Mile 603.0	2,460,000	C.F.S.
Mile 603.0 To Mile 594.2	2,500,000	C.F.S.
Mile 594.2 To Mile 592.0	2,754,000	C.F.S.
Mile 592.0 To Mile 436.0 (Vicksburg)	2,890,000	C.F.S.
436.0 (Vicksburg) To Mile 361.0 Natchez)	2,710,000	C.F.S.
Mile 361.0 (Natchez) to Vicksburg - New Orleans District Boundary	2,720,000	C.F.S.

TABLE 2

DESIGN FLOWLINE ELEVATIONS
MISSISSIPPI RIVER - MAJOR GAGING STATIONS

	1962 River Mile AHP	Allowance For Loop Effect	Allowance For Future Deterioration	Refined 1973 MR&T Project Flood Flowline MSL	Gage Zero
Rosedale	592.2	1.0	0.1	171.3	108.7
Arkansas City	554.1	1.0	0.5	157.7	96.7
Greenville	531.3	1.0	1.0	147.1	74.9
Lake Providence	487.2	1.0	1.1	131.3	69.7
Vicksburg	435.7	1.0	1.2	109.2	46.2
St. Joseph	396.4	1.0	1.4	98.0	33.1
Natchez	363.3	1.0	1.5	85.3	17.3

TABLE 3

RED RIVER BACKWATER AREA

BLACK RIVER

JONESVILLE TO BLACK HAWK

1973 PROJECT DESIGN FLOWLINE ELEVATIONS

1939 Mile	Flowline Elevation Ft MSL: Ouachita Project Flood Meeting Fuse Plug Grade	Flowline Elevation Ft MSL: Miss. River Project Flood Meeting 1973 Miss. R. Project Design Flowline	Remarks
56.3	63.2	64.5	Jonesville - Gage
46.2	62.8	64.0	
25.0	62.3	63.7	Jonesville Lock and Dam
12.5	61.8	63.6	
9.9	61.6	63.5	
7.6	61.5	63.5	
5.10	61.4	63.4	
2.5	61.4	63.4	
0.1	61.3	63.3	Acme
	61.3	63.3	Black Hawk

TABLE 4

PROJECT DESIGN FLOWLINE ELEVATIONS
MISSISSIPPI RIVER
SOUTH EAST ARKANSAS LEVEE DISTRICT

Design Flowline Elevations
Mississippi River - South East Arkansas Levee District
Yancopin, Arkansas to Mississippi River Station 0+00

1962 River Mile AHP	Levee Station	Allowance For Loop Effect	Allowance For Future Deterioration	Refined 1973 MR&T Project Flood Flowline	Remarks
	1952 Station				
	3574+78	1.0	0.0	173.7	Yancopin
595.4	3781+00	1.0	0.0	172.7	
591.6	3908+00	1.0	0.1	171.0	
587.0	4173+00	1.0	0.1	169.5	
583.7	4193+54	1.0	0.2	168.8	Dike
	4193+54	1.0	0.2	168.0	
579.5	4259+57	1.0	0.2	168.0	Dike
	4259+57	1.0	0.2	167.6	
	4280+00	1.0	0.2	167.4	
	4308+49	1.0	0.3	167.4	Dike
	4308+49	1.0	0.3	167.2	
576.0	4353+00	1.0	0.3	167.0	
574.7	4519+75.9=0+00	1.0	0.3	166.4	

Design Flowline Elevations
Mississippi River - South East Arkansas Levee District
(Con't)

1962 River Mile AHP	Levee Station	Allowance For Loop Effect	Allowance For Future Deterioration	Refined 1973 MR&T Project Flood Flowline	Remarks
	1958 Station				
574.7	0+00	1.0	0.3	166.4	
	251+78	1.0	0.3	165.7	Dike
572.6	251+78	1.0	0.3	165.3	
	287+99	1.0	0.3	165.1	Dike
	287+99	1.0	0.3	164.9	
571.1	367+91	1.0	0.3	164.9	Dike
	367+91	1.0	0.3	164.4	
570.1	434+77	1.0	0.3	164.2	
	625+82	1.0	0.4	162.8	Dike
565.9	625+82	1.0	0.4	162.7	
562.0	732+84	1.0	0.4	160.8	
	761+90	1.0	0.4	160.8	Dike
560.7	761+90	1.0	0.4	160.4	
558.4	761+90	1.0	0.4	159.5	
	868+00	1.0	0.5	159.5	Gage-Arkansas City Old Location
	997+71	1.0	0.5	159.0	Dike
	997+71	1.0	0.5	158.4	
	1005+75	1.0	0.5	158.2	Dike
	1005+75	1.0	0.5	157.9	
554.1	1011+45	1.0	0.5	157.7	Gage-Arkansas City

Design Flowline Elevations
Mississippi River - South East Arkansas Levee District
(Con't)

1962 River Mile AHP	Levee Station	Allowance For Loop Effect	Allowance For Future Deterioration	Refined 1973 MR&T Project Flood Flowline	Remarks
	1056+57	1.0	0.5	157.4	Dike
	1056+57	1.0	0.5	157.1	
	1116+50	1.0	0.5	156.9	Dike
552.7	1116+50	1.0	0.5	156.8	
549.1	1246+59	1.0	0.6	154.5	
	1959 Station				
	1556+42	1.0	0.6	154.4	
547.9	1668+07	1.0	0.6	154.1	Dike
544.5	1668+07	1.0	0.7	153.2	
	1671+40	1.0	0.7	153.1	Dike
542.3	1671+40	1.0	0.7	152.5	
	1694+41	1.0	0.7	152.4	Dike
	1694+41	1.0	0.7	152.1	
541.5	1809+90	1.0	0.8	152.0	
540.0	2027+68	1.0	0.8	151.5	Dike
	2027+68	1.0	0.8	150.3	
537.5	2045+78	1.0	0.8	150.3	
534.1	2310+78	1.0	0.9	149.1	
	2510+02	1.0	0.9	148.8	Dike
	2510+02	1.0	0.9	147.9	
531.3	2540+02	1.0	1.0	147.1	Gage - Greenville Bridge

Design Flowline Elevations
Mississippi River - South East Arkansas Levee District
(Con't)

1962 River Mile AHP	Levee Station	Allowance For Loop Effect	Allowance For Future Deterioration	Refined 1973 MR&T Project Flood Flowline	Remarks
	2597+52	1.0	1.0	146.7	Dike
	2597+52	1.0	1.0	146.3	
528.2	2696+72	1.0	1.0	146.1	
526.9	2764+43	1.0	1.0	145.8	
	2809+43	1.0	1.0	145.6	
524.9	2898+43	1.0	1.0	144.9	
	2924+88	1.0	1.0	144.8	Dike
	2924+88	1.0	1.0	144.5	
	2955+50	1.0	1.0	144.2	Dike
	2955+50	1.0	1.0	144.0	
523.4	2960+50	1.0	1.0	144.0	
	2999+21	1.0	1.0	143.8	Dike
	2999+21	1.0	1.0	143.2	
519.0	3090+96	1.0	1.0	142.4	
515.7	3164+02	1.0	1.0	141.6	
	1960 Station				
514.8	3362+90	1.0	1.0	141.3	
	3461+08	1.0	1.0	141.2	Dike
	3461+08	1.0	1.0	141.1	
514.0	3560+00	1.0	1.0	141.0	
	3631+16	1.0	1.0	140.9	Dike
	3631+16	1.0	1.0	140.5	

Design Flowline Elevations
Mississippi River - South East Arkansas Levee District
(Con't)

1962 River Mile AHP	Levee Station	Allowance For Loop Effect	Allowance For Future Deterioration	Refined 1973 MR&T Project Flood Flowline	Remarks
	3693+62	1.0	1.0	139.9	Dike
511.1	3693+62	1.0	1.0	139.7	
509.1	3799+77	1.0	1.0	139.3	
	3829+33	1.0	1.0	139.3	Dike
	3829+33	1.0	1.0	139.2	
	3832+64	1.0	1.0	139.2	Dike
	3832+64	1.0	1.0	138.7	
506.3	3921+67	1.0	1.0	138.6	
	3990+77=0+00	1.0	1.0	138.6	Ark - La. State Line