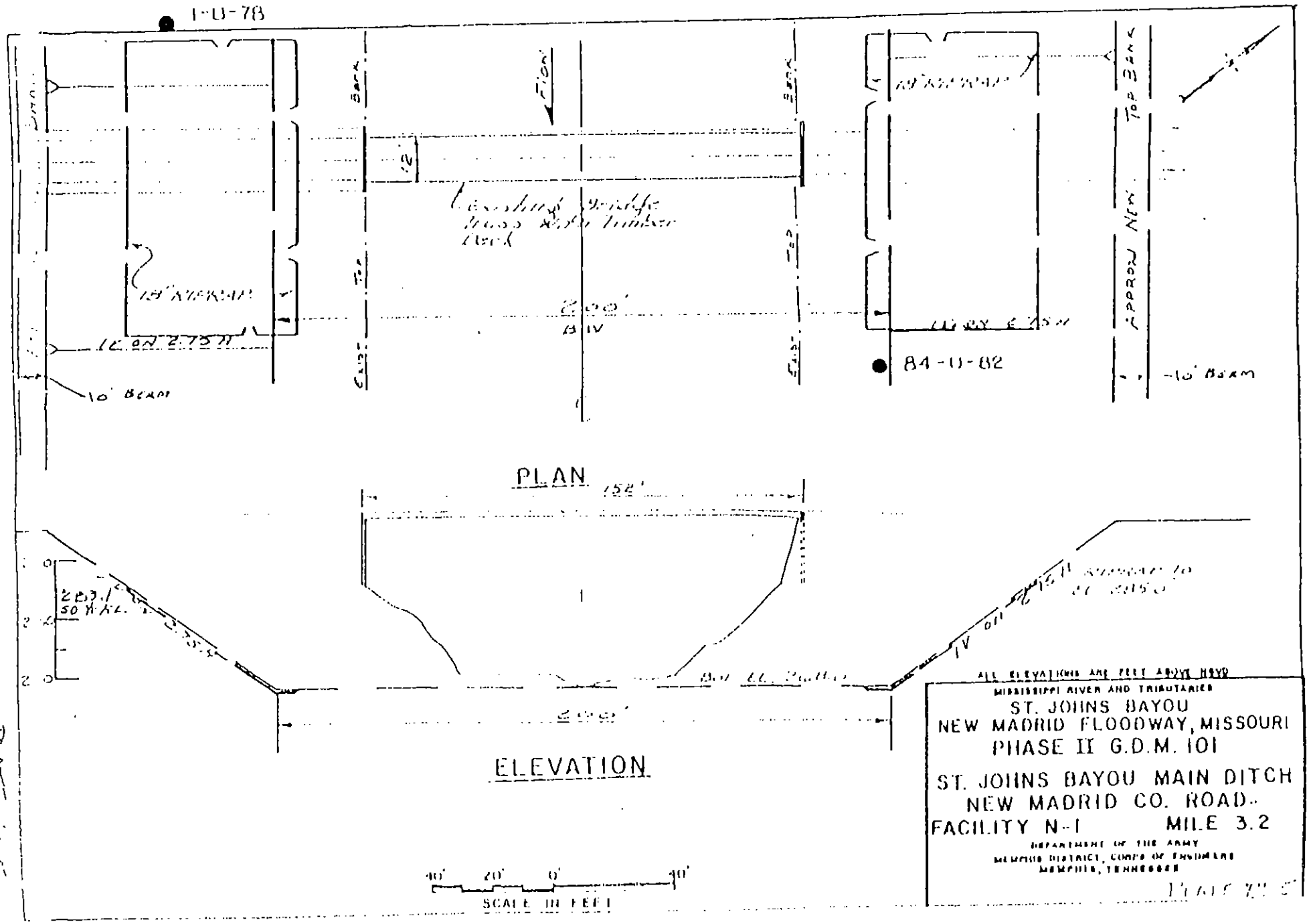
US Army Corps
of Engineers
Memphis District
Mississippi River Commission

ST. JOHNS BAYOU AND NEW MADRID FLOODWAY MISSOURI FIRST PHASE

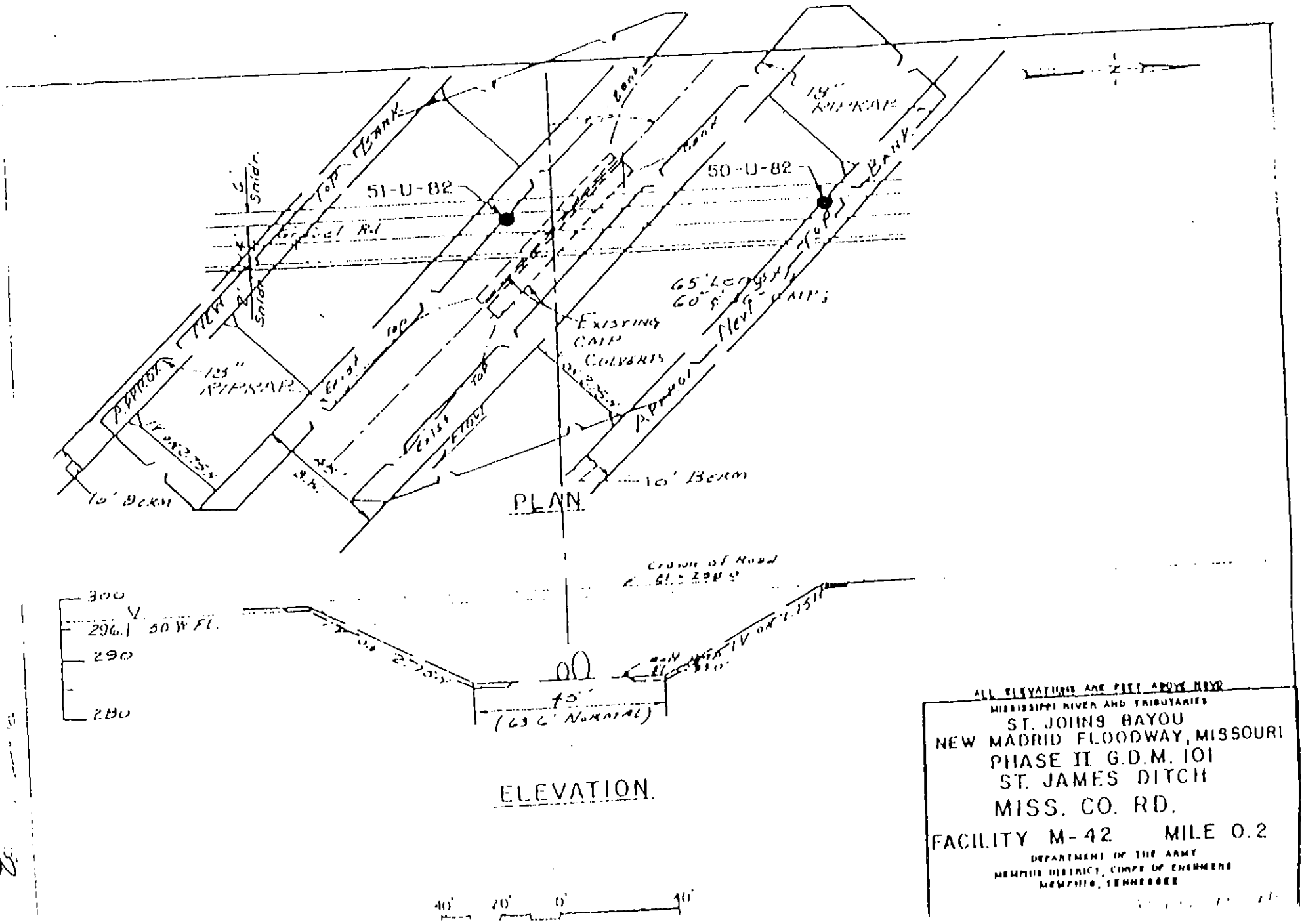
DRAFT
LIMITED REEVALUATION REPORT

MARCH 1997

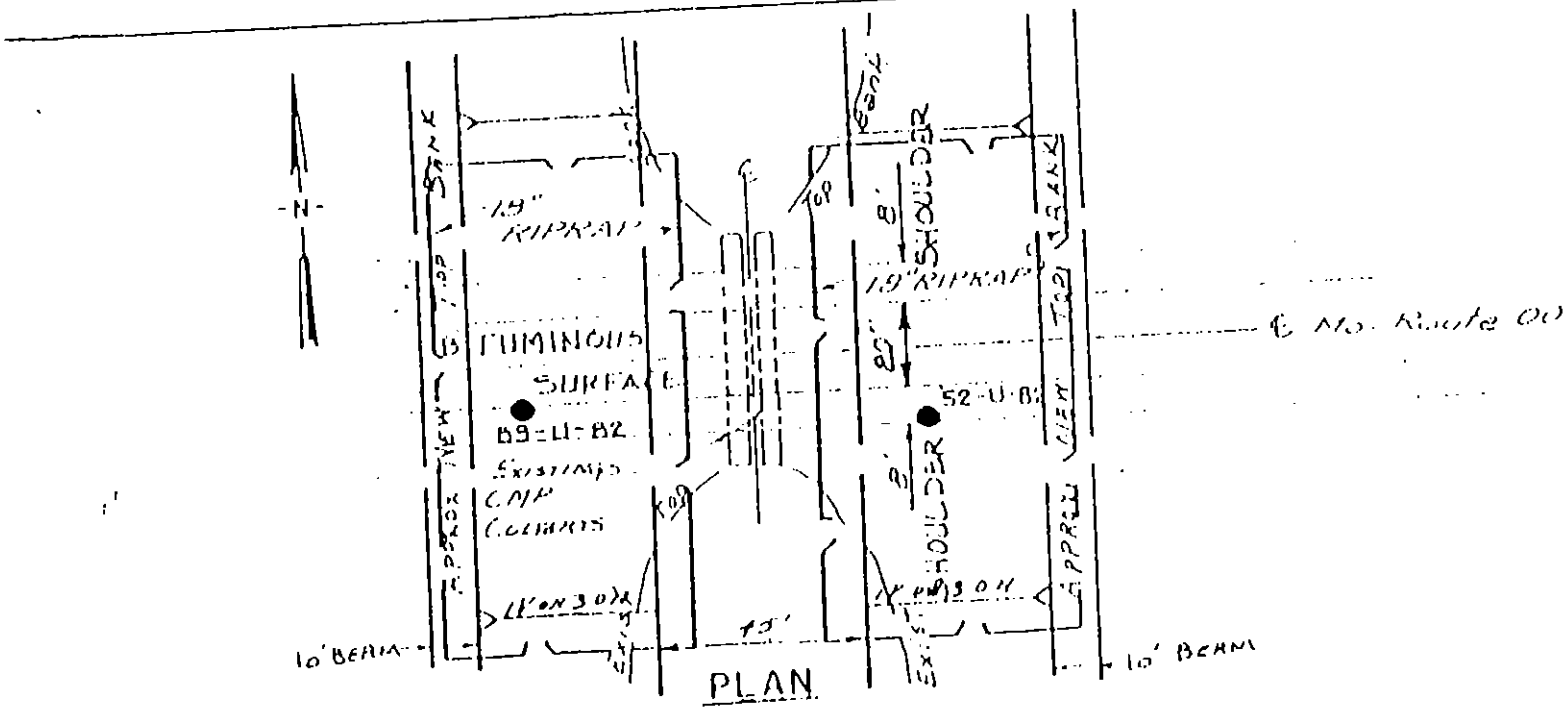


1-U-78
84-U-82
10' BERM
10' BERM
APPROX NEW TOP BANK
PLAN
ELEVATION
152'
200'
SCALE IN FEET
ALL ELEVATIONS ARE FEET ABOVE NGVD
MISSISSIPPI RIVER AND TRIBUTARIES
ST. JOHNS BAYOU
NEW MADRID FLOODWAY, MISSOURI
PHASE II G.D.M. 101
ST. JOHNS BAYOU MAIN DITCH
NEW MADRID CO. ROAD
FACILITY N-1 MILE 3.2
DEPARTMENT OF THE ARMY
MEMPHIS DISTRICT, CORPS OF ENGINEERS
MEMPHIS, TENNESSEE

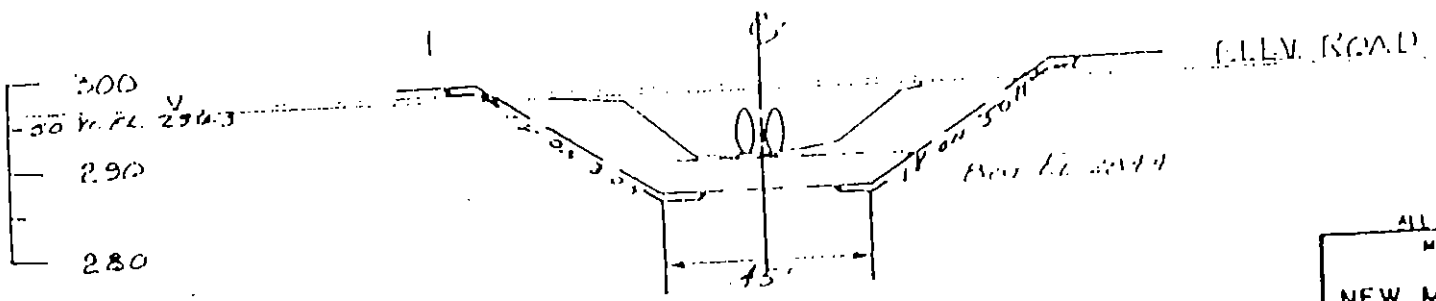
PLATE 2



51-U-82
50-U-82
18" RIPRAP
18" RIPRAP
Top Bank
Top Bank
Gravel Rd
Existing CMP Culverts
65' Length
60" CMP
Approx Nevt
Approx Nevt
10' Berm
10' Berm
PLAN
Crown of Road
300
296.1 50 W FL.
290
280
45'
(63.6' Normal)
ELEVATION
40' 20' 0' 40'
ALL ELEVATIONS ARE FEET ABOVE NGVD
MISSISSIPPI RIVER AND TRIBUTARIES
ST. JOHNS BAYOU
NEW MADRID FLOODWAY, MISSOURI
PHASE II G.D.M. 101
ST. JAMES DITCH
MISS. CO. RD.
FACILITY M-42 MILE 0.2
DEPARTMENT OF THE ARMY
MEMPHIS DISTRICT, CORPS OF ENGINEERS
MEMPHIS, TENNESSEE



PLAN



ELEVATION

40' 20' 0' 40'

ALL ELEVATIONS ARE FEET ABOVE MSVD

MISSISSIPPI RIVER AND TRIBUTARIES

ST. JOHNS BAYOU

NEW MADRID FLOODWAY, MISSOURI

PHASE II G.D.M. 101

ST. JAMES DITCH

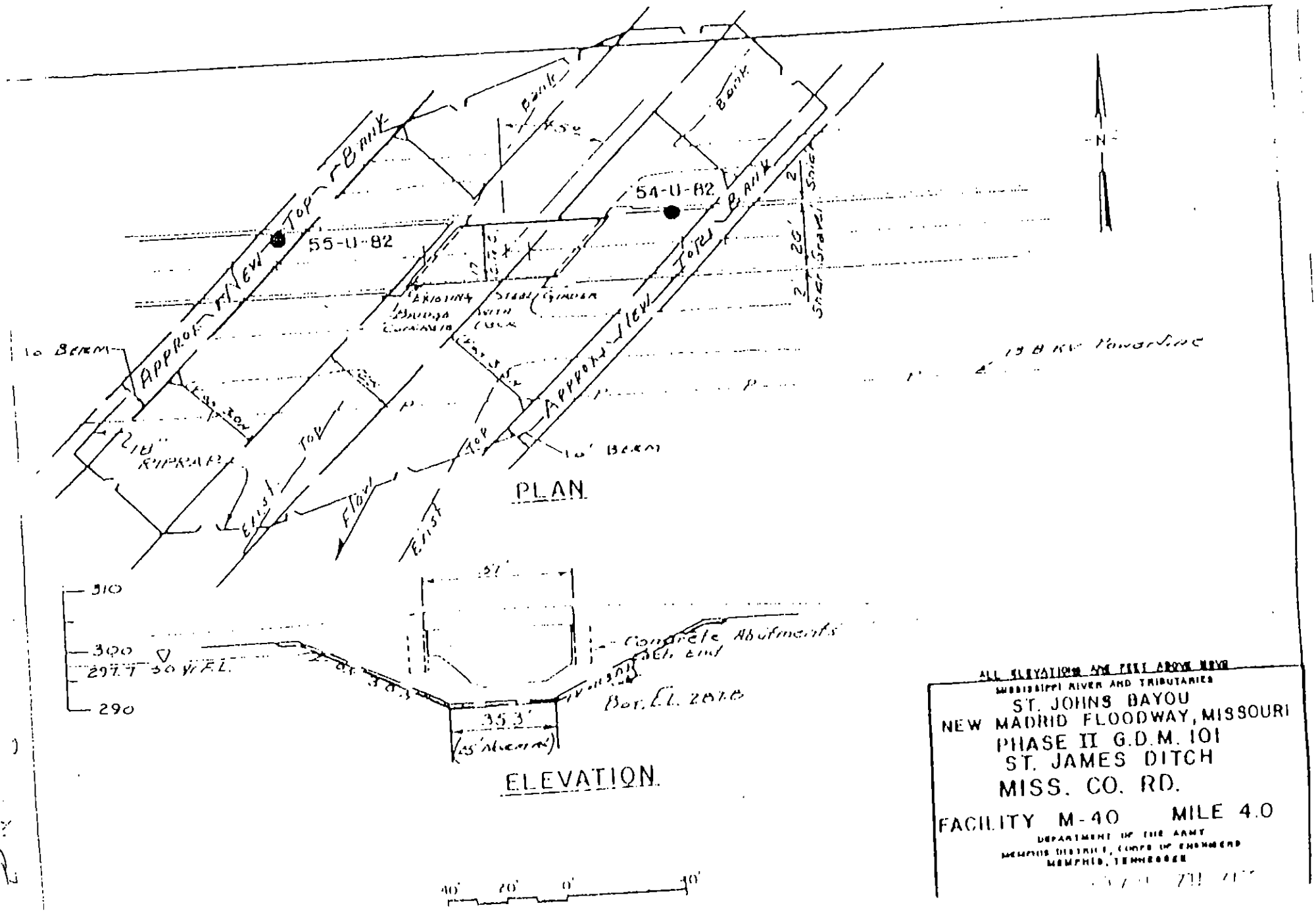
MO. RTE. 00

FACILITY MO-41 MILE 2.0

DEPARTMENT OF THE ARMY

MEMPHIS DISTRICT, CORPS OF ENGINEERS

MEMPHIS, TENNESSEE



ALL ELEVATIONS ARE FEET ABOVE MSVD

MISSISSIPPI RIVER AND TRIBUTARIES

ST. JOHNS BAYOU

NEW MADRID FLOODWAY, MISSOURI

PHASE II G.D.M. 101

ST. JAMES DITCH

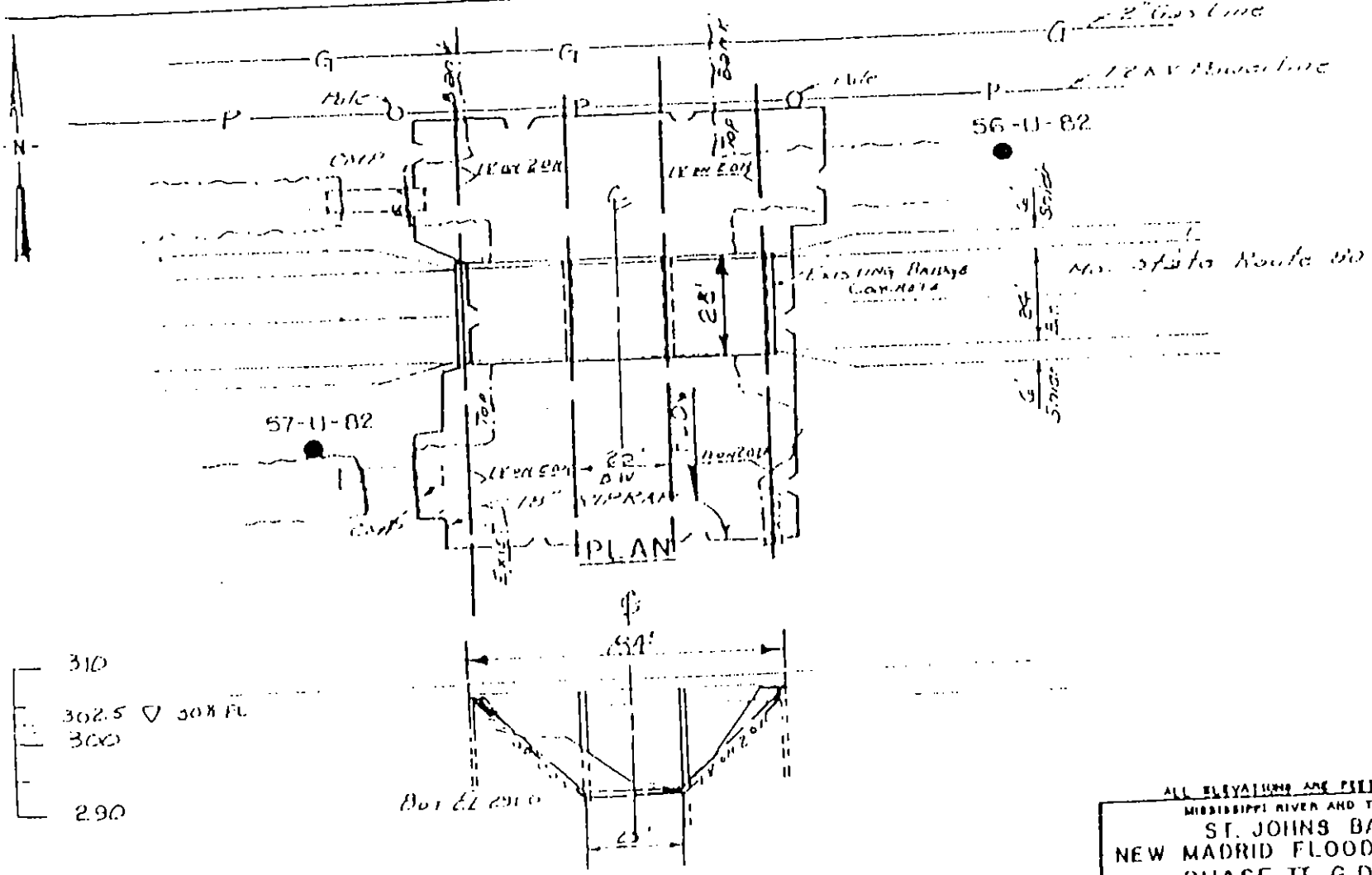
MISS. CO. RD.

FACILITY M-40 MILE 4.0

DEPARTMENT OF THE ARMY

MEMPHIS DISTRICT, CORPS OF ENGINEERS

MEMPHIS, TENNESSEE



ALL ELEVATIONS ARE FEET ABOVE MSVD

MISSISSIPPI RIVER AND TRIBUTARIES

ST. JOHNS BAYOU

NEW MADRID FLOODWAY, MISSOURI

PHASE II G.D.M. 101

ST. JAMES DITCH

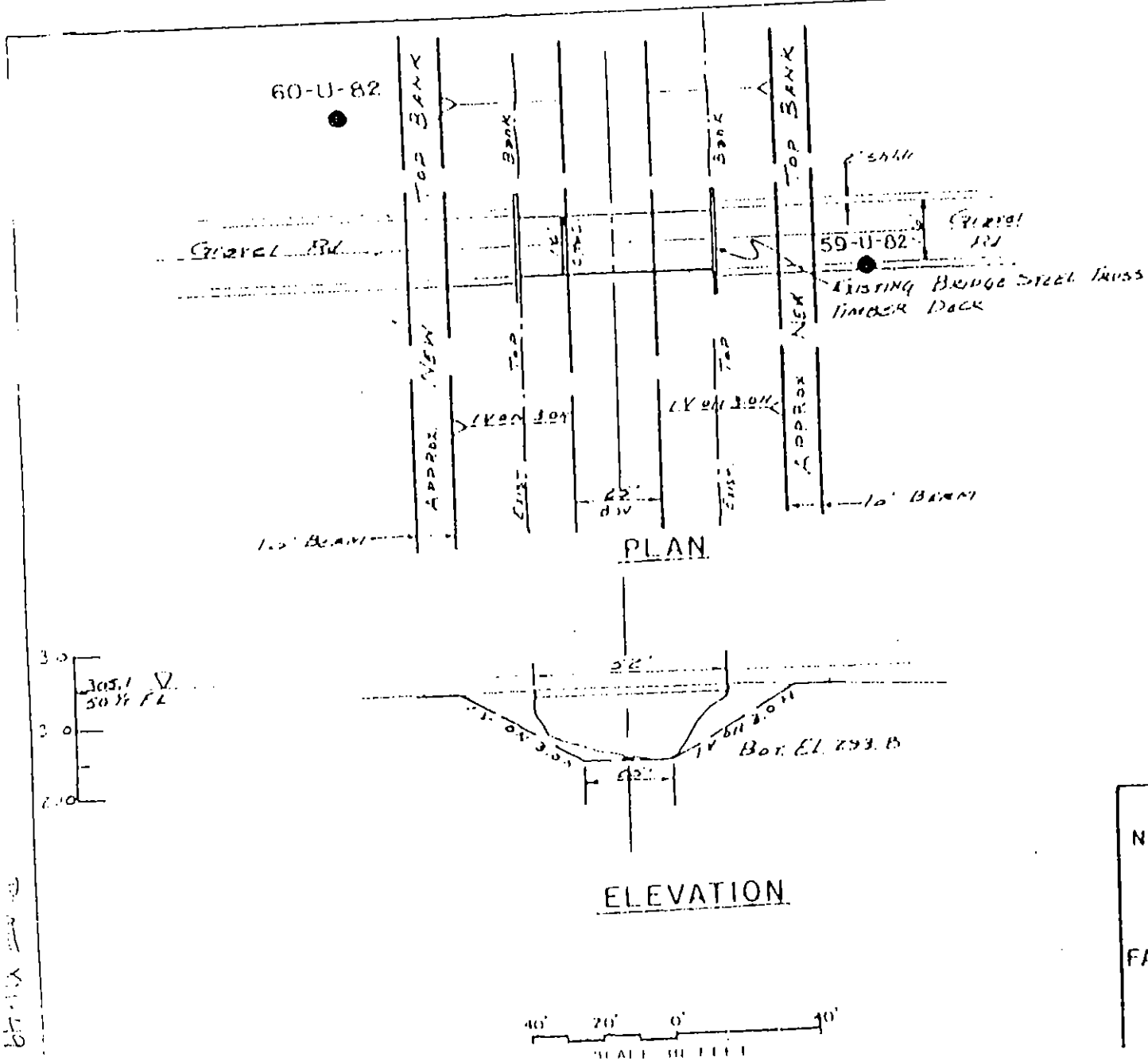
MO. RTE. 80

FACILITY MO-39 MILE 5.5

DEPARTMENT OF THE ARMY

MEMPHIS DISTRICT, CORPS OF ENGINEERS

MEMPHIS, TENNESSEE



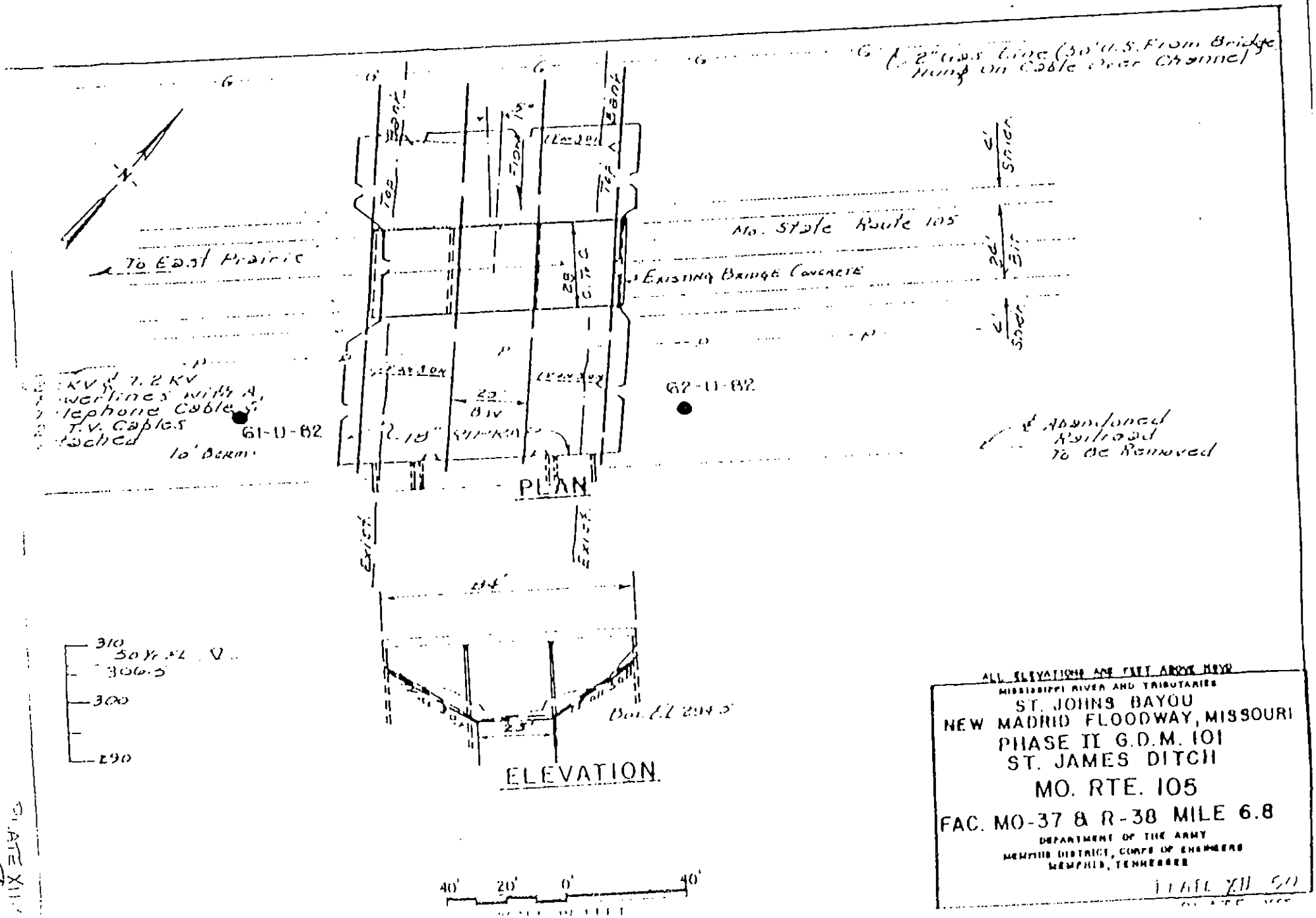
ALL ELEVATIONS ARE FEET ABOVE NGVD

MISSISSIPPI RIVER AND TRIBUTARIES

ST. JOHNS BAYOU
NEW MADRID FLOODWAY, MISSOURI
PHASE II G.D.M. 101
ST. JAMES DITCH
MISS. CO. RD.

FACILITY M-38A MILE 6.6

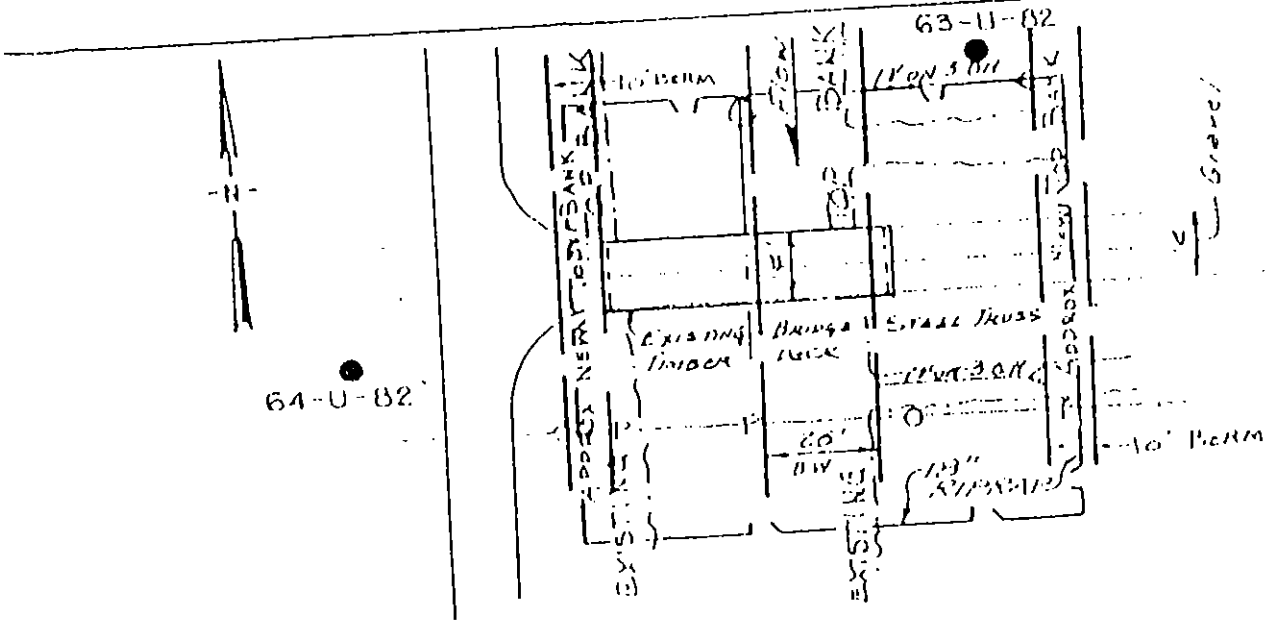
DEPARTMENT OF THE ARMY
MEMPHIS DISTRICT, CORPS OF ENGINEERS
MEMPHIS, TENNESSEE



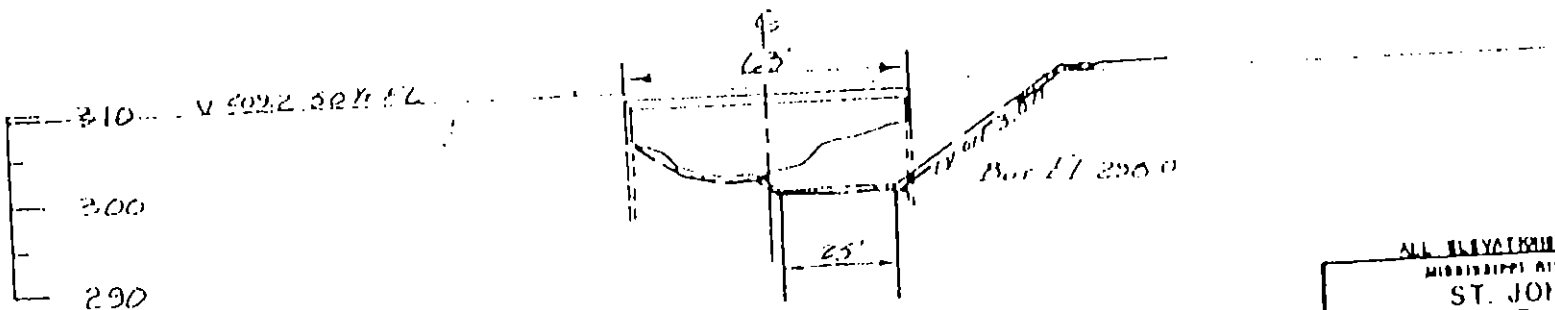
2" Gas Line (30' U.S. From Bridge Hung on Cable Over Channel)
Mo. State Route 105
To East Prairie
Existing Bridge Concrete
Top Bank
Top Bank
Flow
Shldr.
Bit.
Shldr.
KV & 7.2 KV
Powerlines with A
Telephone Cables
T.V. Cables
Attached
10' Berm
61-U-82
62-U-82
Abandoned Railroad To Be Removed
PLAN
Exist.
Exist.
84'
Bot. El 294.5
ELEVATION
310
306.5
300
290
40'
20'
0'
40'
ALL ELEVATIONS ARE FEET ABOVE NGVD
MISSISSIPPI RIVER AND TRIBUTARIES
ST. JOHNS BAYOU
NEW MADRID FLOODWAY, MISSOURI
PHASE II G.D.M. 101
ST. JAMES DITCH
MO. RTE. 105
FAC. MO-37 & R-38 MILE 6.8
DEPARTMENT OF THE ARMY
MEMPHIS DISTRICT, CORPS OF ENGINEERS
MEMPHIS, TENNESSEE

PLATE XIII

8



PLAN



ELEVATION

ALL ELEVATIONS ARE FEET ABOVE MSL

MISSISSIPPI RIVER AND TRIBUTARIES

ST. JOHNS BAYOU

NEW MADRID FLOODWAY, MISSOURI

PHASE II G.D.M. 101

ST. JAMES DITCH

MISS. CO. RD.

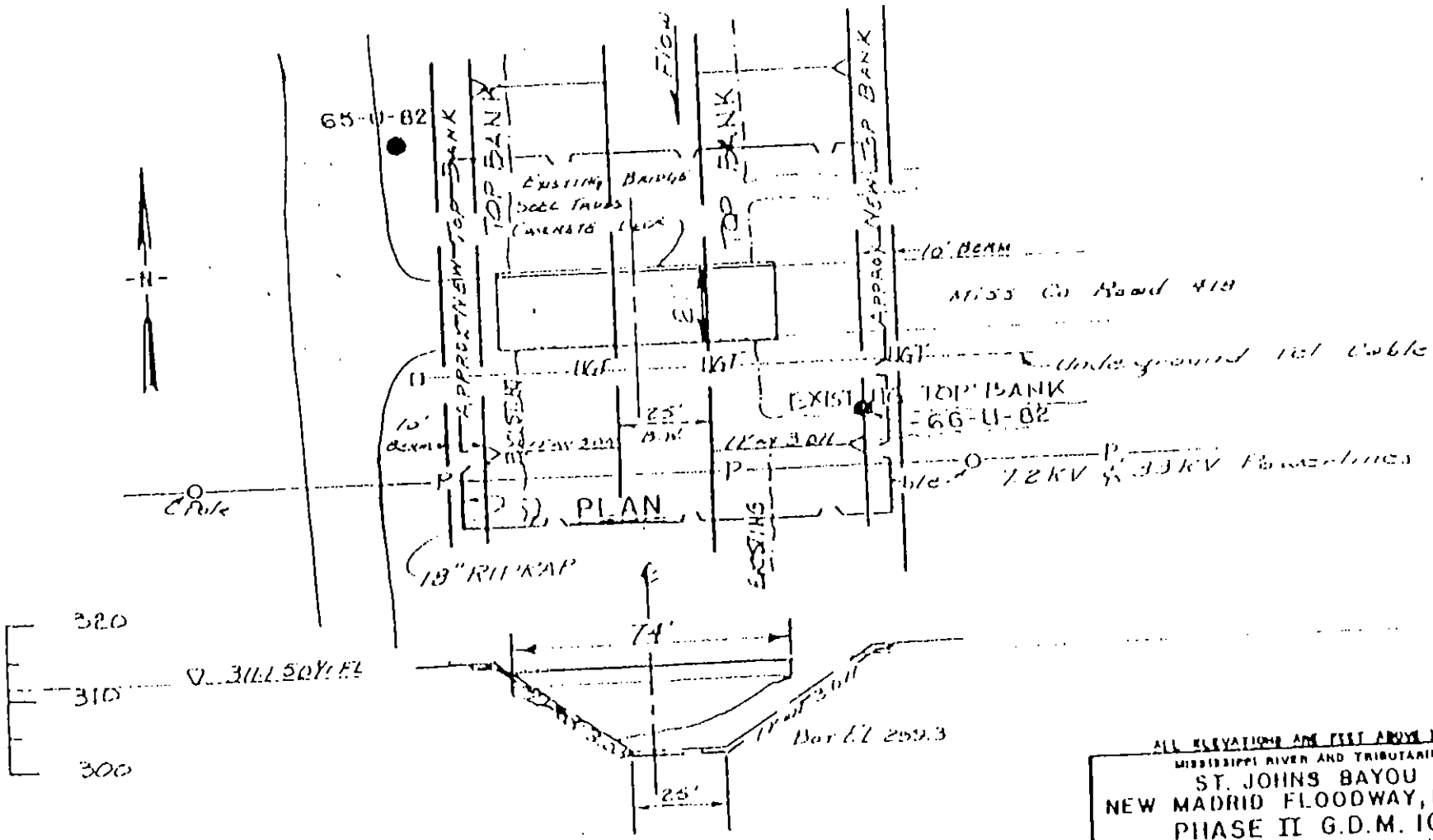
FACILITY M-36 MILE 8.2

DEPARTMENT OF THE ARMY

MEMPHIS DISTRICT, CORPS OF ENGINEERS

MEMPHIS, TENNESSEE

40' 20' 0' 40'



ALL ELEVATIONS ARE FEET ABOVE MSL

MISSISSIPPI RIVER AND TRIBUTARIES

ST. JOHNS BAYOU

NEW MADRID FLOODWAY, MISSOURI

PHASE II G.D.M. 101

ST. JAMES DITCH

MISS. CO. RD. 418

FACILITY M-35 MILE 8.7

DEPARTMENT OF THE ARMY

MEMPHIS DISTRICT, CORPS OF ENGINEERS

MEMPHIS, TENNESSEE

PLATE XII-52

PLATE XII-52

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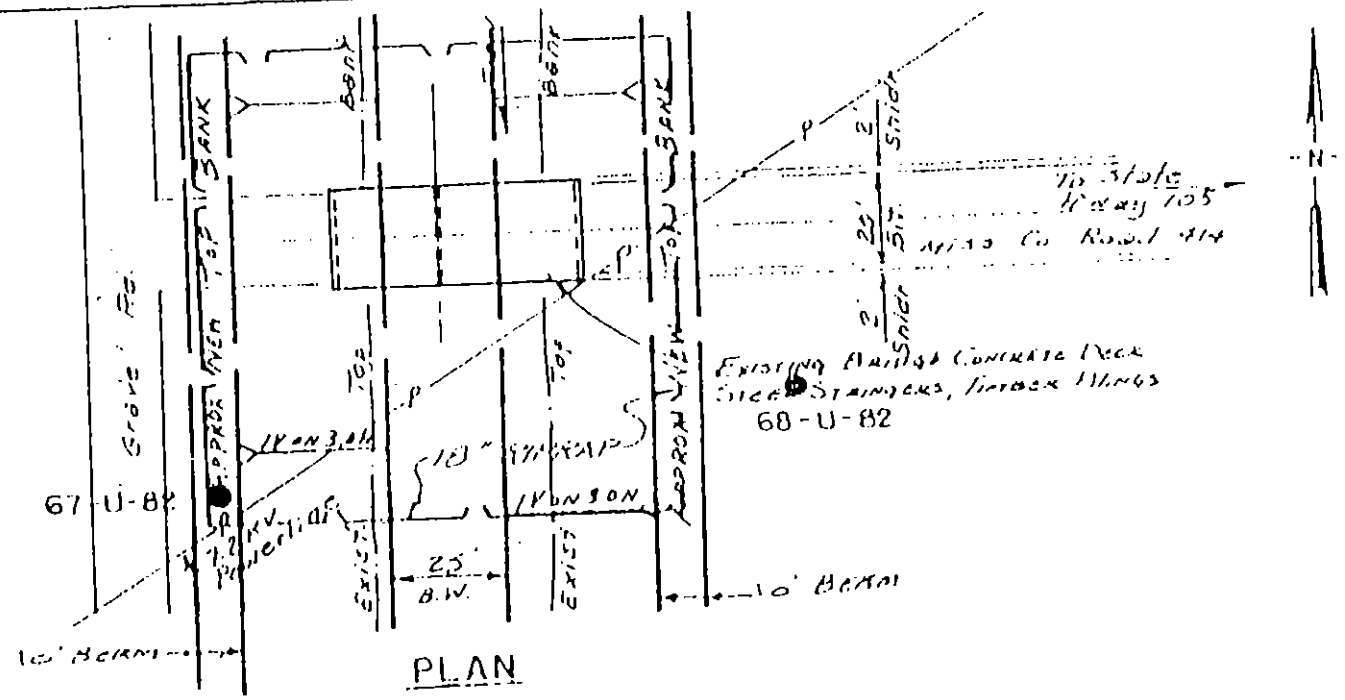
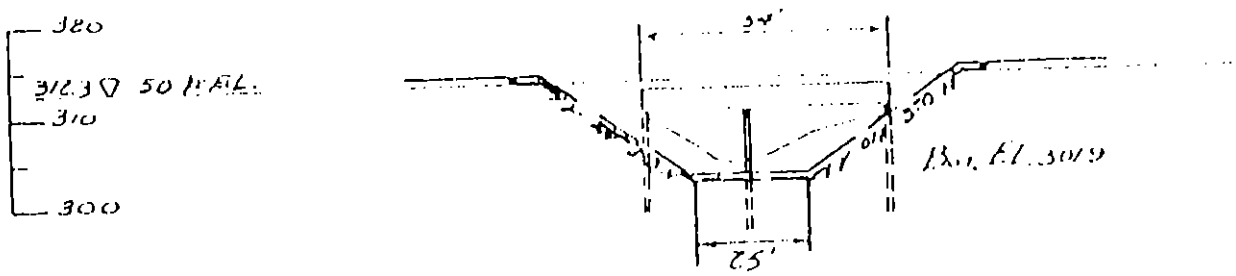


PLAN



ELEVATION

40' 20' 0' 20'

ALL ELEVATIONS ARE FEET ABOVE MSVD

MISSISSIPPI RIVER AND TRIBUTARIES

ST. JOHNS BAYOU

NEW MADRID FLOODWAY, MISSOURI

PHASE II G.D.M. 101

ST. JAMES DITCH

MISS. CO. RD. 414

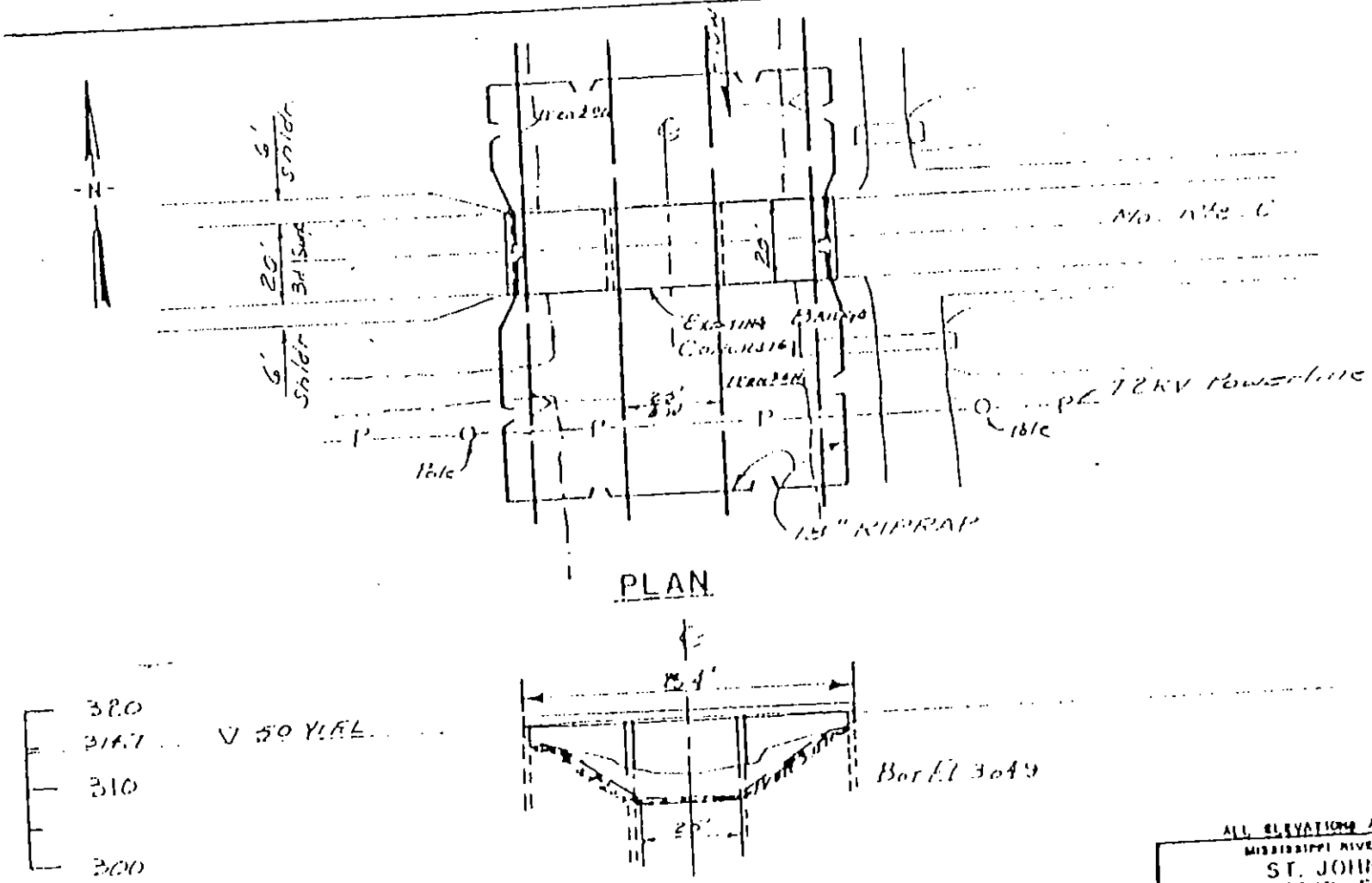
FACILITY M-34 MILE 9.7

DEPARTMENT OF THE ARMY

MEMPHIS DISTRICT, CORPS OF ENGINEERS

MEMPHIS, TENNESSEE

69-U-82



ALL ELEVATIONS ARE FEET ABOVE MSL

MISSISSIPPI RIVER AND TRIBUTARIES

ST. JOHNS BAYOU

NEW MADRID FLOODWAY, MISSOURI

PHASE II G.D.M. 101

ST. JAMES DITCH

MO. RTE. C

FACILITY MO-33 MILE 10.8

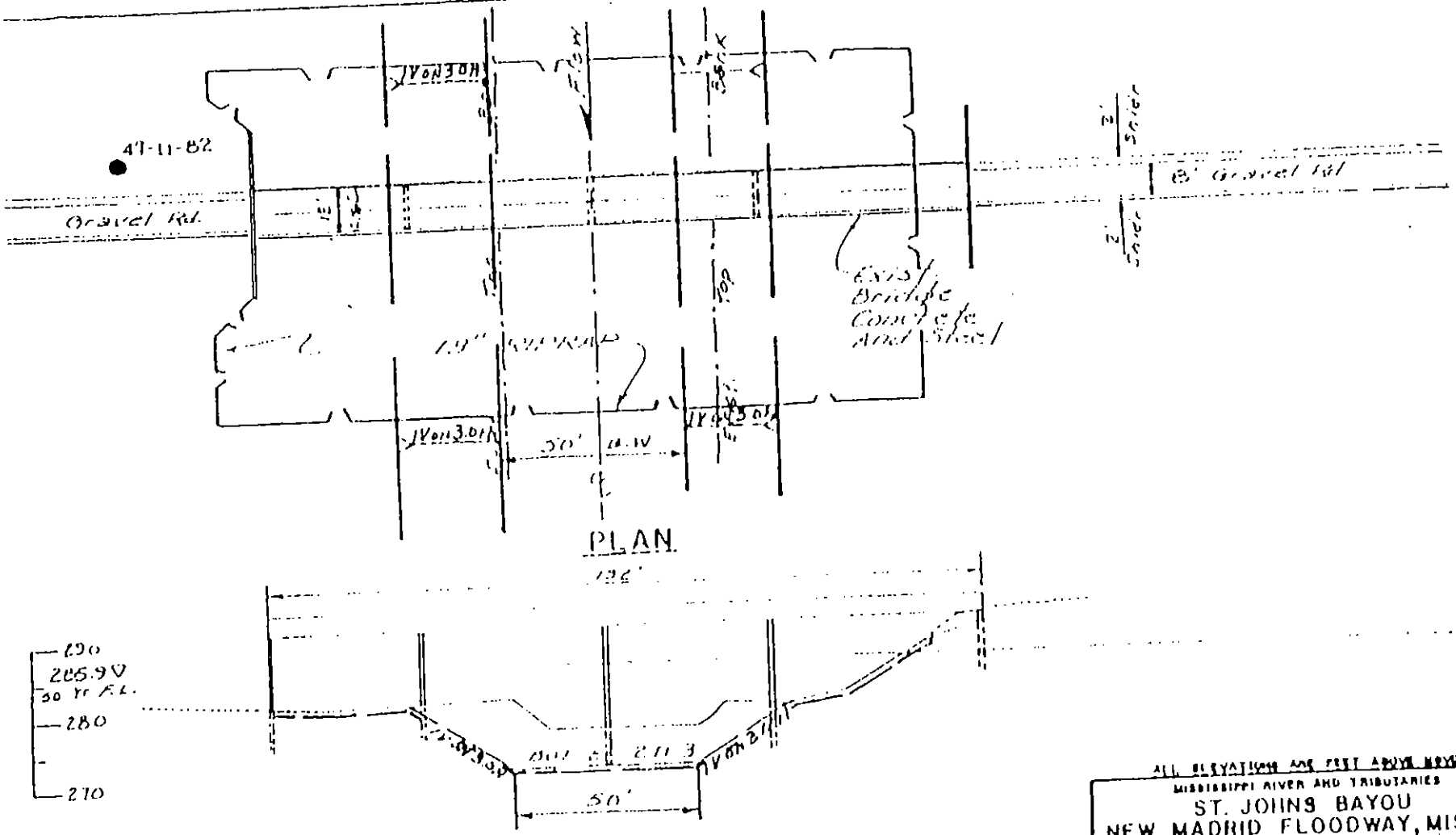
DEPARTMENT OF THE ARMY

MEMPHIS DISTRICT, CORPS OF ENGINEERS

MEMPHIS, TENNESSEE

PLATE NO. 54

12



ALL ELEVATIONS ARE FEET ABOVE NGVD

MISSISSIPPI RIVER AND TRIBUTARIES

ST. JOHNS BAYOU

NEW MADRID FLOODWAY, MISSOURI

PHASE II G.D.M. 101

BIRDS POINT-NEW MADRID

LEVEE DITCH

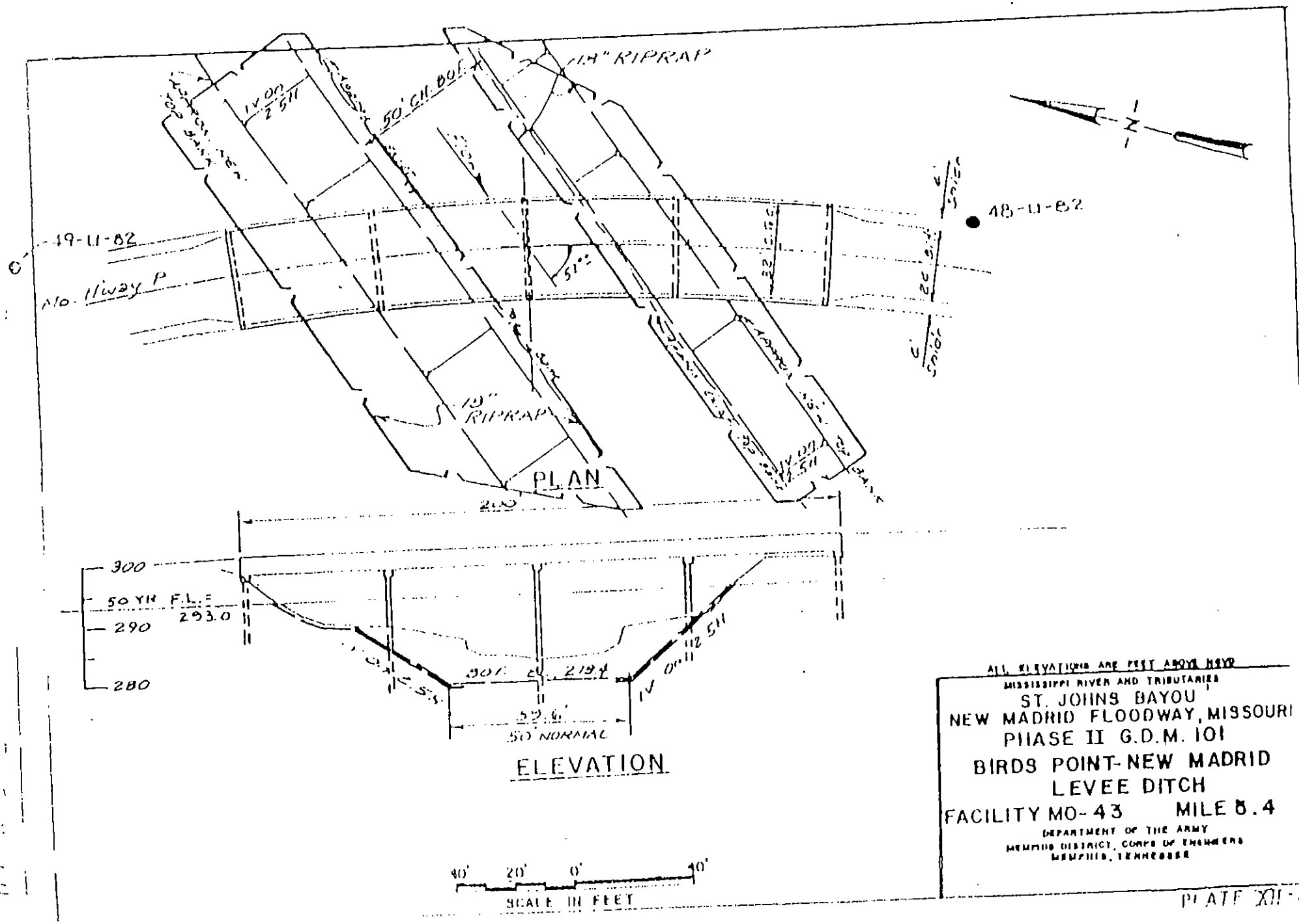
FACILITY N-43A MILE 1.3

DEPARTMENT OF THE ARMY

MEMPHIS DISTRICT, CORPS OF ENGINEERS

MEMPHIS, TENNESSEE

PLATE XII-1


14" RIPRAP
50' CH. BOT.
1V on 2.5H
49-U-82
48-U-82
No. Hiway P
51°
19" RIPRAP
PLAN
300
50 YR F.L.E. 293.0
290
280
50' NORMAL
ELEVATION
40' 20' 0' 40'
SCALE IN FEET
ALL ELEVATIONS ARE FEET ABOVE MSVD
MISSISSIPPI RIVER AND TRIBUTARIES
ST. JOHNS BAYOU
NEW MADRID FLOODWAY, MISSOURI
PHASE II G.D.M. 101
BIRDS POINT-NEW MADRID
LEVEE DITCH
FACILITY MO-43 MILE 8.4
DEPARTMENT OF THE ARMY
MEMPHIS DISTRICT, CORPS OF ENGINEERS
MEMPHIS, TENNESSEE
PLATE XII

ST. JOHNS BAYOU AND NEW MADRID FLOODWAY, MISSOURI
FIRST PHASE
LIMITED REEVALUATION REPORT

SYLLABUS

The St. Johns Bayou and New Madrid Floodway, Missouri Project was authorized for construction by the Water Resources Development Act of 1986, P.L. 99-662. Reevaluation studies were presented in the Phase II, St. Johns Bayou and New Madrid Floodway, Missouri General Design Memorandum (GDM) 101 dated August 1986, and approved by HQUSACE on 15 December 1986 subject to comments that were subsequently resolved in April 1987.

The purpose of the limited reevaluation is to revise the economic analysis to reflect current interest rates and changes and update environmental documentation for those authorized project features associated with providing the most immediate benefits to the Community of East Prairie and the surrounding vicinity.

The plan presented in this limited reevaluation report represents a phase of the overall project plan presented in the Phase II GDM. This phase of the overall plan includes vegetative clearing along 4.3 miles of rural channels and channel enlargement along 23.4 miles of rural channels. In addition to the channel items, this phase includes construction of a 1,000 cfs pumping station to complement the existing gravity outlet structure for the St. Johns Bayou Basin, and a 1,500 cfs pumping station in conjunction with a separately authorized 1,500 foot levee closure and gravity outlet structure at the lower end of the Birds Point-New Madrid Floodway. This phase of the overall recommended plan would provide a 2-year level of protection to the immediate area in and around the community of East Prairie.

Pertinent economic data for this phase of the Recommended Plan at the current interest rate of 7.375 percent and a 100-year project life are as follows:

Total First Investment Cost (October 1996 price levels)	$42,153,000
Average Annual Uniform Equivalent Benefits	$5,016,000
Average Annual Uniform Equivalent Costs	$3,551,000
Benefit-to-Cost Ratio	1.3

The average annual equivalent (AAE) costs on the channel items for operation, maintenance, replacement, repair, and rehabilitation (OMRR&R) were estimated to be $21,000. These costs are based on periodic channel cleanout every 20 years, brushkill every four years, and bridge replacements every 30 to 50 years as dictated by the life of the new bridges.

The AAE costs on the pumping stations for OMRR&R were estimated to be $358,000. These costs are based on electricity and labor costs, replacement of pump impellers every 40 years, gear reducers every 30 years, electric motor stators and motor control centers every 35 years, and roof replacement at 20 year intervals.

A Supplemental Environmental Impact Statement (SEIS) for this phase of the project is currently being prepared. Any significant environmental impacts as a result of this phase will be disclosed once the SEIS is completed. No known cultural resources will be impacted by this phase.

ST. JOHNS BAYOU AND NEW MADRID FLOODWAY, MISSOURI
FIRST PHASE
LIMITED REEVALUATION REPORT

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ST. JOHNS BAYOU AND NEW MADRID FLOODWAY, MISSOURI
FIRST PHASE
LIMITED REEVALUATION REPORT

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ST. JOHNS BAYOU AND NEW MADRID FLOODWAY, MISSOURI
FIRST PHASE
LIMITED REEVALUATION REPORT

1. GENERAL

a. Introduction. The First Phase of the St. Johns Bayou and New Madrid Floodway Project is an economic and infrastructure development project. Its implementation is one of a broad array of critical initiatives being undertaken by a diverse group of local, state, and Federal entities on a collaborative basis in support of the East Prairie Enterprise Community. Towards that end, this Limited Reevaluation Report (LRR) presents the results of a limited reevaluation of selected features of the overall authorized project that offers the most immediate benefits to East Prairie and vicinity. The approved decision document for the overall project (Phase II GDM 101, dated August 1986, approved subject to comments in December 1986, and revised April 1987) served as the basis for this LRR. The reevaluation process focused on updating economic analysis and environmental documentation for those authorized project features associated with this initial phase of the project.

b. East Prairie Enterprise Community. The President's designation of East Prairie as an Enterprise Community (EC) in December 1994 has provided the momentum to move an initial phase of the authorized overall project towards implementation. The Administration's EC designation is designed to create self sustaining long term economic development in areas of pervasive poverty, unemployment, and general distress through the development and implementation of strategic plans that allow them to reach their full economic potential. East Prairie was one of handful of communities across the nation to receive this designation, based on their strategic plan which was framed around the key principles of economic opportunity, sustainable community development, community based partnerships, and a strategic vision for change. It resulted in a $2.95 million Federal grant to the city of East Prairie to carry out those programs identified in its EC strategic plan. Implementation of the St. Johns Bayou and New Madrid Floodway Project was identified in that strategic plan as a critical element for allowing the East Prairie area to improve its economic infrastructure and move toward sustainable economic development. A key benchmark in the East Prairie EC strategic plan included the reduction of the local share of project costs to a level commensurate with the depressed economic conditions in the area (from 35% to 5%). The EC program is administered by the U.S. Department of Agriculture (USDA) and USDA has pledged to provide those funds required to reduce the local sponsor's project costs to 5% (not including the $2.95 million that has been provided for use toward other important local economic development initiatives). Congress facilitated the participation of USDA in project implementation by including language in Section 311 of the Water Resources Development Act of 1996 to provide a statutory basis for using USDA funds to supplement local project funding capabilities, as follows:

> "Notwithstanding any other provisions of law, Federal assistance made available under the rural enterprise zone program of the Department of Agriculture may be used toward payment of the non-Federal share of the costs of the project for flood control, St. Johns Bayou and New Madrid Floodway, Missouri, authorized by section 401(a) of the Water Resources Development Act of 1986 (100 Stat. 4118)".

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The East Prairie EC has proven to be a catalyst for forging a diverse coalition of local communities, agencies, and levee districts in direct support of the project, with the St. John Levee and Drainage District (SJLDD) of New Madrid serving as the lead entity responsible for sponsoring and implementing the project. Congressional support is strong, as evidenced by FY 97 guidance urging the completion of pre-construction activities within six months and a $100,000 Congressional add for new start construction in FY 97. In addition, staff from the office of the President and Vice President have inspected the project area and pledged their support for project implementation to local project stakeholders. Because an integral component of the EC program is enhanced coordination among Federal agencies to support local economic development, Federal project stakeholders (Corps, USDA, USFWS, etc.) have continued to work together in a collaborative manner towards that end.

c. Description of Study Area. The St. Johns Bayou and New Madrid Floodway Project is located in southeast Missouri and includes all or portions of New Madrid, Scott, and Mississippi Counties. The authorized study area is adjacent to the Mississippi River, extending from the vicinity of Commerce, to New Madrid, Missouri. The area is divided by ridge lines and levees into two distinct drainage basins: the St. Johns Bayou drainage basin and the New Madrid Floodway. This report includes only that portion of the authorized study area that provides the greatest economical benefit to the community of East Prairie (see Figure 1).

The St. Johns Bayou area totals approximately 288,000 acres and is drained by St. Johns Bayou through the levee via a gravity outlet structure located near the city of New Madrid, Missouri. This area is bounded on the east by the Birds Point - New Madrid Setback Levee and the frontline Mississippi River Levee, on the west by Sikeston Ridge and the Farrenburg Levee near New Madrid, and on the northwest by the Commerce Hills. It is generally fan shaped, having a length of about 40 miles from north to south and a maximum width of about 25 miles. The area forms a part of the west bank floodplain of the Mississippi River and is substantially devoid of relief with elevations ranging from 280 to 325 feet National Geodetic Vertical Datum (NGVD). St. Johns Bayou is a partially improved channel which empties into the Mississippi River about one-half mile upstream of New Madrid via the St. Johns Bayou gravity outlet structure. This structure provides the only outlet for the many natural and improved channels which form the basin's drainage system.

The St. Johns Bayou area is primarily in agricultural use with approximately 261,376 acres of cleared land and 8,550 acres of scattered woodlands. The major crops grown in the area include soybeans, corn, cotton, wheat, and milo. Agriculture is the mainstay of the economy although it is supplemented by light industry in the urban areas. Sikeston is the largest urban center with a 1990 population of 17,641. Sikeston is situated adjacent to the I-55 route, the major transportation artery located in the area. Railroad lines and several other highways also service the area. The Community of East Prairie, to which this phase of the project is directed, had a 1990 population of 3,416.

The New Madrid Floodway has a length of about 33 miles, a maximum width of about 10 miles and totals approximately 117,000 acres. The Floodway was authorized by the 1928 Flood Control Act, constructed in the early thirties, and is composed of alluvial lands which

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were subject to Mississippi River overflows before the advent of levees and are still subject to frequent lesser floods by Mississippi River backwater. The Floodway is enclosed by Mississippi River project levees, except at the extreme lower end where a gap approximately 1,500 feet wide provides an outlet for interior drainage. Elevations range from 315 feet NGVD in the northern portion to 280 feet NGVD in the southern portion of the Floodway.

The New Madrid Floodway is divided into three drainage areas by low lying ridges. The northern most area is formed by O'Bryan Ridge which crosses the Floodway along a line about 10 miles south and west from Birds Point. This basin is drained through a culvert in the front line levee when stages on the Mississippi River permit. During high Mississippi River stages, impounded floodwater is evacuated over the levee by means of the Peafield Pumping Station. Barker Ridge, which runs along a line about 10 miles above the lower end of the floodway, divides the remaining area into two basins. Barker Ridge outlines the high bank of an old river meander. In the northern end of the St. James Bayou area are remnants of an old oxbow loop formed by a chain of shallow lakes called the Tenmile Pond Area. Prior to construction of the front line levee, drainage of this area was through St. James Bayou directly into the Mississippi River. Two drainage ditches have since been cut through Barker Ridge to provide an outlet for St. James Bayou flows. The two ditches which connect St. James Bayou and the lower New Madrid Floodway are St. Johns Diversion Ditch and Wilkerson Ditch. South of Barker Ridge both ditches empty into East Bayou Ditch (Mud Ditch) which provides the only existing outlet for local runoff.

Land use in the Floodway is primarily agricultural with 108,960 acres in production. There are 6,870 acres of wooded lands. The largest tracts are located in Big Oak Tree State Park (approximately 1,007 acres) and the Ten Mile Pond Area (approximately 1,200 acres). As in the St. Johns Bayou area, the primary crops are soybeans, corn, cotton, wheat, and milo. No urban centers are located in the New Madrid Floodway, although scattered farm houses and ancillary structures can be found. State Highways 8 and 77 service the floodway.

2. AUTHORIZATION

The St. Johns Bayou and New Madrid Floodway, Missouri, Phase I General Design Memorandum, dated September 1980, was prepared in response to Section 101(a) of the Water Resources Development Act of 1976:

> " (a) The Secretary of the Army, acting through the Chief of Engineers, is hereby authorized to undertake the phase I design memorandum stage of advanced engineering and design of the following water resources development projects, substantially in accordance with, and subject to the conditions recommended by the Chief of Engineers in, the reports hereinafter designated.
>
> Lower Mississippi River Basin
>
> The project for flood protection for St. Johns Bayou and New Madrid Floodway, Missouri: Report of the Chief of Engineers September 26, 1975, at an estimated cost of $300,000."

The Mississippi River Commission (MRC) stated in their report of January 29, 1982 that the improvements recommended in the Phase I General Design Memorandum (GDM) for flood control and recreation in the St. Johns Bayou and New Madrid Floodway areas were economically and environmentally justified and socially acceptable. Congress provided funds in fiscal year 1982 to initiate the continuation of planning and engineering studies with MRC concurrence in the plan of improvement, as recommended by the District Commander in the Phase I GDM. These subsequent studies resulted in the St. Johns Bayou and New Madrid Floodway, Missouri, Phase II GDM. The Chief of Engineers report, dated January 4, 1983, was submitted with attachments to the Secretary of the Army on February 3, 1983. The St. Johns Bayou and New Madrid Floodway project was authorized for construction on November 17, 1986, by the Water Resources Development Act of 1986 (Public Law 99-662), Section 401(a):

> "(a) AUTHORIZATION OF CONSTRUCTION.-The following works of improvement for the control of destructive floodwaters are adopted and authorized to be prosecuted by by the Secretary substantially in accordance with the plans and subject to the conditions recommended in the respective reports designated in this subsection, except as otherwise provided in this subsection:
>
> ST. JOHNS BAYOU AND NEW MADRID FLOODWAY, MISSOURI
>
> The project for flood control, St. Johns Bayou and New Madrid Floodway, Missouri: Report of the Chief of Engineers, dated January 4, 1983, at a total cost of $112,000,000, with an estimated first Federal cost of $78,500,000 and an estimated first non-Federal cost of $33,500,000, except that the land for mitigation of damages to fish and wildlife shall be acquired as soon as possible from available funds, including the Environmental Protection and Mitigation Fund established by Section 908 of the Act, and except that lands acquired by the State of Missouri after January 1, 1982, for mitigation of damage of fish and wildlife within the Ten Mile Pond mitigation area shall be counted as part of the total quantity of mitigation lands required for the project and shall be maintained by such State for such purpose."

3. DESCRIPTION OF OVERALL AUTHORIZED PROJECT

a. St. Johns Bayou Area. The authorized flood control measures within the St. Johns Bayou area includes vegetative clearing along 18.8 miles of rural channels and 3.0 miles of urban channels; channel enlargements along 93.3 miles of rural channels and 3.7 miles of urban channels; and construction of a 1,000 cfs pumping station adjacent to the existing gravity outlet at St. Johns Bayou. The channel improvements (118.8 miles total) would provide a 2-year level of protection to all areas except in Sikeston, where a 1.1-year level of protection will be provided to agricultural lands and 5 to 7.5-year level of protection will be provided to existing urban development. The lower portion (approximately 4.5 to 5.0 miles) of St. James Ditch is referred to locally as the Lee Rowe Ditch.

The authorized channel improvements for the St. Johns Bayou area, as presented in the approved Phase II GDM, are summarized in Table 1.

TABLE 1
GENERAL DESIGN MEMORANDUM 101
ST. JOHNS AREA CHANNEL IMPROVEMENTS

Stream	Economic Reach	Stream Miles From	Stream Miles To	Improvement Remarks
St. Johns Bayou	R1	0.0	11.2	2 Yr. Design Enlargement
	R2	11.2	23.0	2 Yr. Design Enlargement
	R3	23.0	26.7	1.1 Yr. Design Enlargement
Lateral C	R1	0.0	3.0	1.1 Yr. Vegetative Clearing
North Cut Ditch	R1	0.0	8.0	2 Yr. Design Enlargement
	R2	8.0	18.7	2 Yr. Design Enlargement
Ash Slough Ditch	R1	0.0	10.0	2 Yr. Design Enlargement
Maple Slough Ditch	R1	0.0	5.2	2 Yr. Design Enlargement
	R2	5.2	11.9	2 Yr. Design Enlargement
Main Ditch No. 10	R1	0.0 5.0	5.0 6.6	2 Yr. Design Enlargement and Vegetative Clearing
Lower Main Ditch	R1	0.0	5.8	2 Yr. Design Enlargement
BPNM Levee Ditch	R1	0.0 8.1	8.1 12.4	2 Yr. Design Enlargement Vegetative Clearing
	R2	12.4	25.3	2 Yr. Vegetative Clearing
St. James Ditch	R1	0.0	10.8	2 Yr. Design Enlargement

b. **New Madrid Floodway.** The authorized flood control measures within the New Madrid Floodway area include channel enlargement along 24.9 miles of rural channels and construction of a 1,500 cfs pumping station. The pumping station is to be constructed in combination with a separately authorized gravity outlet structure located in the levee closure at the lower end of the floodway. The channel improvements provide for a 1.1-year level of flood protection.

The authorized channel improvements for the New Madrid Floodway, as presented in the approved Phase II GDM, are summarized in Table 2.

TABLE 2
GENERAL DESIGN MEMORANDUM 101
NEW MADRID FLOODWAY AREA CHANNEL IMPROVEMENTS

Stream	Economic Reach	Stream Miles From	Stream Miles To	Improvement Remarks
East Bayou Ditch	R1	0.0	13.6	1.1 Yr. Design Enlargement
Wilkerson Ditch	R1	0.0	4.0	1.1 Yr. Design Enlargement
St. James Bayou	R1	0.0	5.5	No Improvement
	R2	5.5	8.75	1.1 Yr. Design Enlargement
	R3	8.75	12.8	1.1 Yr. Design Enlargement

c. **Fish and Wildlife Mitigation.** The authorized fish and wildlife mitigation package includes operating both pumping stations in a manner to benefit waterfowl during the non-crop seasons; the purchase in fee title of approximately 2,500 acres of land in the Tenmile Pond Area (with the Missouri Department of Conservation assuming management of the area); development of greentree reservoirs in the Tenmile Pond area, also managed by the Missouri Department of Conservation; restrictive easements along improved channels for disposal of excavated material; and construction of a fish pool weir on St. Johns Bayou Main Ditch.

4. **RECOMMENDED FIRST PHASE OF THE AUTHORIZED PROJECT.** The First Phase includes selected features of the overall authorized project that offers the most immediate benefits to East Prairie and vicinity (See Figure-1).

a. **Channel Items.** All channel items in the First Phase of the project are within the St. Johns Bayou area. No channel items within the New Madrid Floodway are included in this limited reevaluation.

The authorized channel work within the First Phase of the overall project includes channel enlargement along 23.4 miles of rural channels and vegetative clearing along 4.3 miles of rural channels. These channel improvements would provide a 2-year level of protection to the immediate area in and around the community of East Prairie.

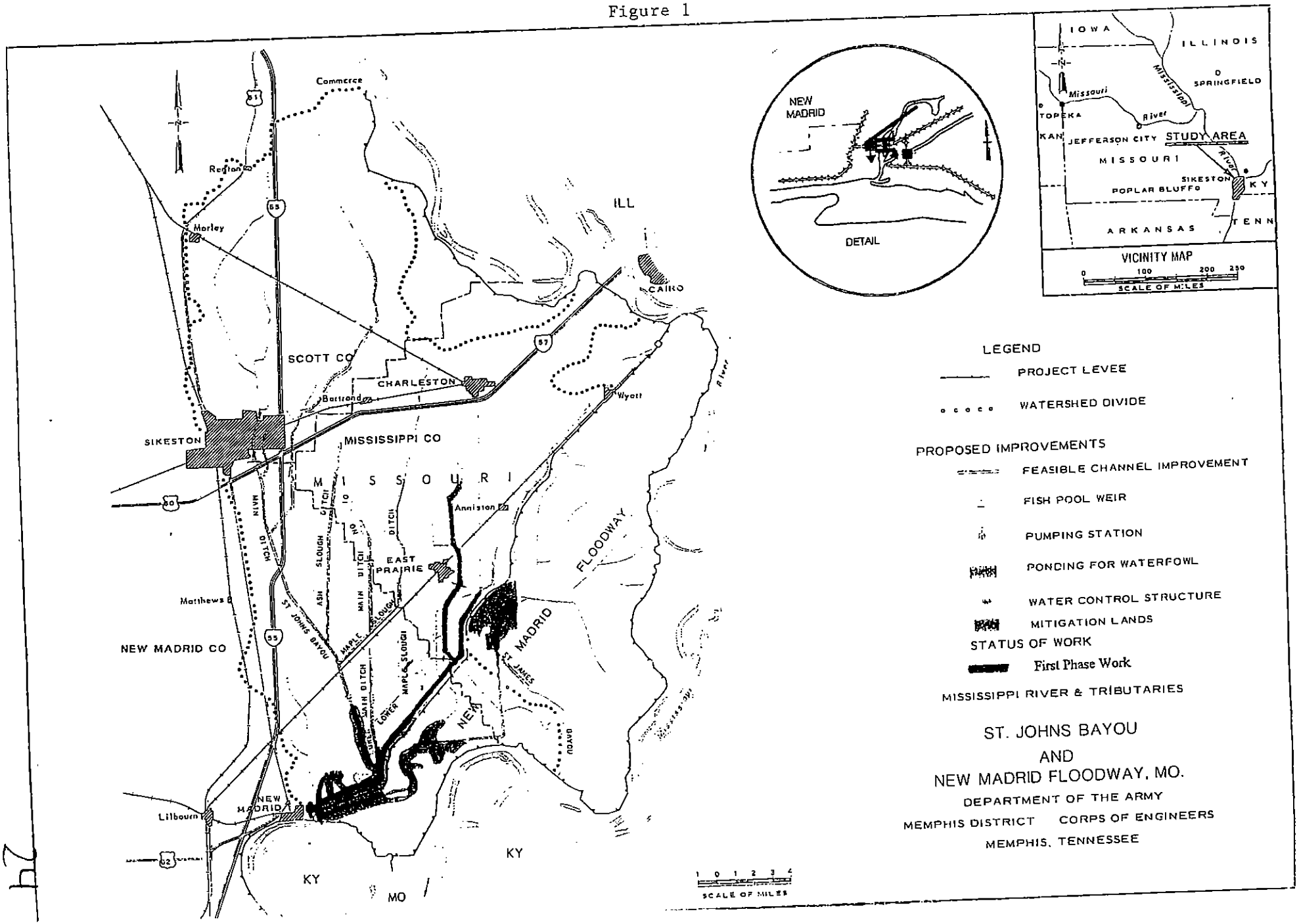
The recommended channel improvements are part of the overall authorized project. Until such time as the overall project is completed, the improvements within the First Phase will function in a manner consistent with the intent of the overall project and will be conducive to work that has been previously accomplished by local interests.

The channel components included in this phase, as described in the Phase II GDM, and as recommended for construction in this phase are summarized in Table 3.

TABLE 3
GENERAL DESIGN MEMORANDUM 101
FIRST PHASE CHANNEL COMPONENTS

Stream	Location (Miles) From	To	Improvement Remarks	Bottom Width	Side Slopes
St. Johns Bayou	0.0	4.5	2 Yr. Design Enlargement	200'	1V on 2.25 H
BPNM Levee Ditch	0.0	8.1	2 Yr. Design Enlargement	50'	1V on 2.75H
	8.1	12.4	Vegetative Clearing Only	Vegetative Clearing Only	N/A
St. James Ditch	0.0	3.5	2 Yr. Design Enlargement	45'	1V on 2.5H
	3.5	5.0	2 Yr. Design Enlargement	25'	1V on 2.5H
	5.0	7.1	2 Yr. Design Enlargement	25'	1V on 3.0H
	7.1	10.8	2 Yr. Design Enlargement	25'	1V on 2.0H

Figure 1


Commerce
Morley
SCOTT CO
CHARLESTON
Bertrand
SIKESTON
MISSISSIPPI CO
MISSOURI
Anniston
EAST PRAIRIE
Matthews
NEW MADRID CO
NEW MADRID
Lilbourn
KY
MO
ILL
CAIRO
Wyatt
FLOODWAY
ST JAMES BAYOU
NEW MADRID
DETAIL
IOWA
ILLINOIS
SPRINGFIELD
Missouri
River
TOPEKA
JEFFERSON CITY
STUDY AREA
MISSOURI
SIKESTON
POPLAR BLUFFS
ARKANSAS
KY
TENN
VICINITY MAP
SCALE OF MILES
LEGEND
PROJECT LEVEE
WATERSHED DIVIDE
PROPOSED IMPROVEMENTS
FEASIBLE CHANNEL IMPROVEMENT
FISH POOL WEIR
PUMPING STATION
PONDING FOR WATERFOWL
WATER CONTROL STRUCTURE
MITIGATION LANDS
STATUS OF WORK
First Phase Work
MISSISSIPPI RIVER & TRIBUTARIES
ST. JOHNS BAYOU
AND
NEW MADRID FLOODWAY, MO.
DEPARTMENT OF THE ARMY
MEMPHIS DISTRICT CORPS OF ENGINEERS
MEMPHIS, TENNESSEE
SCALE OF MILES

b. Pu[illegible]tions

1. St. Johns Bayou Pumping Station. Included in this phase is the construction of a 1,000 cfs pumping station to complement the existing gravity outlet structure for the St. Johns Bayou Basin, as presented in the approved Phase II GDM. During Phase II GDM studies, a 3-bay self-priming station with conventional electrical driven pumps (1200 hp) was determined to have the lowest total life cycle costs (i.e., construction, operation, maintenance, and replacement costs).

As described in the Phase II GDM, data pertinent to the selection of the pump and prime mover to be used for the St. Johns pumping station are as follows:

(1) Authorized Levee Grade	311.00 feet NGVD
(2) Operating Floor Elevation	300.00 feet NGVD
(3) Pump Discharge Centerline	297.00 feet NGVD
(4) Pipe Invert at Highest Point	308.50 feet NGVD
(5) Pipe Centerline at Outlet	277.50 feet NGVD
(6) Lip of Saxophone Discharge	284.00 feet NGVD
(7) Project Flood	308.00 feet NGVD
(8) Maximum River While Pumping	308.00 feet NGVD
(9) Average River While Pumping	290.10 feet NGVD
(10) Minimum River While Pumping	279.00 feet NGVD
(11) Maximum Land side While Pumping	298.10 feet NGVD
(12) Average Land side While Pumping	287.10 feet NGVD
(13) Start Pump	279.00 feet NGVD
(14) Start Pump During Waterfowl Season	286.00 feet NGVD
(15) Stop Pump	277.00 feet NGVD
(16) Stop Pump During Waterfowl Season	285.00 feet NGVD
(17) Station Design Flow	1000 CFS
(18) Average Pumping Days per Year	40.00 DAYS

The St. Johns Bayou pumping station will be located approximately 600 feet east of the existing St. Johns Bayou gravity outlet. This location was selected over two other alternative sites since it provides for the utilization of an existing entry channel and placement of discharge pipes perpendicular to the levee.

2. New Madrid Floodway Pumping Station. The New Madrid Pumping Station is also recommended as part of this phase, since the economy of the community of East Prairie is dependent upon the agricultural production within the New Madrid Floodway.

As presented in the approved Phase II GDM, a 1,500 cfs pumping station is planned in conjunction with the authorized 1,500 foot levee closure and gravity outlet structure at the lower end of the floodway. As a previously authorized and separately justified item, the costs of the closure and outlet structure, as shown in Table B-1, Appendix B, are not chargeable to the project features described in the Phase II GDM or in this limited reevaluation report. The selected alternative for the New Madrid Pumping Station includes a 3-bay pumping station with

electrically driven vertical mixed flow pumps (1300 horsepower) with formed suction intakes. The selection of this configuration was based on it being adequate to handle all extremes of pumping at this location with the lowest total life cycle costs.

As described in the Phase II GDM, data pertinent to the selection of the pump and prime mover to be used for the New Madrid Pumping Station are as follows:

(1) Authorized Levee Grade	311.00 feet NGVD
(2) Operating Floor Elevation	306.00 feet NGVD
(3) Pump Discharge Centerline	277.30 feet NGVD
(7) Project Flood	308.00 feet NGVD
(8) Maximum River While Pumping	305.50 feet NGVD
(9) Average River While Pumping	290.00 feet NGVD
(10) Minimum River While Pumping	278.00 feet NGVD
(11) Maximum Land side While Pumping	290.90 feet NGVD
(12) Average Land side While Pumping	280.00 feet NGVD
(13) Start Pump	278.00 feet NGVD
(14) Start Pump During Waterfowl Season	285.40 feet NGVD
(15) Stop Pump	275.00 feet NGVD
(16) Stop Pump During Waterfowl Season	284.40 feet NGVD
(17) Station Design Flow	1500 CFS
(18) Average Pumping Days per Year	37.22 DAYS

The recommended New Madrid Pumping Station is to be constructed in conjunction with the previously and separately authorized levee closure and gravity outlet structure. Plans for the authorized gravity outlet structure were approved in 1959; however, the structure has not been constructed. The current recommended plan includes construction of a combined gravity outlet structure at the time the 1500 foot gap in the levee is closed. Two Feature Design Memorandums (one for the structural and geotechnical, and one for the mechanical and electrical features of the combined pump/gravity structure) have been prepared and reviewed. In addition, a value engineering study of the combined structure has been completed. Review comments and value engineering suggestions have either been resolved or will be considered during preparation of construction plans and specifications.

3. Electrical Requirements. The two pumping stations in the St. Johns Bayou and New Madrid Floodway, Missouri project will receive electrical power from one electric substation to be situated in the vicinity of the two pumping stations. The electrical power will run pumping units driven by electric motors and all auxiliary systems at the pumping stations. The substation will be fed from a 69-kv three phase transmission line and will provide 4,160-volt, three phase ac power for each pumping unit and 480/208Y/120-volt ac power for all auxiliary pumping station systems. All electrical circuits will be designed to conform with the National Electrical Code, the National Electrical Safety Code, and the Corps of Engineers Guide Specifications.

The first cost of the electric substation and all transmission lines necessary to deliver power to the substation are included as part of the total first cost of the pumping station, as

authorized by Engineering Manual 1110-2-3102, General Principles of Pumping Station Design and Layout, dated 28 February 1995. This may lower or remove completely the electrical monthly demand charges required to operate the stations. At the present time, discussions are in progress with alternate electrical power suppliers to secure the most favorable power rate schedule. The power costs presented in this report were developed by the Municipal Power and Light Company of the City of New Madrid, Missouri and includes construction of approximately .75 miles of transmission line and one electrical substation. The design of the substation and transmission lines required for operation of the pumping stations will be conducted by the selected power supplier or in close coordination with the supplier to allow for their acceptance of future maintenance and repair responsibilities. The demand charge in this report is lower than that presented in the Phase II GDM 101 and is a results from including the substation and transmission lines as a project first cost.

a. **St. Johns Bayou Pumping Station.** The St. Johns Bayou Pumping Station will contain three 1200 horsepower electric motors that will operate at 4,160-volts three phase and will use a form of reduced-voltage starting as required by the power companies. In addition, all ancillary systems with motors (gates, trash rakes, pre-lubrication pumps, roof ventilators, dewatering pumps, well pumps, overhead cranes, and sluice gates, etc.) will operate at 480-volt three phase power. The station will also be provided with 208-volt single phase power which will be used for interior and exterior lighting, office heaters, office air conditioners, infrared radiant heaters, and gear lube oil heaters and with 120-volt single phase power for receptacles, motor heaters, office lighting and any other small electrical loads. The pumping station will have a 1,000 CFS capacity.

b. **New Madrid Pumping Station.** The New Madrid Pumping Station will contain three 1300 horsepower electric motors operating at 4,160-volts three phase and will essentially contain the same equipment operating at the same voltages as the St. Johns pumping station. The pumping station will have a 1,500 CFS capacity.

5. OTHER AUTHORIZED PROJECTS IN THE AREA

The First Phase of the overall St. Johns Bayou and New Madrid Floodway Project plan of improvement was authorized as a proper added increment to the Mississippi River and Tributaries (MR&T) Project as authorized by the Flood Control Act approved May 15, 1928, as amended. The Flood Control Act of 1928 (PL 391-70) provides authorization for a "project for flood control of the Mississippi River in its alluvial valley and for its improvement from Head of Passes to Cape Girardeau, Missouri." Section 10 of the Act directs the Secretary of the War, acting through the Corps of Engineers, "to prepare and submit to Congress at the earliest practicable date projects for flood control on all tributary streams of the Mississippi River System subject to destructive floods."

The Flood Control Act of 1946 (PL 525-79) modified the MR&T Project by authorizing the St. Johns Bayou closure levee and gravity outlet structure. The six 10-foot concrete outlet culverts with lift gates have been constructed and their location is reflected on Plate II-1 in Appendix I.

The Flood Control Act of 1954 (PL 780-83) further modified the MR&T Project by authorizing the closure of the gap at the lower end of the Birds Point-New Madrid Floodway and construction of a gravity outlet structure, with local interests being responsible for project lands, easements and rights-of-way. The 1,500-foot levee closure with four 10-foot by 10-foot concrete outlet culverts with lift gates have not been constructed due to the reluctance of local interest in acquiring rights-of-way. Upon completion of the St. Johns Bayou outlet structure, local interests became concerned over the evacuation of interior drainage and were not prepared to move forward into construction of the levee closure with the gravity outlet structure as planned. However, with the addition of the New Madrid Pumping Station, the local concerns are addressed to allow the project to be implemented. The construction plans for this authorized levee closure and outlet structure were completed in June 1959. Plate II-1 of the Phase II GDM reflects the location for the authorized levee closure and outlet structure.

The Flood Control Act of 1965 (PL 89-298) adopted modifications and expansion of the MR&T Project as recommended by the Chief of Engineers in House Documents Numbered 308 and 319. The recommended improvements in the concerned study area included raising the frontline levee from the existing 57 feet to an effective height of 60 feet on the Cairo, Illinois gage.

The 1965 Flood Control Act also provides authority to purchase easements necessary for operation of the Birds Point-New Madrid Floodway. The Real Estate Design Memorandum which addressed the acquisition of the flowage easements recommended that they be purchased on all lands within the floodway. During review it was decided that flowage easement acquisition would be limited to those ownerships above elevation 300 feet NGVD since those lands below elevation 300 feet NGVD would be inundated anyway. The decision to not acquire flowage easements was based on a prior determination by the U.S. Court of Claims in the case of Matthews. et al v. U.S., 87 Ct.Cl.662, which in essence found that the addition of flood waters on lands in the floodway which were flooded from backwater did not impose a burden for which compensation was due.

Easement acquisition on the lands below elevation 300 feet NGVD will now be required once the levee closure is made because they will no longer be subject to inundation from Mississippi River backwater. This change in conditions imposes a burden on the lands below elevation 300. The 1965 Flood Control Act provides that the necessary easements will be acquired at Federal expense. Therefore, in order to fulfill the Federal responsibilities as established by the 1965 Flood Control Act, it is necessary to acquire flowage easements on those lands below elevation 300 feet NGVD as a result of the closure at the lower end of the Birds Point-New Madrid Floodway.

6. **HYDROLOGY, HYDRAULICS, AND SEDIMENTATION.** The hydrological, hydraulic, and sedimentation analyses pertaining to the segments considered in this limited reevaluation report as presented in the "St. Johns Bayou and New Madrid Floodway Missouri" Phase II GDM are acceptable. Applicable regulations, standards, and other guidelines were followed in conducting the analyses. Changes that have occurred in the St. Johns Bayou and the New Madrid Floodway areas since completion of the Phase II GDM have a negligible effect

on the hydrological and hydraulic analyses done for this report. The channel improvements constructed by local interests during the period of November 17, 1981 to November 17, 1986 were approved on May 13, 1988, by the Assistant Secretary of the Army (Civil Works) (ASA(CW)) as credit work that will be provided to the project sponsor when included in the Project Cooperation Agreement. None of the approved credit work is included within the channel features in the First Phase of the project.

An analysis of risk and uncertainty regarding the flowlines and the stage-frequency relationships considered in this reevaluation report and presented in the Phase II GDM indicated a variance (standard deviation) in stage of 1.5 feet above or below the values shown. This figure was determined by considering the accuracy of the variables used to compute the water surface elevations, the error inherent in the topographic information, comparison with historical stage data in the basins, and other estimated information used to conduct the analyses.

Stage-frequency curves and frequency flowlines presented in the Phase II GDM for the 2-year design of the channel segments investigated (St. Johns Bayou miles 0-4.5; Birds Point-New Madrid Levee Ditch miles 0-12.4; and St. James Ditch miles 0-10.8) represent conditions with the entire project in place. Prior to construction of the remaining channel improvement items in the St. Johns Bayou area, additional benefits will be obtained along the improved reaches of St. Johns Bayou, Birds Point-New Madrid Levee Ditch, and the lower portion of St. James Ditch. These additional benefits will be in terms of lower flowlines due to a lower flow contribution from the unimproved channel reaches. Upon completion of the remaining channel improvement items presented in the Phase II GDM, the frequency flowlines for the St. Johns Bayou, the Birds Point-New Madrid Levee Ditch, and the St. James Ditch segments will be as shown in the Phase II GDM.

7. NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) COMPLIANCE. An Environmental Impact Statement (EIS) on the St. Johns Bayou and New Madrid Floodway, Missouri project was completed by the Memphis District and filed with the Council on Environmental Quality in June 1976.

Due to changes in the scope of the project during preparation of the Phase 1 GDM, a supplement to the EIS (SEIS) was developed in close coordination with the local sponsors, the Missouri Department of Conservation, and the U.S. Fish and Wildlife Service. This SEIS was included in the Phase I GDM and filed with the Environmental Protection Agency in July 1982. The project as described in the Phase I GDM was determined to be economically and environmentally justified and socially acceptable. In 1982 Congress provided additional funds to continue planning and engineering studies (Phase II GDM). Subsequently, the Phase I GDM served as the basis for the St. Johns Bayou and New Madrid Floodway project being authorized for construction on November 17, 1986, by the Water Resources Development Act of 1986 (Public Law 99-662), Section 401(a).

During the conduct of this LRR, the intent was to update NEPA compliance by preparing an Environmental Assessment (EA) to address only those features of the overall project that were included in the First Phase. Although the amount of work to be addressed was

considered to be substantial, it was believed that an EA would be the proper mechanism to update NEPA compliance because all of the work was addressed in a previous EIS and the project was already authorized. However, as the reevaluation and coordination with resource agencies evolved, it became apparent that all concerns could not be adequately addressed in an EA for all of the First Phase work items. Concerns about project environmental impact and NEPA compliance are stated in letters dated 23 January and 27 February 1997 from the U.S. Fish and Wildlife Service and in a letter dated 27 February 1997 from Missouri Department of Conservation (see Appendix A). Therefore, a Supplemental EIS (SEIS) to adequately address the environmental impacts and to perform the appropriate NEPA related coordination is currently being developed. It will address not only features of the St. Johns Bayou and New Madrid Floodway project, but also the impacts of constructing the mainline levee closure at the lower end of the New Madrid Floodway in conjunction with the New Madrid pumping station.

In order to provide some immediate economic benefit to the community of East Prairie, the vegetative clearing reach along the Birds Point-New Madrid Setback Levee Ditch (mile 8.1 to 12.4) was selected as the first item of work to be constructed. Based on a review of the hydraulics, the completion of this item of work prior to the downstream channel items will not cause changes in flow to the extent that significant adverse impacts will be incurred on the downstream items. Construction of this item will improve the conveyance of one of the primary outlets for the East Prairie area thereby reducing the duration of flooding the community is presently experiencing until such time as the other features are constructed. Since this item includes clearing and snagging only with no channel enlargement, the environmental impacts associated with this item should prove to be minimal when compared to the other items of work. For this reason, a separate EA has been developed for this item only and is currently available for public review (see Appendix F).

8. MITIGATION. Mitigation for the original project as authorized and presented in the Phase II GDM included 2,500 acres of land acquisition in the New Madrid Floodway and 4,900 acres of ponding area above both pumping stations during the winter waterfowl season. The current LRR addresses only a portion of the channel work that was contained in the original project.

In October 1996, field reconnaissance was conducted by Memphis District environmentalists to obtain data required to conduct a Habitat Evaluation System (HES) survey of the areas included in this phase of the overall project. Based on the HES survey data collected for this phase in comparison to the survey data collected for the Phase II GDM 101, it appears that approximately 413 acres of the authorized 2.500 acres will be required to mitigate losses. Resource agencies have concurred with this estimate (see Appendix A).

The ponding area for waterfowl is the area above each of the pumping stations. Although 4,900 acres of ponding would not be required to mitigate waterfowl losses associated with LRR activities, there is no compelling reason to limit the ponding area to less than that originally designed. Current estimates have been revised that indicate 5,700 acres would be flooded during the waterfowl season, and this would be a significant benefit to waterfowl and wading birds.

Recent coordination with resource agency personnel and in-house study have indicated a need to mitigate fishery losses associated with channel modification. As such, construction of in-channel weirs to promote scour, maintain channel depth, and provide hard structure habitat for the fish resources of the St. Johns Basin is recommended. A cost of $750,000 has been added to the project mitigation cost for this feature in addition to $400,000 that is required for mitigation land acquisition.

In addition to the mitigation features described above, restrictive easements necessary for the channel work will be required adjacent to all project channel features. The restrictive easements to be acquired will prohibit the mowing, cutting, burning, and use of the land for growing crops or grazing; prohibit the reshaping or removal of earth or other material; and prohibit public access. This element will further serve to mitigate and/or restore wildlife habitat in the project area. Although project impacts and mitigation will be further addressed in the SEIS that is currently being prepared, the environmental impacts associated with this phase of the project have been adequately studied and discussed with resource agency personnel to provide a reasonable estimate of the scope and costs for mitigation measures.

9. **REAL ESTATE.** Construction of the First Phase of the St. John's Bayou and New Madrid Floodway project will require that a real estate interest be acquired over approximately 6,141 acres of land in addition to approximately 413 acres required for mitigation. A detailed breakdown of the estates and land classifications and area required for this phase of the project are shown on page 15 in Appendix D. An estimated 109 individual ownerships will be impacted by project construction. Project lands are located in rural agricultural areas and are primarily used for the growing of agricultural products. No structural improvements were observed in the proposed right-of-way. The project has been planned and designed to avoid or minimize relocations. Rights-of-way for the first phase of the project will be acquired through the use of four estates. The estates are: Fee Simple, Restrictive Channel Improvement Easement, Transmission Line Easement, and a Flowage Easement (Seasonal).

Lands purchased for mitigation are considered a portion of the 2500 acres previously authorized for the overall project in the Phase II GDM 101. For purposes of this report, it was assumed that 399 acres of woodland and 14 acres of cropland would be purchased for this mitigation resulting in a cost estimate of $400,000 being included in this report for such purposes.

A detailed description of the real estate requirements and costs are provided in Appendix D, Real Estate Report and Cost Estimate. This report provides a detailed description of the real estate component by individual construction item. Page 15 provides a summary of the real estate costs.

10. RELOCATIONS.

a. General. Relocations for the first phase of the St. Johns Bayou and New Madrid Floodway, Missouri project are consistent with those previously approved in the Phase II GDM. The extent of relocations required for the first phase of the overall project was determined after considering existing conditions; present and contemplated uses by the owners; owners' and Government's criteria for relocations; and the project economics evaluated from engineering reconnaissances, field surveys, geotechnical data, conferences with owners and local sponsors, engineering analyses and cost studies. After determining the extent of relocations required for this phase, it has become evident that there have been some minor changes in the relocations required when compared to those in the Phase II GDM. However, the differences were found to be insignificant since they will not cause changes in the project as described in the Phase II GDM. This report addresses only those relocations required for the first phase of the overall project.

b. Relocations Procedure.

1. Federal Relocations. Relocations Feature Design Memoranda will be prepared for facilities which will be relocated at Federal expense. Upon approval, these memoranda will be the authority to negotiate relocations contracts with facility owners. No Federal relocations are anticipated for this phase of the overall project.

2. Non-Federal Relocations. Requests for relocation of facilities which are not a Federal responsibility will be included in the real estate requests to the local sponsors. The requests will require that in addition to being financially responsible for the required relocations, the local sponsors obtain the District Engineer's approval of all relocations plans and that the relocations be implemented in a timely manner as necessary to accommodate the channel construction and not interfere with the future operation and maintenance of the project.

c. Division of Relocations Responsibility. The division of relocations responsibility between Federal and non-Federal entities was established for this project by the Water Resources Development Act of 1986 (Public Law 99-662).

d. Riprap Protection. Riprap bank protection will be placed at bridges on project reaches based on soils and hydraulic characteristics of the channel at the facilities. Factors such as cost, alignment, and the propensity to accumulate drift will also be considered. The estimates of cost of riprap at bridge sites are included in the cost estimates under account number 09.

e. Roads. There are thirteen (13) road crossings on channel reaches to be enlarged by the first phase of the project and no crossings on channels to undergo vegetative clearing. The facilities are owned, operated and maintained by three (3) owning entities: the State of Missouri; and New Madrid and Mississippi Counties, Missouri. In order to accommodate the proposed channel work, the crossing facilities that are not adequate will be either replaced or altered. Riprap channel protection will be provided where warranted within the channel enlargement portions of the project.

The responsibility for procurement of interest in rights-of-way at bridges, for relocations purposes, depends on the division of relocations responsibility established by project authorization. Coordination of design and construction standards for required relocations will be continued between facility owners, local project sponsors and Federal entities as the project progresses toward construction.

1. **State Facilities.** The Missouri Department of Transportation owns and operates seven highway segments which will be affected by this phase of the overall project either through channel enlargement or by the construction of the St. Johns Bayou pumping station. Approximately 1,400 feet of Missouri Route WW, which is located on the setback levee crown adjoining the proposed pumping station site, will be altered to accommodate the new station. The estimated cost for this work is included in the pumping station estimate in Table 9 in Section 10 of this report. Of the six remaining road segments and/or bridges, one will be replaced and five will remain as they exist. Channel protection will be provided at each of these crossing facilities. Cost estimates for the alteration and replacement of the State facilities contained in this report are based on standards and guidelines furnished by the owner.

2. **County Facilities.**

New Madrid County, Missouri. There are two county crossings in the first phase of the overall project located on reaches scheduled for channel enlargement. One bridge will be replaced. The remaining bridge will be altered to accommodate the enlargement. Channel protection will be provided at both of these sites. The cost estimates included in this report are based on the owners' standards and practices.

Mississippi County, Missouri. There are six county bridge facilities that will be affected by the project channel reaches to be enlarged in the first phase of the overall project. All of these bridges will be replaced. Channel protection will be placed at five of these bridge sites. The cost estimates for the Mississippi County facilities are included in this report based on local standards, practices, and historical cost data within the Memphis District.

f. **Railroads.** There are no relocations involving railroads in the first phase of the project. When the remainder of the overall project is implemented, three railroad bridges will be affected by channel enlargement. Relocations responsibility for these bridges will be Federal.

g. **Utilities.** Project channel reaches to be enlarged in the first phase are crossed by 20 utility lines to be altered. Ten are electric facilities, seven telephone, two gas pipelines, and one cable television line. Utilities within the vegetative clearing reach of phase one are not identified within this report; however, costs based on the Phase II GDM have been updated and included in the cost estimate for relocations. The number of utilities to be altered is considered to be approximate due to the probability of significant additions and changes that have and will continue to occur. The estimates of cost for altering utilities, included in this report, are based on applicable historical cost data.

11. COST ESTIMATES

a. **First Costs.** Estimated incremental first costs by cost account at October 1996 price levels for the recommended project features are summarized by item in Table 4. Phase one in its entirety is summarized by cost account at October 1996 price levels in Table 5 and at fully funded levels in Table 6. The project purpose associated with these costs is for flood control (no recreation features are included). A detailed estimate can be found in Appendix B of this report.

b. **Funding/Construction Schedule.** The construction phase of the First Phase of the project is scheduled to begin in fiscal year 1997, and be completed in fiscal year 2002. Figure 2 shows the location and scope of each First Phase construction item. Acquisition of rights-of-way and costs inherent with relocations, excluding railroads, would be borne by the non-Federal interest. All Federal, state, and local laws concerning air, water, and noise quality would be followed during construction activities. Control of erosion would be maintained during excavation and placement.

Project funding is at the discretion of Congress, and, therefore, any construction scheduling is tentative. The proposed construction schedule by fiscal year, cost account, and Federal/non-Federal estimates are shown in Table 5. The costs estimates shown in Table 5 are presented at October 1996 price levels. Table 6 shows similar information, except that the October 1996 estimates are shown to be fully funded, which takes into account the effects of inflation over the length of the construction phase.

c. **Cost Allocation.** Project cost sharing for Federal and non-Federal responsibilities is in accordance with cost sharing principles in Section 103(a) of Public Law 99-662 (Water Resources Development Act of 1986). Table 4 shows the project first costs of $42,153,000 to be cost shared $31,614,750 (Federal) and $10,538,250 (non-Federal). The non-Federal portion is 25 percent of the total first cost. The annual operation and maintenance, replacement, repair and rehabilitation (OMRR&R) for the project has been estimated to be $379,000 (see Tables C-20 and C-21, Appendix C).

d. **M-CACES Cost Estimate.** An M-CACES cost estimate has been prepared in conjunction with the Report (see Appendix B). The M-CACES estimate reflects the costs developed in the project first costs at October 1996 price level.

Figure 2

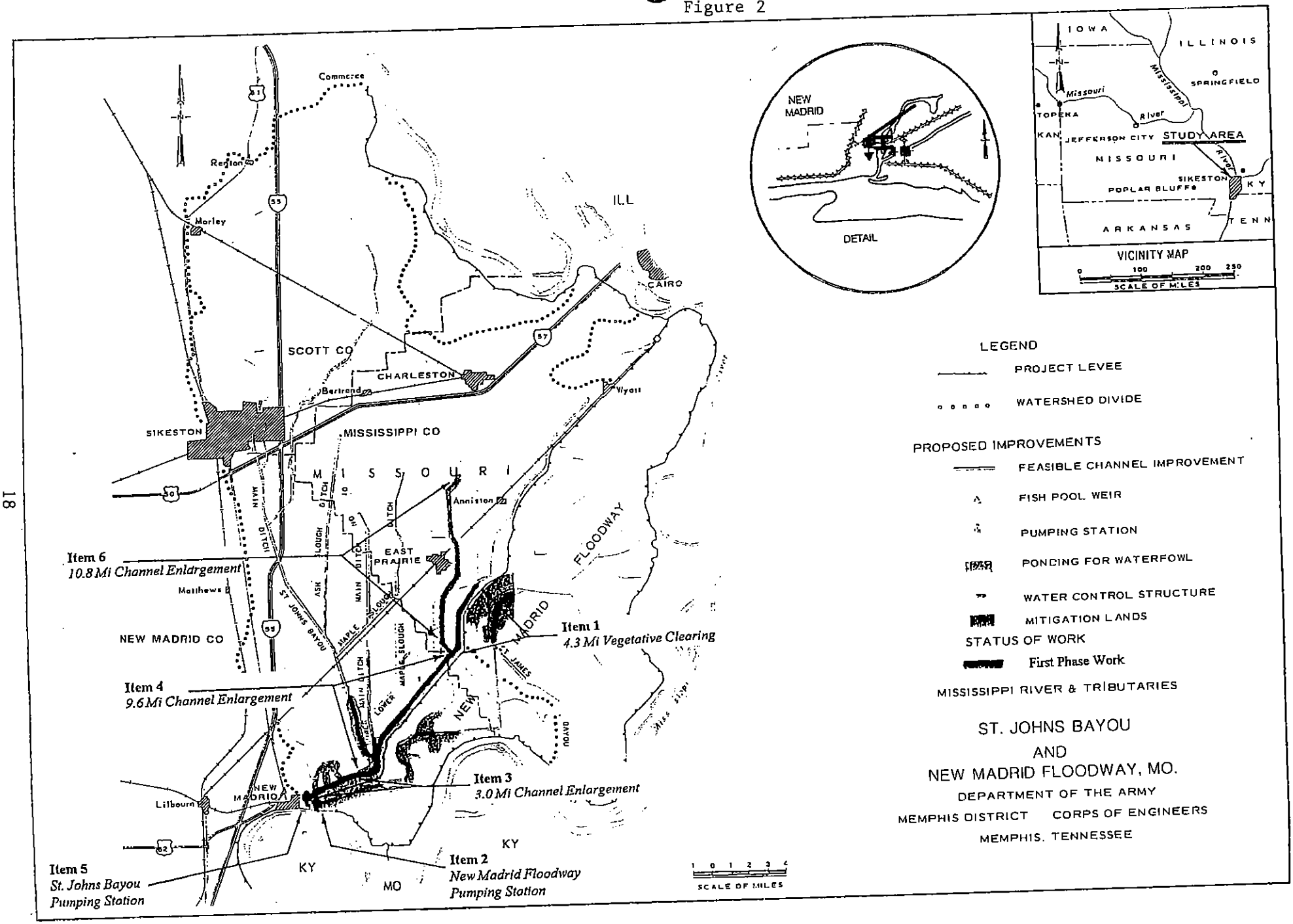

Commerce
Renton
Morley
SIKESTON
SCOTT CO
CHARLESTON
Bertrand
MISSISSIPPI CO
M I S S O U R I
ILL
CAIRO
Wyatt
Anniston
EAST PRAIRIE
FLOODWAY
Matthews
NEW MADRID CO
NEW MADRID
Lilbourn
KY
MO
Item 6
10.8 Mi Channel Enlargement
Item 1
4.3 Mi Vegetative Clearing
Item 4
9.6 Mi Channel Enlargement
Item 3
3.0 Mi Channel Enlargement
Item 5
St. Johns Bayou
Pumping Station
Item 2
New Madrid Floodway
Pumping Station
SCALE OF MILES
NEW MADRID
DETAIL
IOWA
ILLINOIS
SPRINGFIELD
Missouri
Mississippi
River
TOPEKA
JEFFERSON CITY
STUDY AREA
MISSOURI
SIKESTON
POPLAR BLUFFS
ARKANSAS
TENN
VICINITY MAP
SCALE OF MILES
LEGEND
PROJECT LEVEE
WATERSHED DIVIDE
PROPOSED IMPROVEMENTS
FEASIBLE CHANNEL IMPROVEMENT
FISH POOL WEIR
PUMPING STATION
PONDING FOR WATERFOWL
WATER CONTROL STRUCTURE
MITIGATION LANDS
STATUS OF WORK
First Phase Work
MISSISSIPPI RIVER & TRIBUTARIES
ST. JOHNS BAYOU
AND
NEW MADRID FLOODWAY, MO.
DEPARTMENT OF THE ARMY
MEMPHIS DISTRICT CORPS OF ENGINEERS
MEMPHIS, TENNESSEE

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Table 4
RECOMMENDED PHASE I
COST ESTIMATE (October 1996 price levels)

Feature	Acct. No.	Item	Estimated Cost ($000)	Federal ($000)	Non-Federal ($000)
Item 1	01	Lands and Damages 1/	217	9	208
Birds Point New Madrid (BPNM) Levee Ditch (Mile 8.1 to 12.4)	02	Relocations	8	0	8
	09	Construction	65	65	0
	30	Planning/Engineering/Design	27	27	0
	31	Construction Management	21	21	0
Item 2	01	Lands and Damages 1/	271	3	268
New Madrid Pumping Station 2/	02	Relocations	0	0	0
	09	Construction	10,644	10,644	0
	30	Planning/Engineering/Design	859	859	0
	31	Construction Management	706	706	0
Item 3	01	Lands and Damages 1/	486	15	471
St. Johns Bayou (Mile 0.0 to 3.0)	02	Relocations	0	0	0
	09	Construction	1,899	1,899	0
	30	Planning/Engineering/Design	242	242	0
	31	Construction Management	196	196	0
Item 4	01	Lands and Damages 1/	598	14	584
St. Johns Bayou (Mile 3.0 to 4.5) BPNM Levee Ditch (Mile 0.0 to 8.1)	02	Relocations	703	0	703
	09	Construction	1,504	1,504	0
	30	Planning/Engineering/Design	134	134	0
	31	Construction Management	106	106	0
Item 5	01	Lands and Damages	427	3	424
St. Johns Pumping Station	02	Relocations	125	0	125
	09	Construction	13,121	13,121	0
	30	Planning/Engineering/Design	2,530	2,530	0
	31	Construction Management	1,725	1,725	0
Item 6	01	Lands and Damages 1/	831	60	771
St. James Ditch (Mile 0.0 to 10.8)	02	Relocations	2,139	0	2,139
	09	Channels and Canals	938	938	0
	30	Planning/Engineering/Design	173	173	0
	31	Construction Management	116	116	0
Prior Year PED	30	Planning/Engineering/Design	1,342	1,342	0
Total Project Costs			42,153	36,492	5,661
Cash Contribution (>5%)				(4,877)	4,877
Total Project Cost Share				31,615	10,538

1/ The Lands and Damages estimate for the channel items in the above table includes $400,000 for mitigation purposes. The Mitigation land will be acquired as construction on the channel items takes place. Mitigation land has been allocated as follows: Item 1-$40,000; Item 3-$92,000; Item 4-$112,000; and Item 6-$156,000.
2/ The New Madrid Gravity Outlet Structure Cost can be found in Table B-1, Appendix B.

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Table 5
Funding/Construction Schedule
Incremental Costs
St Johns Bayou and New Madrid Floodway, First Phase
(October 1996 Price Levels)

	Account	Prior Year		FY 1997		FY 1998		FY 1999		FY 2000		FY 2001		FY 2002		TOTAL	
		Federal	Non-Federal	Federal	Non-Federal	Federal	Non-Federal	Federal	Non-Federal	Federal	Non-Federal	Federal	Non-Federal	Federal	Non-Federal		
01	Lands			9,000	208,000	24,000	666,000	37,000	953,000	20,000	532,000	14,000	367,000	0	0	2,830,000	(6.7%)
02	Relocations				8,000		0		1,142,000		1,700,000		0		125,000	2,975,000	(7.1%)
09	Channels and Canals			65,000		146,000		1,966,000		1,557,000		672,000		0		4,406,000	(10.5%)
13	Pumping Stations			0		460,000		6,000,000		10,000,000		6,684,000		621,000		23,765,000	(56.4%)
30	Planning Engineering and Design	752,000		1,217,000		2,535,000		630,000		100,000		73,000		0		5,307,000	(12.6%)
31	Construction Management			21,000		44,000		636,000		1,179,000		925,000		65,000		2,870,000	(6.8%)
	Sub-Total	752,000	0	1,312,000	216,000	3,209,000	666,000	9,269,000	2,095,000	12,856,000	2,232,000	8,368,000	367,000	686,000	125,000	42,153,000	
	Non-Federal Cash			-354,000	354,000	-302,750	302,750	-746,000	746,000	-1,540,000	1,540,000	-1,816,750	1,816,750	-77,750	77,750	4,837,250 -4,837,250	
	TOTAL	752,000		958,000	570,000	2,906,250	968,750	8,523,000	2,841,000	11,316,000	3,772,000	6,551,250	2,183,750	608,250	202,750	42,153,000	

Cost Summary:

Non-Federal LERRD's	5,701,000	(13.5%)
Non-Federal Cash	4,837,250	(11.5%)
Total Non-Federal Cost	10,538,250	(25.0%)
Total Federal Cost	31,614,750	(75.0%)
Total Project Cost	42,153,000	(100.0%)

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Table 6
Funding/Construction Schedule
Fully Funded Costs
St Johns Bayou and New Madrid Floodway, First Phase

	Account	Prior Year		FY 1997		FY 1998		FY 1999		FY 2000		FY 2001		FY 2002		TOTAL	
		Federal	Non-Federal	Federal	Non-Federal	Federal	Non-Federal	Federal	Non-Federal	Federal	Non-Federal	Federal	Non-Federal	Federal	Non-Federal		
01	Lands			9,000	208,000	25,000	684,000	39,000	1,005,000	22,000	576,000	16,000	408,000	0	0	2,992,000	(6.6%)
02	Relocations				8,000		0		1,205,000		1,841,000		0		143,000	3,197,000	(7.0%)
09	Channels and Canals			65,000		150,000		2,074,000		1,686,000		747,000		0		4,722,000	(10.4%)
13	Pumping Stations			0		472,000		6,330,000		10,830,000		7,433,000		709,000		25,774,000	(56.7%)
30	Planning Engineering and Design	752,000		1,217,000		2,641,000		684,000		113,000		86,000		0		5,493,000	(12.1%)
31	Construction Management			21,000		46,000		691,000		1,333,000		1,091,000		80,000		3,262,000	(7.2%)
	Sub-Total	752,000	0	1,312,000	216,000	3,334,000	684,000	9,818,000	2,210,000	13,984,000	2,417,000	9,373,000	408,000	789,000	143,000	45,440,000	
	Non-Federal Cash			-354,000	354,000	-320,500	320,500	-797,000	797,000	-1,683,250	1,683,250	-2,037,250	2,037,250	-90,000	90,000	5,282,000 -5,282,000	
	TOTAL	752,000		958,000	570,000	3,013,500	1,004,500	9,021,000	3,007,000	12,300,750	4,100,250	7,335,750	2,445,250	699,000	233,000	45,440,000	

Cost Summary:

Non-Federal LERRD's	6,078,000	(13.4%)
Non-Federal Cash	5,282,000	(11.6%)
Total Non-Federal Cost	11,360,000	(25.0%)
Total Federal Cost	34,080,000	(75.0%)
Total Project Cost	45,440,000	(100.0%)

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12. OPERATIONS AND MAINTENANCE

a. Introduction. Operations and Maintenance as a result of the First Phase of this project will remain applicable as written in the Phase II, GDM 101. Estimates of maintenance for the various features included in the First Phase were updated to October 1996 price levels. Local interest operations and maintenance requirements for the St. Johns Bayou and New Madrid Floodway project were established by the authorizing act. Non-Federal interests are responsible for all operation and maintenance of all completed works after completion. Responsibility for maintenance of roads, bridges, and utilities relocated at Federal or local interests expense will be returned to the individual facility owner. Channel maintenance will be the responsibility of the local sponsor, the St. John Levee and Drainage District, as discussed in Section III of the Phase II GDM. Since there are on-going maintenance programs for the existing channels, only the increase in annual maintenance costs is charged against the project. The Missouri Department of Conservation is expected to be responsible for operation, maintenance and replacement costs for the fish and wildlife mitigation measures in the Tenmile Pond area.

b. Channel Maintenance.

1. Brushkill. Since herbicides are applied only to the channel slopes, the cost of spraying channel banks with herbicides necessary to control the growth of vegetation is a function of channel depth and side slopes. A 4-year brushkill interval, as used in the Phase II GDM, was also used for the First Phase. It is anticipated that brushkill costs on the channels included in the First Phase will increase 17 percent following completion of this phase of the overall project. Since no channel work in the New Madrid Floodway is included as part of the First Phase, no additional brushkill costs within the Floodway will be incurred at this time.

2. Channel Cleanout. As written in the Phase II GDM, it is anticipated that channel cleanout will be required on an average of once every 20 years to remove silt deposits and to restore the channel to its design section. In unstable soils, more frequent cleanout may be required. In more stable soils less frequent work may be required. Being a function of the size of equipment required to remove the deposited material and whether one or two side operations are involved, the cost of cleanout is related to channel width. It is anticipated that channel cleanout costs on the channels included in the First Phase will increase 15 percent following completion of this phase of the overall project. Since no channel work in the New Madrid Floodway is included as part of the First Phase, no additional cleanout costs within the Floodway will be incurred until the entire floodway portion of the project is constructed.

c. Induced Bridge Replacements. The first costs of construction of the First Phase includes construction of project related bridge replacements. However, additional bridge replacements at the same location would have been necessary over the 100-year life of the project since the average life of most bridges is 30 to 50 years. For purposes of this analysis, as utilized in the Phase II GDM, it is assumed that the owner will make all bridge repairs and replacements after initial construction. It is also assumed that the owner in a without project situation would construct a bridge to meet the construction standard imposed at that time. Thus, the owner would build a bridge having the same "width standards" as the Federal Government for any particular bridge in the project area. As written in the Phase II GDM, the difference between how the owner would construct future replacements with the project is that the length would be longer in order to span the added channel width created by the project. The cost of this additional length is annualized and added to the cost of the project as a recurring induced replacement cost.

d. Average Annual Equivalent Values. Table C-20, Appendix C, shows average annual equivalent values for estimated channel operation and maintenance cost by channel reaches for those channels included in the first phase of the project. Within the St. Johns Bayou basin, the average annual operation, maintenance, and replacement costs are expected to be about $21,100 on the 27.7 miles of improved channels. The average annual maintenance costs within the New Madrid Floodway will not change since no channel work within the floodway is included in the First Phase of the project.

e. **Pumping Stations.** Estimates for operation, maintenance, and replacement costs are based on electrical driven pumps. Detailed descriptions of the pumping stations and their operations are discussed in Sections VIII and V of the Phase II GDM. As analyzed within the Phase II GDM, the pumping stations would operate anytime during the growing season when the zero damage elevation in the sump areas are exceeded, except when the riverside water surface elevation is lower than the landside water surface elevations. During the season that ponding is allowed for waterfowl (approximately 1 December to 15 March) the pumps would operate during high Mississippi River stages when the landside elevations exceed the designated allowable elevations. Table C-21, Appendix C, shows expected operation, maintenance, and replacement interval costs and average annual equivalent costs for each of the pumping stations.

13. **ECONOMICS OF THE FIRST PHASE.** Total annual benefits accruing from construction of the project are estimated to be $5,016,000. Flood control benefits of $4,961,000 will result from flood damage reduction to agricultural crops and public streets and roads and from a general intensification of agricultural activities. The other benefits are comprised of advanced replacement and betterment benefits ($55,000). The annual benefits are based on a discount rate of 7.375 percent, and a 100 year period of analysis. A summary of the annual benefits is presented in Table 7. Details of the economic reevaluation are presented in Appendix C of this report.

The project costs, like the annual benefits, are based on current price levels (October 1996), estimated over a 100-year project life plus the installation period, and discounted to the end of the project installation period using the current Federal discount rate (7.375%). Project first costs total $40,811,000 which excludes $1,342,000 in sunk study costs. Economic costs associated with the project are initial investment charges, operation and maintenance charges, and replacement charges and are also presented in Table 7. The annual interest charges are approximately $3,551,000 and annual sinking fund charges are slightly less than $3,000. Annual maintenance and replacement costs account for the remaining $382,000 in annual costs.

A comparison of the annual benefits and costs shows that the project is justified with a benefit-cost ratio of 1.3 to 1. The project annually contributes excess benefits, or net benefits over costs, of $1,083,000 to the national economic development account.

Table 7

First Cost, Annual Benefits, Costs, Excess Benefits, and Benefit-to-Cost Ratio
St Johns Bayou and New Madrid Floodway, First Phase
(October 1996 Price Levels, 7.375%)

Item	Value
Total Investment Cost	40,811,000.00
Annual Costs	
Interest	3,551,000.00
Sinking Fund	3,000.00
Channel OM&R	21,000.00
Pump Station OM&R	358,000.00
Total Annual Cost	3,933,000.00
Annual Benefits	
Agricultural Flood Damage Prevented	3,334,000.00
Agricultural Intensification	1,170,000.00
Streets and Roads	457,000.00
Advanced Replacements	51,000.00
Betterments	4,000.00
Total	5,016,000.00
Excess Benefits	1,083,000
Benefit-to-Cost Ratio	1.3

14. NON-FEDERAL SUPPORT. The project sponsor, the St. John Levee and Drainage District of Missouri, has indicated a strong willingness and capability to participate in this project. A letter has been provided by the local sponsor outlining a strategy to meet obligations for project financing, and operation and maintenance. This letter is included as Appendix G of this report. The sponsor has obtained several formal and informal commitments from other local, State of Missouri, and Federal offices to provide the resources necessary to sponsor the project. They are currently working to finalize these commitments for inclusion in the final version of the financing plan which will accompany the Project Cooperation Agreement.

15. CONCLUSION. The First Phase of the St. Johns Bayou and New Madrid Floodway Project is an important economic and infrastructure development project. Its implementation is one of a broad array of critical initiatives being undertaken by a diverse group of local, state, and Federal entities on a collaborative basis in support of the East Prairie Enterprise Community. This Limited Reevaluation Report (LRR) presents selected features of the overall authorized project that offers the most immediate benefits to East Prairie and vicinity. The approved decision document for the overall project (Phase II GDM 101, dated August 1986, approved subject to comments in December 1986, and revised April 1987) served as the basis for this LRR. The reevaluation process focused on updating the economic analysis and environmental documentation for those authorized project features associated with this initial phase of the project.

16. RECOMMENDATIONS. This limited reevaluation report describes recommended flood control improvements for the First Phase of the St. Johns Bayou and New Madrid Floodway Project, Missouri. All First Phase features were included as part of the overall authorized project as described in the Memphis District Corps of Engineers Phase II GDM 101, prepared August 1986 and revised in April 1987, and authorized for construction in the Water Resources Development Act of 1986 (P.L. 99-662). This limited reevaluation report will serve as the decision document for a Project Cooperation Agreement.

The First Phase plan of improvement will provide flood protection for the community of East Prairie and vicinity in southeast Missouri. It is technically, economically, and environmentally feasible and is in the Federal interest. Implementation of the First Phase is justified with a benefit-cost ratio of 1.3 to 1, and it will annually contribute excess benefits of $1,080,000 to the national economic development account.

The First Phase plan of improvement as described in this Limited Reevaluation Report is appropriate, and it is recommended that it be approved to serve as the decision document for the Project Cooperation Agreement.

ST. JOHNS BAYOU AND
NEW MADRID FLOODWAY MISSOURI
FIRST PHASE

APPENDIX A

PERTINENT CORRESPONDENCE

DEPARTMENT OF AGRICULTURE
OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20250

FEB 19 1997

Major General Robert Flowers
President, Mississippi River Commission
P. O. Box 80
Vicksburg, Mississippi 39181-0080

Dear General Flowers:

The purpose of this correspondence is to provide you with some update on the East Prairie Enterprise (EPEC) Community Flood Control Project.

At your staff's request following our October meeting, in East Prairie I asked our Office of General Counsel (OGC) to provide a legal interpretation of the pertinent section of the Water Resources Development Act of 1996 and implications for USDA assistance in the total flood control project.

Our OGC's opinion (attached) is that any Federal assistance made available under what the legislation terms, "the rural enterprise zone program is", can be counted as "local matching" funds in connection with the flood control project for the St. Johns Bayou and New Madrid Floodway.

This is good news for our East Prairie Enterprise Community and the EZ/EC Program. The legislation will allow additional funding flexibility which will increase our ability to assist EPEC with implementing its strategic plan.

We will continue to work closely with you, Colonel Bean, Mr. Eddie Belk, and any other Army Corps staff assigned to work on the project. We are pleased with all efforts to date and look forward to assisting with the next phase. We will be happy to work with the local sponsors to provide any assistance needed toward moving the project cooperative agreement forward.

Sincerely,

VICTOR VASQUEZ
Deputy Administrator for
Community Development

Attachment

cc: Col. Gregory G. Bean
Mr. Eddie Belk

United States
Department of
Agriculture

Office of the
General
Counsel

Washington,
D.C.
20250-1400

December 23, 1996

MEMORANDUM FOR VICTOR VASQUEZ
DEPUTY ADMINISTRATOR FOR
COMMUNITY DEVELOPMENT, RUS

FROM: David Ohlich
Attorney
Electric and Telephone Division

THROUGH: Michael W. Kelly
Assistant General Counsel
Electric and Telephone Division

SUBJECT: Interpretation of the Water Resource
Development Act of 1996

In response to your inquiry of November 7, 1996 please be advised that it is our interpretation of Section 331 of the Water Resources Development Act that any Federal assistance made available under the rural enterprise zone program can be counted as "local matching" funds in connection with the flood control project for the St. Johns Bayou and New Madrid Floodway.

If you require any further assistance from this Office, please contact Dave Ohlich (720-9114).

IN REPLY REFER TO

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
Columbia Field Office
608 East Cherry Street, Room 200
Columbia, Missouri 65201
Tel: 573/876-1911 Fax: 573/876-1914

FEB 27 1997

FWS/AES-CMFO

Colonel Gregory D. Bean
District Engineer
Memphis District, Corps of Engineers
B-202 Clifford Davis Federal Building
167 North Main Street
Memphis, Tennessee 38103-1894

Attn.: Mr. Edward E. Belk, Jr., Chief, River Engineering Section

Dear Colonel Bean:

This letter contains the Service's mitigation recommendations for the East Prairie Phase of the St. Johns Bayou/New Madrid Floodway Flood Control Project as was requested by your staff during the February 13, 1997, progress meeting in Memphis. In addition to mitigation recommendations, we are also providing our recommendation for how best to proceed with National Environmental Policy Act (NEPA) compliance, which also was discussed at the February meeting. Our letter has been coordinated with the Missouri Department of Conservation, who will be providing similar mitigation recommendations under separate cover.

These recommendations are submitted in accordance with provisions of the National Environmental Policy Act of 1969 (42 U.S.C. 4321-4347), and the Fish and Wildlife Coordination Act (FWCA; 48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), but do not fulfill the reporting requirements of the Service under Section 2(b) of the FWCA.

1. Loss of Terrestrial and Wetland Habitat From Channel Widening and Clearing

Impacts: Channel widening in the St. Johns Bayou Basin will result in the direct loss of 204 acres of scarce and valuable bottomland hardwoods and 93 acres of ditchbank and berm habitat. National Wetland Inventory maps classify practically all of the bottomland hardwood stands in the St. Johns Bayou Basin as forested wetlands. The Corps' habitat suitability analyses indicate that these stands also contain the more valuable mast trees and mature trees more than 18 inches in diameter-at-breast height. While not as significant as the bottomland hardwood loss, the project-induced temporal losses in ditchbank and berm habitat will eliminate important, and perhaps the only, wildlife cover on some reaches of these ditches for several years after project construction.

Mitigation Recommendation: We concur with the Memphis District's proposal to purchase and reforest 197 acres of cleared land to mitigate direct habitat losses associated with channel widening and clearing. These acres should be planted with seedlings (species mix and rate to be determined by the MDC District Forester), weeds controlled for a minimum of five years, and 60 percent tree survival attained at the end of five years. The area should be replanted and weed control implemented again if the 60 percent survival threshold is not met.

Rationale: Overall habitat value in the project area will decline immediately by 147 units according to the Corps analysis largely due to bottomland hardwood losses on the ditch embankment and adjacent areas. Full replacement of bottomland hardwood wetland function will not occur for many years given the time needed to grow large, mature trees. We estimate that it will take at least 50 years with natural succession for a mitigation site to approach the habitat quality that currently exists.

Restoration of forested wetlands is far more complex than restoration of marshes and other emergent wetlands. Very few, if any, existing forested wetland restoration projects are mature enough to judge whether full functional replacement is attainable. Given the time needed to produce large trees and uncertainties concerning weather conditions after planting and eventual species composition with succession, seedling planting, weed control and potential replanting are needed.

Our analysis of bottomland hardwood habitat quality over the next 50 years starting with the Corps estimate of existing quality (0.69) results in a replacement ratio of roughly 2:1 (0.70 Average Annual HU without the project 0.35 Average Annual HU with the project). To mitigate for both the bottomland hardwood and embankment trees would require 418 acres (304 acres X 2). However we estimate that as much 51% of the embankment trees (105 acres) will be cleared every 10 years or so during one-sided channel maintenance. In addition, the restrictive easements proposed for the embankments will afford some long-term habitat protection. With seedling planting, weed control and replanting in five years if necessary, the 197 acres of cleared land proposed to be purchased by the Corps is adequate to mitigate bottomland hardwood losses.

D. Loss of Bottomland Hardwood Habitat From Future Conversion

Impacts: The enhanced drainage and flood control provided by the project will increase the likelihood that existing bottomland hardwood wetlands in the St. Johns Bayou Basin will be cleared and converted to croplands. The St. Johns Bayou pumping station and increased channel capacities in the ditches will lower overbank and ditch water levels generally by 1-1.5 feet from March through June. Bottom elevations of the ditches will be lowered from one to four feet which also will decrease the duration and extent of ponding or high water tables in forested areas. Currently, 3,050 acres of forested habitat remain in the St. Johns Bayou Basin. Some of the largest contiguous stands of remaining bottomland hardwoods occur in the lower St. Johns Basin and will be most affected by project implementation.

Mitigation Recommendation: A restrictive covenant or some other appropriate protective measure should be used to prevent the clearing of all existing forested wetlands that occur at or below elevation 300 feet in the St. Johns Bayou Basin. Under present conditions, this restriction would conserve 2,750 acres of wetlands in the Lower St. Johns Bayou Basin that will be most influenced by project pumping and drainage.

Rationale: The original project planning documents (see pages 31 and 33 of the Phase I General Design Memorandum) recognized the value and vulnerability of remaining bottomland hardwood wetland stands in the project area. In fact the original selected plan (see page 73 of the Phase I GDM) contained provisions for purchase of, or land exchange for, 1,000 acres of bottomland hardwoods in the Lower St. Johns Bayou Basin, which was represented as the largest remaining block of bottomland timber in the Basin. Subsequent plans dropped this provision because of desires to not fragment mitigation lands but did call for purchase of 1,000 acres of existing timber in the Ten-Mile Pond Mitigation Area. This latter provision presumably was to mitigate for future conversion of the 1,000 acre block of timber in the Lower St. Johns Bayou Basin. We believe that it is still appropriate to protect important bottomland hardwood wetland habitats in the Basin from future conversion, but do not support purchase of existing forested wetlands outside of the Basin as the most effective mitigation. The most effective means to prevent the loss of forested wetland function within the basin is to prevent the conversion of those remaining forested wetlands through protective covenants.

3. Loss of Aquatic Habitat From Channel Widening

Impacts: Channel widening will result in significant decreases in depth in more than 23 miles of channel. Water depths may be reduced as much as 50% in St. Johns Bayou, 40% in Setback Levee Ditch, and 20% in St. James Ditch from the widening work proposed. The decreases in depth, uniform shaping and smoothing of the channel for flow conveyance, and loss of woody debris will decrease habitat diversity and food supplies for the fish community in St. Johns Bayou and in some cases could make certain ditch reaches completely unusable by fish. The decreases in depth and loss of streambank timber will increase summer water temperatures perhaps to unsuitable levels during low flow conditions. Overall, we expect fish species diversity and carrying capacity to decrease from the proposed work.

Mitigation Recommendations: a. 200 acres of ponded water connected to the channel and capable of supporting fish year-round should be created where soil conditions permit. Fifty percent of the water surface area should be at least eight feet deep with the remaining 50% gradually sloping to a depth of two feet. A minimum of eight large hardwood trees per acre should be placed and anchored in the ponds to provide woody cover and attachment sites for invertebrates. A small berm should be placed around the perimeter of the ponded area to exclude/divert sediment from the pond during runoff. Finally, a 50-foot wide strip of hardwood trees should be planted around the perimeter of the ponded area(s) to provide shade.

b. In addition to creating 200 acres of off-channel ponded water, channel widening losses should be mitigated by:

1) creating a scour hole at least three feet deep during low flow conditions in the ditch every 0.05 mile throughout the reaches affected;

2) maintaining a low-water channel with existing channel depths on the tree-lined side of the channel (where trees exist) during low flow conditions; and

3) maintaining a sinuous, low-water channel with existing widths and depths within the enlarged channel during low-water conditions.

We recognize that site conditions and circumstances will dictate where the foregoing may be implemented, but in general we recommend that roughly one third of each affected ditch reach would have one of these conditions (i.e. 1.5 miles of St. Johns Bayou would have a scour hole every 0.05 miles, 1.5 miles would have a defined low-water channel along one bank, and 1.5 miles would have a sinuous low-water channel). We also believe that hard structures (rock, concrete etc.) will be necessary to achieve and continuously maintain these conditions otherwise sediment/sand will fill the channel after the first high flow event.

Rationale: Without these measures, aquatic habitat losses from channel widening will go unmet. The original plan called for greentree reservoirs and perhaps a fish weir (as an experimental measure) to mitigate aquatic losses. The measures identified above are more appropriate for mitigating loss of aquatic habitat diversity, loss of depth, and high water temperatures during the low flows and high ambient temperatures of late summer. The ponded water connected to the enlarged channels will provide off-channel refugia for fish during high ambient water temperatures in the summer and also partially contribute to mitigating the loss of spawning and nursery habitat in the spring as explained below.

4. Loss of Spring Spawning and Nursery Habitat for Fish and Loss of Spring Feeding Habitat for Shorebirds and Wading Birds

Impacts: On average, more than 900 acres of overbank flooded area used as spawning habitat by adult fish, nursery habitat for larval and juvenile fishes, and feeding habitat by shorebirds and wading birds will be lost in March, April, and May. Spring flooding of overbank areas is important to maintaining the fish community of St. Johns Bayou, providing forage (crayfish, small fish, amphibians, invertebrates) for shorebirds and wading birds, and contributing fish to the Mississippi River. Data previously provided in our January 13, 1997, letter demonstrated the value of flooded conditions in the spring to fish.

Mitigation Recommendation: Between March 15 and May 31, the outlet gates should remain open up to a water elevation in the sump of 280 feet. If river elevation exceeds 280 feet, the gates may be closed and water above 280 feet pumped out. Beginning June 1, control to 277 feet as per the original plan.

Rationale: Spring inundation in the sump up to 280 feet will flood 695 acres (450 acres of cropland and 245 acres of woods). This will offset, in combination with the 200 acres of ponded water recommended above, the average [illegible]

annual loss from the project of about 911 flooded acres in the Lower Basin during March, April, and May.

5. Loss of Winter/Spring Waterfowl Habitat

Impacts: According to data provided by Memphis District staff, ponded water above elevation 085 feet in the St. Johns Bayou Basin occurs at the following frequencies without the project: December 14%, January 15%, February 09% March 16%. Time did not allow Corps staff to calculate the median amount of flooded habitat in various depth classes during these months for both with and without project conditions. These data would have better identified the impacts to winter spring waterfowl habitat and clearly specified the area and depth of ponding needed for mitigation. The mitigation proposed as part of the project will substantially increase the amount of ponded water during the months of December, January, and February based on average annual conditions and impose a long-term stable water regime below elevation 085 feet. However much of this water is too deep (> 1 feet) to be used by waterfowl and will negatively alter wetland plant community species composition and productivity below elevation 085 feet over the long-term. With mitigation the project will cause an average loss of about 960 acres in spring migration (March) waterfowl habitat.

We believe the proposed mitigation plan needs modification to: 1) avoid the impacts associated with providing a stable water regime year after year in the Lower Basin and 2) improve availability and suitability of waterfowl roosting and feeding habitat. Without data on existing ponding depths, areas, and frequency we are relying on the previously agreed to 2,500 acres as a mitigation target for winter/spring waterfowl habitat.

Mitigation Recommendation: Between December 1 and March 15, the outlet gates should remain open to allow flooding up to the elevation that avoids inundation of important public infrastructure. Preliminary discussions with your staff indicate that this elevation is between 085 and 091 feet. If river stages exceed the trigger elevation, the gates may be closed and water levels reduced to the trigger elevation. In addition to this measure, the capability to control water depth during the December 1-March 15 time frame on 2,500 acres along the ditches is needed. Simple and inexpensive water level control structures (e.g., structures which can be dicted or retrofitted to field cultivation) should be purchased and installed at suitable locations to allow capture and ponding of runoff independent of river stages. Such ponding should occur after harvest. Depending on location, additional rights-of-way agreements between the sponsors and individual landowners may be necessary. MDC has offered to provide technical and management assistance to the sponsors/landowners.

Rationale: Leaving the gates open between December 1 and March 15 will better protect the long-term variability in water depths that is important to wetland invertebrate production, wetland plant response during the growing season, and overall wetland health. The capability to control water depths on 2,500 acres is needed to provide those range of depths (0-18 inches) most suitable and used by waterfowl. The present plan has 2,200 acres of water ponded during the December 1 - March 15 time frame, but almost half (47%) of the ponded water

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is more than three feet deep and unusable by dabbling ducks and more than 81% is greater than two feet deep and marginally usable by waterfowl. In addition to better mitigating winter/spring waterfowl habitat losses, we believe that our recommendations have the potential to lower long-term pumping costs in comparison to the original plan.

NEPA Procedures

Three options for proceeding with NEPA compliance for the East Prairie Phase of the project were discussed at the February 13 meeting:

Option 1--Prepare an Environmental Assessment (EA) that addresses the environmental effects of the St. Johns Bayou Basin portion of the East Prairie Phase now and proceed later with a Supplemental Environmental Impact Statement (SEIS) for the New Madrid Floodway portion of the project (pumping station and levee closure);

Option 2--Prepare an EA that addresses the environmental effects of the lower three miles of channel work slated for St. Johns Bayou Basin and then proceed with a SEIS for the remaining St. Johns Bayou Basin and New Madrid Floodway components;

Option 3--Prepare an EA that addresses the environmental effects of the St. Johns Bayou Basin components and the <u>direct</u> impacts of the New Madrid Floodway pump station footprint. A SEIS would be done later for the <u>direct</u> impacts of the levee closure footprint and the <u>indirect</u> impacts of the pump station and levee closure.

We recognize the tight time constraints you are under to meet the scheduled summer construction start for the three miles of St. Johns Bayou channel work. If the Corps and project sponsors and Service/MDC can agree on appropriate mitigation, we would concur that Option 1 is adequate to evaluate the environmental effects of the St. Johns Bayou portion of the East Prairie Phase, provided that the New Madrid Floodway pump station is not included in the EA. We are opposed to Options 2 and 3 because both piecemeal what is clearly a larger project. We also reiterate our opposition to a NEPA analysis that includes the New Madrid Floodway pump station and the St. Johns Bayou Basin components without including the Frontline Levee closure. In our view, construction and operation of either the New Madrid Floodway pump station or Frontline Levee closure will result in significant negative impacts to fish and wildlife resources and will therefore require a SEIS to comply with NEPA.

Mussel Survey

At the February 13 meeting, we also discussed how best to proceed with mussel surveys given the potential for significant mussel resources to occur in the project area. Recognizing your ambitious planning, design, and construction schedule, we agreed that mussel surveys and relocation of significant mussel beds if needed could proceed after completion of the NEPA document but prior to construction. Mussel salvage should include all mussels and salvage plans should be coordinated with the Service and MDC prior to implementation.

We appreciate the opportunity to provide input and look forward to continued close coordination on this project. Please contact Mike LeValley or myself at (573) 876-1911 if you have any questions or need further information.

Sincerely,

Mike LeValley for

Gary D. Fraser
Field Supervisor

MISSOURI DEPARTMENT OF CONSERVATION

2901 West Truman Boulevard, P.O. Box 180, Jefferson City, Missouri 65102-0180
Telephone: 573-751-4115 • Missouri Relay Center: 1-800-735-2966 TDD:

JERRY M. CONLEY, Director

February 27, 1997

Colonel Gregory G. Bean
District Engineer
Memphis District, Corps of Engineers
B-202 Clifford Davis Federal Building
167 North Main Street
Memphis, Tennessee 38103-1894

ATTN: Mr. Edward E. Belk, Jr., Chief, River Engineering Section

Dear Colonel Bean:

I am writing to provide the information requested regarding mitigation measures associated with the East Prairie Phase of the St. John's Bayou Flood Control Project. The Department and the U.S. Fish and Wildlife Service (Service) have worked closely with your staff to furnish it in a very short time frame enabling enclosure in the supplemental environmental compliance document.

It is not necessary to reiterate the fish, forest and wildlife resources at stake. I merely refer you to the Service's letter of January 23, 1997 and your own files and staff work. The bottom land hardwood stands, wetlands, oxbows, wet prairies, marshes and potholes that remain are a mere remnant of what was once a vast wetland ecosystem with a level of biological diversity that today can only be imagined.

We believe that conversion of bottom land hardwoods will occur if the project is completed. Further, there will be a large reduction in the acres of flooded cropfields and forest for migrating birds. Likewise, significant negative impacts to the fishery will occur under the present scenario. More than a thousand acres of annual flooding important to spawning will be eliminated during the March 15-May 31 time period. Ditches will be widened and lowered and water levels will be controlled. Wider ditches with the same volume of water means shallower water. We realize that what we see as the cause of significant negative impacts to the natural resources is in fact the desired goal of the sponsors, namely flood control. However, we believe that a balance is achievable and a portion of these losses can be mitigated. In this light, we propose that the following mitigation measures be incorporated into the project.

COMMISSION

RANDY HERZOG JOHN POWELL RONALD J. STITES

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Department staff concur with the Corps of Engineer's (Corps) determination that restoration of 397 acres of forested wetland will mitigate for the terrestrial losses associated with ditch deepening and widening. These acres should be reestablished on cleared land, planted with seedlings to a species mix and rate determined by the MDC District Forester and receive five years of weed control. At the end of that period there should be a minimum of 60% survival. Anything less would require replanting and weed control.

It is our recommendation that the project require a restrictive covenant between the landowners and the St. John's Levee and Drainage District to prohibit clearing of any existing woodlands on lands with an elevation of 300 feet or less. The Department has itself been subjected to such action via Section 404 of the Clean Water Act.

The following recommendations will mitigate for the elimination of flooded lands used for fish spawning and nursery, a reduction in depth within the widened ditches, and controlled water levels.

In those localities with good soil conditions (i.e., sufficient clay lenses), 200 acres of pond habitat should be constructed for fish spawning and nursery. This amount is much less than the 1,000 acres estimated by the Corps to be currently flooded each spring. Several ponds should be built and at least 50% of each pond should be 8' deep and sloped to 2' deep. They should be seasonally connected to the adjacent ditch and water levels should be maintained on a year-round basis. Large trees should be anchored in these ponds, 8 per acre. A small berm would protect them from sediment laden agriculture runoff. A 50' wide band of hardwood trees should be planted around the perimeter to provide shade for cooling.

It is our recommendation that rock structures be placed in the enlarged ditches to increase depths during summer low-flows by a) concentrating flow to create three feet deep scour holes, located approximately 1/8 mile apart; b) maintaining water depth equal to the existing condition, on the tree lined side of the channel; and c) maintaining sinuous channel with existing channel widths and depths. These conditions should be placed through the entire lengths of the modified channels, perhaps on a 1/3,1/3,1/3 basis.

It is our recommendation that the project provide flooded acres through May 31. From March 16 to May 31 the St. Johns Bayou Basin outlet gates should be operated to maintain a 280' m.s.l. water elevation. If the river is greater than 280' m.s.l., the gates may be closed and water above that elevation may be pumped out. On June 1, control to 277' m.s.l., per the approved plan.

To mitigate for losses of flooded lands used by waterfowl, it is our recommendation that water levels be varied from December 1 through March 15. The gates should be opened on December 1 to allow opportunistic flooding to a height that would not inundate important public infrastructure. This elevation is estimated to be 286' or greater. Such operation has the potential to lower pumping costs when compared to the original plan.

In order to achieve desirable overland water depths, the capability to control water ingress/egress on 2,500 acres should be installed along all ditches, at suitable locations (as noted in data provided by the Memphis District, much of the ponded water would be over 3 feet deep and not usable by waterfowl). This condition should be achievable independent of river stage variations and would use both headwater and back water flooding. This will permit the landowners to flood their lands following harvest. Given that this could effect lands outside the proposed ponding easement area and will impact private landowners, an agreement will be necessary between them and the sponsors. The Department will supply technical advice to achieve optimum habitat results.

I believe these recommendations will offset the majority of the resource losses that could occur via the project. Mr. Gary Christoff of this office will continue to coordinate for the Department. Please direct all questions and concerns to him.

Sincerely,

JERRY M. CONLEY
DIRECTOR

c: Gary Frazier

MEMBER OF CONGRESS
8TH DISTRICT, MISSOURI

HOUSE COMMITTEE ON
WORKS AND TRANSPORTATION

Congress of the United States
House of Representatives
Washington, DC 20515–2508

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September 29, 1995

The Honorable John H. Zirschky
Acting Assistant Secretary
of the Army (Civil Works)
U.S. Department of the Army
108 Army Pentagon
Washington, DC 20310-0108

Dear Dr. Zirschky:

We are writing to follow up on your recent meeting with the Vice President's Office and representatives from the Agricultural Department and Office of Management and Budget regarding ongoing discussions to reduce the cost share for the non-federal portion of the St. John's-New Madrid Floodway Project. It is our understanding that questions arose concerning our support. We would like to take this opportunity to once again reiterate, as we did in a letter dated May 2, 1995, our strong support for moving this much-needed project forward.

As you may know, East Prairie, Missouri was selected by the Administration as an Enterprise Community for purposes of enhancing economic development in the area. The community submitted a detailed application that was endorsed and approved by the President as part of this program. As a result of this hard work, East Prairie will be awarded approximately $3 million for economic development purposes.

Discussions are continuing at the staff level, and we are hopeful that a meaningful solution can be found to provide relief from the devastating effects of annual flooding in Southeast Missouri. As an area that produces approximately 30 percent of Missouri's agricultural cash crops, the region's economic development is inherently tied to adequate flood protection. Earlier this year, Mississippi and New Madrid counties experienced high water levels that destroyed more than 32,000 acres with damages estimated in the millions of dollars.

Moreover, it is important to note that this project is not only an agricultural project. When completed, it will allow rural communities to attract small business and enhance economic development. The situation right now is such that industry is reluctant to locate in an area that is unprotected from annual flooding. In fact, industry has left the area for this very reason.

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In summary, we believe that the Enterprise Community designation of East Prairie warrants strong consideration to help complete this project. We look forward to working with the Administration and look forward to your cooperation in this matter.

Sincerely,

Kit Bond

CHRISTOPHER "KIT" BOND
U.S. Senate

John Ashcroft

JOHN ASHCROFT
U.S. Senate

Bill Emerson

BILL EMERSON
Member of Congress

cc: Ms. Kumiki Gibson
Mr. Alvin Brown
Mr. T.J. Glauthier
Mr. Bruce Long
Mr. Randy Hanchey

10 09 96 10 03 FAX 601 ...
OCT 22 '96 ...

St. John Levee and Drainage District of Missouri

Established 1912

Board of Supervisors
John Joe Bryant
F. S. Hunter
William D. LaValle
James H. Bogle
William D. Dill

Lynn N. Bock
Secretary-Treasurer
565 Virginia P.O. Box 40
New Madrid, MO 63869
Telephone (573) 748-9232
Fax (573) 748-2585

October 2, 1996

Major General Robert B. Flowers
President, Mississippi River Commission
P.O. Box 80
Vicksburg, MS 39180

Dear General Flowers:

The Fiscal Year 1997 Energy and Water Appropriations Act and the 1996 Water Resources Development Act has provided the necessary funding and authorization to initiate construction of the St. Johns - New Madrid Floodway Project in Fiscal Year 1997.

We understand that limited studies will be required before construction can begin. We would like to meet with you as soon as possible to learn how the Corps plans to proceed and how we can accommodate the process.

Please have your staff contact our office to arrange a meeting. We can accommodate your schedule. If possible we would like to meet in the project area. Our telephone number is (573) 748-9232 or you can contact our consultant, Rodger Harris at (601) 638-1984.

Sincerely,

Lynn N. Bock

Lynn N. Bock,
Secretary/Treasurer

LNB:mh

A Member of The Lower Mississippi Valley Flood Control Association

Floodway, Missouri Flood Control Project with the appropriate officials of the U.S. Army Corps of Engineers.

Very truly yours,

Lynn N. Bock,
Secretary

LNB/las

MISSOURI DEPARTMENT OF CONSERVATION

Headquarters

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JERRY J. PRESLEY, Director

December 30, 1996

Mr. Edward E. Belk, Jr.
US Army Corps of Engineers
CELMM-ED-DR
167 North Main Street, Suite 741
Memphis, Tennessee 38103-1894

Dear ~~Mr. Belk~~: Eddie

I am enclosing aquatic data from Missouri Department of Conservation files as promised at our December meeting in Columbia.

John Rumancik can contact Mark Boone at our Cape Girardeau office, 573-290-5730, for clarification of the data or other explanations needed. Mark will be glad to help him.

We are meeting next week to go over the proposal, historic data, etc. and hope to have a reply to you by the week of January 20. Sorry for the delay, but year end vacation time coupled with the holidays kept us from getting together sooner.

Sincerely,

Gary Christoff

GARY T. CHRISTOFF
ENVIRONMENTAL POLICY COORDINATOR

GTC:tef
Enclosure

COMMISSION

[illegible] JOHN POWELL RONALD [illegible]

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
Columbia Field Office
608 East Cherry Street, Room 200
Columbia, Missouri 65201
Tel: 573/876-1911 Fax: 573/876-1914

IN REPLY REFER TO:

FWS/AES-CMFO

JAN 23 1997

Colonel Gregory D. Bean
District Engineer
Memphis District, Corps of Engineers
B-202, Clifford Davis Federal Building
167 North Main Street
Memphis, Tennessee 38103-1894

Attn: Mr. Edward E. Belk, Jr., Chief, River Engineering Section

Dear Colonel Bean:

This is in follow-up to our December 12, 1996, meeting with your staff to discuss the East Prairie Phase of the St. Johns Bayou/New Madrid Floodway Flood Control Project and the associated closure of the Frontline Levee. The U.S. Fish and Wildlife Service (Service) and the Missouri Department of Conservation (MDC) agreed at that meeting to identify the fish and wildlife data needs and resource issues that should be addressed in the supplemental environmental compliance work for these projects, and to provide the Corps with relevant information that we have readily available.

These comments and recommendations are submitted in accordance with provisions of the Endangered Species Act of 1973 (16 U.S.C. 1531-1543), as amended, the National Environmental Policy Act of 1969 (42 U.S.C. 4321-4347), and the Fish and Wildlife Coordination Act (FWCA; 48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), but do not fulfill the reporting requirements of the Service under Section 2(b) of the FWCA.

This letter has been coordinated with the MDC, which concurs with its content.

Federally-Listed Species

The federally-listed endangered interior least tern (Sterna antillarum athalassos), endangered pallid sturgeon (Scaphirhynchus albus), and threatened bald eagle (Haliaeetus leucocephalus) all occur in the project area.

Interior least terns nest in colonies on barren sandbars in the Mississippi River throughout the project area. Both adult birds and chicks require an abundant supply of small fish, and adults may forage for fish up to two miles from the nest site.

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large numbers of adult terns have been observed foraging in the spring (mid to late May) in the lower end of St. Johns Bayou below the outlet structure and its confluence with Mud Ditch, because of the availability of large numbers of forage fish (Kate Duggers, University of Missouri, pers. comm.) as the backwater drained to the river.

Both adult and juvenile pallid sturgeon are reported from the Mississippi River and associated off-channel habitats in the project area. A juvenile pallid sturgeon released in the Middle Mississippi River by the MDC was caught in a river backwater near Point Pleasant, Missouri (River Mile 87[illegible]) in 1994. None of the sub-adult pallid sturgeon released by MDC into the Mississippi and Missouri Rivers have been recaptured in tributaries or tributary confluence areas. Commercial fishermen report capturing adult pallid sturgeon in these same habitats. While these data suggest that connected tributaries and backwaters of the Mississippi River, such as Mud Ditch and the New Madrid Floodway, may be important feeding habitats or refugia for some life stages of pallid sturgeon, most adult pallid sturgeon from the lower river have been captured over sand in deep, main channel habitats with current (Bobby Reed, Louisiana Department of Wildlife and Parks, pers. comm., Glenn Constantz, Louisiana State University, pers. comm.).

Low numbers of wintering and nesting bald eagles (Haliaeetus leucocephalus), occur along the Mississippi River in New Madrid and Mississippi Counties. Though nesting by bald eagles has not been documented in the immediate project area, eagles successfully fledged young at Donaldson Point Conservation Area in 1990 and have made unsuccessful nest attempts elsewhere in Mississippi County.

Federal Candidate Species

Two candidate fish species, the sicklefin chub and sturgeon chub, occur in the main channel of the Mississippi River in the project area. The chubs are small, native river cyprinids which are currently being considered for federal listing as threatened or endangered species. Both of these fish occur along and over sandbars in main channel border areas and chutes between the mainland and sandbar islands. Typically, they are found over sand and gravel substrate and in current velocities of 0-1.0 feet-per-second. The East Prairie Phase of the flood control project and the associated closure of the Frontline Levee will not affect habitat for these candidate species.

State-Listed Species and Other Unique Resources

In general, Mississippi and New Madrid Counties, including the project area, support more diverse habitats and natural communities than elsewhere in the Bootheel. This increased diversity is reflected in the number of state-listed plant, mammal, fish, amphibian, reptile, bird, mammal, and natural communities reported for the two-county area (Enclosures 1 and 2), and is due in part to the influence of the river's annual hydrologic regime on the lower St. John's Bayou and New Madrid Floodway basins. Through 1994, 10 rare or endangered plants, one rare amphibian, one rare reptile, six rare or endangered birds, two rare mammals, two rare and two watch-list fish, and two rare or endangered natural communities were recorded for New Madrid County.

in Mississippi County, nine rare or endangered plants, two rare mussels, two rare amphibians, one endangered and three rare natural communities, one endangered reptile, one watch-list fish, and eight rare or endangered birds were reported. Since 1994, an additional three state-listed fish -- the rare mooneye and watch-list filter and river darter -- have been reported from the St. Johns Bayou Mud Ditch confluence area below the Setback Levee outlet structure (John Tubbs, University of Missouri, pers. comm.).

Most of these unique flora and fauna and natural communities are associated with the wetlands that still remain in portions of the St. John's Bayou Basin and the Floodway. Over 1,000 acres of bottomland hardwood wetlands occur in the lower reaches of both of these areas (see enclosed Figure 1) from the Draft Environmental Impact Statement for the New Madrid National Wildlife Refuge. National Wetland Inventory maps are also available for the project area, either in hardcopy form or in digital form through the NWI Home Page at Internet address http://www.nwi.fws.gov.) Drainage of St. John's Basin and the Floodway will make these important wetlands more vulnerable to drying out during the growing season and more likely to be converted to other land uses.

The ditches and streams of the Missouri Bootheel also support some of the most significant freshwater mussel resources in the state. Although no systematic sampling of project area ditches for freshwater mussels has been conducted to date, live and freshly dead mussels were commonly encountered during fish sampling of Mud Ditch (S. Brienderman, MDC, pers. comm.). Project construction could harm freshwater mussel resources through physical removal and habitat destruction during channel cleanout, or through ditch dewatering or other hydrological modifications resulting from operation of the outlet structures or pumps.

Fishery/Aquatic Habitat Issues

The East Prairie Phase of the flood control project and the associated closure of the Frontline Levee will cause the loss of off-channel spawning and nursery habitat and recreational fishing opportunity because of the Frontline levee closure and drainage of the ponded water in both the St. Johns Bayou Basin and the Floodway. Mud Ditch is the last tributary directly connected to the Lower Mississippi River in Missouri. The recreational fisheries provided by Mud Ditch, St. Johns Bayou, and the Mississippi River are important to this area of the state because of the lack of other fishable waters in the Bootheel. Excellent sport fisheries are associated both with Mud Ditch and St. Johns Bayou. Electrofishing data collected by the Missouri Department of Conservation in St. Johns Bayou reflects a diverse fish community with over 30 species reported. Sport fishes captured in the Bayou include spotted bass, largemouth bass, channel catfish, flathead catfish, sauger, bluegill, rock bass, white crappie, black crappie, longear sunfish, warmouth, black bullhead, carp, and grass pickerel.

The good fishery in St. Johns Bayou reflects the better habitat conditions associated with this stream as compared to most Bootheel ditches. The stream has a variety of habitat including deeper pools, woody debris, and a [illegible] corridor with large trees in its lower reaches. The corridor [illegible] summer water temperatures by providing needed shade.

Mud Ditch (East Bayou Ditch) also supports a diverse fish community and provides significant angling opportunity for white bass, crappie, channel catfish, and flathead catfish in the spring as far upstream as Ten-Mile Pond Conservation Area (Dave Wissehr, MDC, pers. comm.). Limited seining of the lower reaches of Mud Ditch in 1994 resulted in the capture of 17 fish species, including channel catfish, sauger, bluegill, and white bass, and other species normally associated with the river and its backwaters (Sue Bruenderman, MDC, pers. comm.). Despite the limited sampling effort, species richness was greater in 1994 than in the 1960 statewide fish survey of the same ditch; normally the reverse is true. Two species which may have declining populations in Missouri--the mud darter and bluntnose darter--were collected in 1994.

The flooded conditions that exist annually in the Floodway provide significant spawning and nursery habitat for river fish. Sampling of Mud Ditch and St. Johns Bayou below the outlet structure in late spring and early summer (mid-May to early July) during 1993 and 1994 collected large numbers of juvenile and larval fishes less than 100 mm in length as the backwater drained back to the Mississippi River (John Tibbs, University of Missouri, pers. comm.). Twenty-seven species were collected in 1993 from late May to late July with fish being most dense in late May and early June. Seventeen species were collected in 1994 from late March through mid July. The greatest numbers of fish captured peaked in late May (John Tibbs, University of Missouri, pers. comm.). The small fish assemblage reported by Tibbs included numerous river species that require quiet, off-channel habitat for spawning and rearing of young and important sport fishes such as spotted bass, white bass, and black crappie. Three state-listed species were also collected--the rare mooneye and watch-list filer and river darter.

Data Needs/Resource Issues

We recommend that the following issues and data be thoroughly presented and discussed in the NEPA documentation for the East Prairie Phase of the St. John's Bayou/New Madrid Floodway project and the associated closure of the Frontline Levee:

- Mitigation of fishery and ecosystem impacts resulting from the levee closure and spring pumping of both basins. Measures to avoid, minimize, or compensate for adverse impacts to fish and wildlife need to be identified as soon as possible. Engineering options for seasonal control structure and pump operations, fish passage around the Frontline levee closure, and ponding of water upstream of the levees during the spring for fish reproduction and recruitment, should be explored as well as purchase and restoration of other off-channel floodplain areas to offset project losses.

- Pre- and post-project hydrologic conditions. In order to identify project impacts to fish and wildlife and develop appropriate mitigation, we need better information on the annual hydrologic conditions in both basins with and without the project. In this regard, we request that the Corps describe pre- and post-project flooding conditions within both basins on a median monthly basis for each month of the year. We ask

that these conditions be described both numerically as a table of affected acreage and graphically in map form, both segregated by depth class. Depth classes to describe include 0-1 foot, 1-2 feet, 2-3 feet, and greater than 3 feet. The previously established ponding easement (median monthly) should be overlaid on the pre-project condition. We strongly recommend that this information be developed and presented in a Geographic Information System so that we can evaluate alternative mitigation scenarios in timely fashion.

- Effect of pumping on Floodway ditch and St. John's Bayou water surface elevations. The effects of the pumping plan on the water surface elevations of affected ditches and streams needs to be described in more detail so that the effects on stream fisheries, adjacent wetland hydrology, and dependent public lands can be determined. Map products similar to those described above, graphically displaying water surface elevations on a median monthly basis, would be most useful.

- Indirect effects of project construction on forested wetlands. The acreage and mapped location of privately owned bottomland hardwood wetlands within the project area should be presented. This information is needed, along with the pre-and post-project hydrologic conditions and ditch water surface elevations, to assess the indirect effect of project construction on the conversion to other uses of existing forested wetlands within the basins.

- Habitat Quality Index calculations. More information is needed on the procedures used in formulating the Habitat Quality Indices used to calculate mitigation for habitat losses due to channel enlargement. In particular, what biological measures were used to assess habitat quality (e.g., species composition, diameter-at-breast-height of trees, canopy closure)? What species or species groups did the Habitat Quality Index seek to model? How were temporal losses of habitat value accounted for in the analysis (i.e., the loss of habitat value incurred while "growing out" habitat to replace the loss of mature timber)?

- Impacts to freshwater mussels. Freshwater mussels, the most imperiled of all aquatic species groups, have been documented within the affected project area, but the mussel resources of project area streams and ditches remains poorly described. In light of the ecologically important mussel fauna found elsewhere in the Bootheel, project construction may impact significant freshwater mussel resources. We recommend that the Corps initiate a mussel survey of ditches and streams that would be affected by altered hydrology or physical habitat alteration from the East Prairie Phase of the St. Johns Bayou/New Madrid Floodway project and the associated Frontline Levee Closure.

Section 7 Consultation

Following review of information and data provided in this letter and otherwise available to you regarding federally-listed species, the Memphis District [illegible] whether one or both projects may affect the pallid sturgeon, bald eagle, or interior least tern. If the Corps determines that one or both

projects may affect one or more listed species, consultation should be initiated with this office. If consultation is initiated, we can either work informally to identify ways to avoid adverse effects to listed species through project design or construction methods, or proceed directly to formal consultation and prepare a biological opinion on the action. In either event, we are committed to timely action on any consultation that may occur.

NEPA Procedures

With regard to your plans to prepare separate and independent National Environmental Policy Act (NEPA) documents for the East Prairie Phase of the St. Johns Bayou/New Madrid Floodway Project and the closure of the Frontline Levee, the Service finds this to be contrary to the plain language of the Council on Environmental Quality's NEPA regulations concerning scope of a Federal action (40 CFR 1508.25). As made clear at the December 12 meeting, the Frontline Levee closure cannot proceed without construction of the pump station that is part of the East Prairie Phase of the St. Johns Bayou/New Madrid Floodway Project. Similarly, the utility of the pump station and channel work proposed in the Floodway as part of the East Prairie Phase is dependent upon the Frontline Levee closure being constructed. These are "connected actions" within the meaning of the term in the NEPA regulations and should, in the Service's view, be discussed in the same environmental document. The Service is concerned that separate NEPA documents will contribute to a fragmented and confusing description of environmental impacts, alternatives, and mitigation measures.

We appreciate the opportunity to provide input and look forward to continued close coordination on this project. Please contact Mike LeVallley or myself at (573) 876-1911 if you have any questions or need further information.

Sincerely,

Gary D. Frazer
Field Supervisor

Enclosures

ST. JOHNS BAYOU AND
NEW MADRID FLOODWAY MISSOURI
FIRST PHASE

APPENDIX B

COSTS

DEPARTMENT OF THE ARMY
MEMPHIS DISTRICT, CORPS OF ENGINEERS
167 NORTH MAIN STREET B202
MEMPHIS, TENNESSEE 38103-1894

BASELINE COST ESTIMATE

FOR

EAST PRAIRIE PHASE LRR
INCLUDING ST JOHNS & NEW MADRID
PUMPING STATIONS AND ASSOCIATED
CHANNEL WORK, MISSISSIPPI CO. &
NEW MADRID CO., MISSOURI

ESTIMATE PREPARATION DATE: 15 MARCH 1997

ESTIMATE APPROVED BY:

Jerry R. Welch, CCC _____ Date: 3/14/97
Cost Engineer

Ronald U. Dunn, PE _____ Date: 3/14/97
Chief, Cost and Design Branch

Joseph E. Keithley, Jr., PE _____ Date: 3-21-97
Chief, Engineering Division

David W. Wolfe, PE _____ Date: _____
Deputy District Engineer (Project Management)

CONSTRUCTION COST ESTIMATE, 09 AND 13 ACCOUNT.

A. *Methodology.*

The methodology for this cost estimate is guided by ER 1110-2-1302. The cost detail presented here and in the MCACES cost reports were made to a level of detail commensurate with the design information provided. Since historically 80 percent of project cost is contained in 20 percent of the estimated work elements, efforts and detail were focused on those cost elements that had the greatest influence on cost. All previous pricing that was indexed used the Civil Works Construction Cost Index System, EM 1110-2-1304. The computer software used was MCACES Gold, Version 5.30, developed by Building Systems Design, Inc., of Atlanta, GA. The major cost elements in this estimate were based upon current labor, equipment and material costs or subcontract/manufacturer quotes for the specific locality. Production rates were extracted from Memphis District contract field reports, the Memphis District Cost Item data base, various technical publications such as R.S. Means, and information from contractors, subcontractors and manufacturers. Production for draglines and excavators was calculated from a spreadsheet program based upon the Power Shovel Association method for dragline production and calibrated with Memphis District historic production data. The labor rates are based upon the November 1996 Davis Bacon labor rates for the counties involved which reflect prevailing rates paid in the area. Labor overburden was calculated at 29.4 per cent by weighted averaging worker's compensation for concrete construction and earthwork classifications (NCCI assigned risk) and adding social security and state/federal unemployment. Overtime was added as applicable and calculated as a percentage of straight time hours. Work hours per week per shift varies from 40 to 60 hours per week. Equipment costs were calculated using the Corps of Engineers MCACES equipment data base adjusted for age, current fuel costs, and shift hours based upon EP 1110-1-8, Volume 5, dated August 1995. Site visits were made to all the construction areas and photographs were studied to obtain access, obstruction and clearing information.

Overhead costs for the channel construction estimates were entered at 6 percent of the direct costs calculated. This value was obtained from historic supervision and miscellaneous costs calculated from Official Government Estimates for similar channelization jobs. Overhead for the pumping station prime contractor was 10 percent for work done by his own crews and 1 percent if a subcontractor was engaged. Home office costs varied similarly from 4 to 6 percent of direct costs plus field overhead. Profit was calculated at 7 to 8 percent based upon the Corps weighted guideline method. Contract bond was figured at 1 percent for the prime only which is typical. Mobilization and demobilization costs were calculated as a construction contract bid item and were therefore included as a direct cost and not included as an indirect cost.

The MCACES cost reports included in this appendix were those determined to be most applicable to the majority of users. They consist of the cost summaries down to the cost "element" level. Detail task notes, production and crew information are available at the "detail" level and are available in printout form for review or on floppy disk from the Memphis District Cost Engineering and Specifications Section. The "second view" report summary shows the percentage of each cost element as compared to the bottom line total.

B. *Channels and Canals, 09 Account*

1. General.

All of the channels to be improved in the East Prairie Phase Limited Reevaluation report are land side or west of the Birds Point New Madrid Setback Levee in New Madrid and Mississippi, Counties, Missouri. The flow from these channels travels south to an existing gravity outlet structure through the Birds Point New Madrid Setback Levee into the Mississippi River. This structure is just east of the city of New Madrid, Pemiscot County, Missouri. The proposed St. Johns Bayou Pumping Station will be adjacent and east of the existing St. Johns Bayou gravity Outlet structure. The channel specifications for the improved channels are listed as follows:

Description	Mile	to Mile	Side slope 1V on	Bottom Width Ft	Comments
Item 1, Birds Point New Madrid Levee Ditch	8.10	12.4	NA	NA	Vegetative Clearing
Item 3, St. Johns Bayou	0.00	3.00	2.25H	200	Two-sided enlargement
Item 4, St. Johns Bayou	3.00	4.35	2.25H	200	Two-sided enlargement.
	4.35	4.50	2.25H	200-50	Transition.
Item 4, Birds Point New Madrid Levee Ditch	0.00	8.10	2.75H	50	One-sided channel enlargement
Item 6, St James Ditch	0.00	3.48	2.5 H	45	One-sided channel enlargement.
	3.48	5.00	2.5 H	25	"
	5.00	7.12	3.0 H	25	"
	7.12	10.80	2.0 H	25	"

The item numbers in the above table identify the anticipated construction contracts and the anticipated order the contracts will be advertised. See Plate B-1 for the location and layout of the channels in the geographic area. The channelization project costs account for about 21% of the overall project costs for the study.

2. Construction Contract Cost

a. Item 1

Item 1, Birds Point New Madrid Levee Ditch consists of vegetative clearing. A clearing crew will perform the vegetative selective clearing from mile 8.1 to 12.4 with the assistance of a

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hydraulic excavator equipped with a boom mounted mowing attachment. No channel protection is anticipated.

b. Item 3

Item 3, St. Johns Bayou, consists of digging the existing channel from both sides and placing the backfill on the right of way. The 200 ft bottom width channel will require a large dragline such as a Manitowoc 4600, Series 3 with a 140 foot boom and a 7 cubic yard bucket. Some assistance from a dozer was estimated to help place and shape the backfill. The estimate assumes two large draglines will be used, one digging on each side of the channel. This operation will be staffed by crews for 24 hr operations, three eight-hour shifts. The dozers will work the day shift only. The clearing along the channel consists of medium timber which will be piled, burned and buried on the right of way. This will be accomplished by a separate clearing crew which will precede the excavation crew. The "2ND View Summary " for Item 3 indicates that the excavation item consists of about 67% of the construction contract costs. The clearing costs account for about 8% and mob/demob about 4%. The mobilization/ demobilization costs assume equipment and personnel will be moved from within a 150-mile radius in the region. Two large draglines were mobilized along with other miscellaneous equipment. The other cost elements comprise about 21% of the construction cost and are typical of channel jobs of this type. All of the channels estimated in this account included costs for environmental protection. For further information see the MCACES detail cost estimate reports and documentation.

c. Item 4

Item 4, St. Johns Bayou & Birds Point New Madrid Levee Ditch, starts out as a continuation of Item 3 channel configurations on the first 1.35 miles. The estimate for this portion is identical to Item 3. At mile 4.35 the ditch transitions to a 50-foot bottom width channel dug from one side only as it merges with the Birds Point New Madrid Levee Ditch. This portion will require one large dragline with a 140-foot boom due to the reach requirements. The backfill will be placed directly as in Item 3 with some assistance and shaping by a dozer. Field inspection showed that clearing of the channel would be classified as very light timber if performed from one side and medium if performed from the other. Production was based upon the medium timber because of the uncertainty in which side the clearing would be performed. The production for the dragline was computed in a like manner as Item 3. The shifts for the excavation and clearing crews are also the same as Item 3. Riprap and filter material protection for the Item 4 channel in the vicinity of bridges accounts for about seven percent of the total estimated construction contract cost. The stone material will be placed by dragline with front end loader assistance. The material will be hauled by truck about 45 to 50 miles from quarries and pits in the area and stockpiled at the various sites for placement.

c. Item 6

Item 6, St. James Ditch, consists of 10.8 miles of one-sided channel enlargement which will commence at the Birds Point New Madrid Levee Ditch and progress north. This channel has several county roads crossing it, which results in considerable relocation costs (51% of total project costs for this item). A Northwest 190D dragline with a 90-foot boom and a 6 cubic yard bucket was found to be the most economical machine for digging this ditch. Clearing along the existing berm and backfill area consists of medium to light timber. Production was computed in like manner to the other Items. Shifts for equipment and labor are based upon 6 days per week, 10 hours per day. Riprap and filter material protection for the Item 6 channel in the vicinity of bridges accounts for over 13 percent of the total estimated construction contract cost. The stone material will be placed and supplied as described in Item 4. The construction contract cost of Item 6 is just over 22 per cent of the total project costs and less than half of the relocation costs for the Item.

C. *Pumping Stations, 13 Account.*

1. General

There are two pumping stations to be constructed within about one-fourth mile of each other. These stations are located about one mile east of New Madrid, Missouri, just off of Missouri State Highway "WW". See Plate B-1 for location details. The New Madrid Pumping Station is a 1,500-cfs three pump station and combination gravity outlet structure. When this facility is joined with a planned levee closure it will provide a 1.1-year degree of flood protection within the New Madrid Floodway. The New Madrid Pumping Station, or Item 2, will actually be constructed using two contracts. The first contract will be for the supply and delivery of the main pumps, the pump transmission gears and the main pump electric motors. The second contract will be for the actual construction of the station. This station is documented in *St. Johns Bayou and New Madrid Floodway Missouri Phase II GDM 101*, Dated August 1986 and also in *Feature Design Memorandum No.'s 201 and 202*, dated March 1989 and September 1989, respectively.

The St. Johns Bayou Pumping Station is a 1,000-cfs three pump station also but without a gravity outlet. The existing St. Johns Bayou floodgate lies about 600 feet to the west of the proposed station location and will provide the gravity outlet needed. This station will pump water over the Birds Point New Madrid Setback Levee by way of three 72" steel pipes to provide interior flood relief due to impounding caused by high stages on the Mississippi River. Missouri Highway WW will be raised to pass over the steel discharge pipes. The St. Johns Bayou Pumping Station, or Item 5, will be constructed using two contracts in like manner to the New Madrid Station. The New Madrid Pumping Station was used as a cost model for the St. Johns Pumping Station estimate because of the detailed quantities and costs computed for the Feature Design Memorandums. The St. Johns Pumping Station has not had a Feature Design Memorandum prepared for it. The New Madrid and St. Johns Pumping Stations project costs account for about 43 and 36 percent respectively of the entire project cost.

2. Construction Contract Costs

a. Item 2, New Madrid Pump Station

There are four elements where over 94% of the construction costs for the New Madrid Pumping Station are concentrated; sitework, concrete, mechanical and electrical. A detailed cost estimate for the New Madrid Pump Station was developed for the 1989 Feature Design Memorandum. This estimate was updated and put into the required MCACES format for this report.

1. Site work. An earthwork construction plan used for the FDM cost estimate was followed in determining the sitework costs. The site drawings from FDM No. 202, Plate II-9, included a layout for the cofferdam and diversion channel. Any missing earthwork quantities were computed from the dimensions shown on the various plates within the FDM. Material from the diversion channel and structural excavation were used to construct the cofferdam and closure levee embankment. The diversion channel is to be completely refilled and restored after the station construction. The closure levee costs were broken out separately since it will be constructed under a different funding authority. A considerable portion of the backfill for the station will be washed sand hauled in by truck from local suppliers. Excavation costs generally include turning and dumping of material from the draglines or hydraulic excavators onto the right-of-way or into trucks. Any rehandle by the excavators is also included in the excavation costs. Embankment costs include the haul plus any compaction requirements. Most of the haul distances for earthen embankment ranged from 500 to 1000 feet. Cycle times and production was determined from programs developed in the Memphis District. Off road trucks and scrapers were the primary movers. Riprap protection will be brought in by barge (the St. Johns Bayou channel is about a +2.0 LWRP) and placed directly (about 40%) or stockpiled and rehandled near the St. Johns Bayou Outlet structure. An analysis was made to determine the most economical method for bringing in the stone either by barge or truck. It was found that stages are +20.0 LWRP or above at the site about 80% of the time over a five month period. The vibroflotation densification cost for the foundation areas was based upon a quote obtained from a subcontractor for the 1989 FDM and indexed to the present date. The dewatering cost is based also upon a quote from a dewatering subcontractor and has been indexed from the 1989 FDM and compared with current pricing. The cost includes the cost of installing 17-16" wells to a wetted depth of 130 feet and removing them. An analysis was done for mean stages on the Mississippi River (which controls elevations at the construction site) and it was found that a mean year would require 7.6 wells to be operating over the estimated dewatering period of eight months. The cost includes installation, removal, equipment rental, labor, fuel and other operating costs.

2. Concrete. The concrete quantities were taken from the FDM for the various categories such as slabs, walls, footings, elevated slabs, columns, etc. The most economical quote for the redi-mix concrete was obtained from a supplier in Sikeston, Missouri. Five percent was added to the concrete material quote price for waste. Productivity rates for reinforced concrete categories were taken from Means Building Construction Cost Data, 53rd Annual Edition, 1995. Reinforcing steel quantities were estimated at an average of 120 LBS./CY. The resulting unit prices calculated were compared to historic bid prices in the Memphis District for comparable projects and were found to be reasonable.

3. Mechanical and Electrical. The mechanical and electrical pricing was obtained from manufacturers and suppliers for the FDM. These prices included installation and were indexed up to October 1996 prices and were entered into MCACES accordingly. They were also compared to historic pricing for reasonableness. The pricing for the main pumps, pump transmission gears, and main pump motors are not included with the main station contract but are included in the estimate as a separate contract.

b. Item 5, St. Johns Bayou Pump Station

There are four elements where 94% of the construction costs for the St. Johns Bayou Pump Station are concentrated; sitework, concrete, mechanical and electrical. This is almost identical to the New Madrid Pump Station and also points out the similarities of the two stations and their costs. The estimate for the St. Johns station was modeled after the New Madrid estimate. The quantities for the station were taken from the above referenced 1987 GDM. Where insufficient design data and quantities were available the New Madrid Station quantities were proportioned. Whenever possible the New Madrid MCACES cost estimate was used with the appropriate adjustments in quantities, haul distances, etc. to insure consistent estimates. Where the GDM quantities or costs for the St. Johns Pumping Station did not look reasonable or proportionate the designers were consulted and computations made to arrive at the best cost solution.

1. Site work. An earthwork construction plan was formulated from the GDM and used in determining the sitework costs. The site drawing from Volume 2 of GDM No. 101, Plate VI-39, shows the excavation plan and layout for the cofferdam. The material for the cofferdam embankment will be obtained from the station structural excavation and from a borrow pit. The one way haul distance from the pit to the cofferdam is about 630 linear feet. After the cofferdam is no longer needed, part of it will be carried back to the pit, and the other parts will be used in the inlet channel embankment item and the random backfill around the station. The material to build the training dikes on the inlet channel will be placed directly from the outlet and inlet channel excavation by dragline. The remainder of the required material will be obtained from the cofferdam as it is removed. The one way haul distance for this operation is about 500 linear feet. Pervious washed embankment will be trucked in from Dexter, MO, similar to the New Madrid station.

Dewatering is the largest construction cost item in the sitework division. A quote used in the New Madrid pumping station cost estimate was adjusted to reflect a shorter construction time for this smaller station and the use of 15-16" wells as opposed to 17. All other factors were considered to be similar.

Vibroflotation densification costs were computed by adjusting the New Madrid Station subcontractor quote. An adjustment was made proportionate to the square feet of area to be densified. It was assumed the entire pumping station and area under the outlet pipes would be densified.

Prices for riprap and bedding material that goes under the riprap were based on a quote assuming it would be barged in on the Mississippi River and off-loaded at a site near the pumping station as described in the New Madrid Pumping Station description. This process would be more economical than trying to truck the rock in from the nearest quarry. Riprap is

used in the inlet and outlet ditches.

Relief wells are to be installed in the inlet channel of the St. John Pumping Station. The cost for these wells was escalated from the 1987 GDM costs to Oct 96 price.

2. Concrete. The total quantity of concrete was taken from the cost table in the original GDM. All other specifics are similar to the New Madrid Station. The concrete quantities and costs for both pumping stations are concentrated in the walls and slabs .

3. Metals. The bulk of the weight and costs in this CSI Division come from the steel galvanized trash rack to be installed in the intake structure. Cost for the rack was based on unit price historical data and includes installation. The pricing for the St. Johns station overhead crane beams was proportioned from the New Madrid Station using the physical dimensions of the two buildings.

4. Mechanical. Costs for the items in this division were based on the GDM costs and indexed to current levels. The cost in this division is more than the New Madrid Station because of the addition of three 72" discharge pipes about 520 feet long. This is the most expensive item in this division.

Two other large items in this division are the roller gates and the trash rake. The rake is used to clean the trash rack that is listed in the metals division. The main pumps and transmission gears are included in the equipment contract as mentioned in the general paragraph of this section.

5. Electrical. Costs for the items in this division were based on historical data and manufacturer's quotes, and includes installation. The main pump motors are included in the equipment contract.

6. Miscellaneous Divisions. The "Finishes Division" consists of painting the station, inside and out, and some of the machinery inside it. The square feet was based on a percentage of the New Madrid Pumping Station square feet. A unit cost was taken from the New Madrid Pumping Station estimate. The same is true of the Masonry Division.

The "Thermal/Moisture Protection Division" consists of the station roofing, insulation, and caulking. The roofing square feet was taken from the GDM cost estimate; the price was based on a quote. Insulation square feet was based on a percentage of the New Madrid Pumping Station square feet; the price was based on a quote.

D. *Risk and Contingencies.*

An analysis of the "2nd View Summary" MCACES report shows that the channel improvement project costs account for about 21 percent of the project total with the two pumping stations accounting for the remaining 79 percent. Out of the 79 percent, 78 percent of the project costs are assigned to construction/supply contracts. Therefore, the project cost risk weighs heavily with the construction contracts.

As the pervious discussion on the pumping stations indicated, 94% of their construction costs

lie in the sitework, concrete, and mechanical/electrical classifications. Whenever sitework is considered wet conditions are always important. In the case of the pumping stations the construction time table will be critical. The areas where the stations are to be built are low and subject to inundation. If the weather or hydrologic conditions follow an extreme cycle, construction would be delayed to the point where the concrete construction would be forced into winter or the high water season. This would impose additional costs for heating the concrete, the addition of additives, and the operation of dewatering wells. An advantageous contract advertisement (November of the previous year through February of the next year) should help minimize this construction risk and help ensure a successful bid opening for the main pumping station contracts. It should be noted that the dewatering costs are a significant risk due to the uncertainity in the number of wells required to operate and their operation time. The operating cost per month for dewatering with seven to eight wells operating is about $240,000. A month at a maximum capacity of 17 wells operating is estimated to cost $433,000. An extremely wet construction year due to a combination of local rainfall or stream/river stages could result in signifcant cost overruns. This perceived risk may or may not adversely affect the bidding process. The contract documents should show adequate historic river and stream stage information so the bidders can accurately assess their construction risk. The 25 year frequency protection level of the cofferdams also leaves a margin of risk to the cost either through the bidding if the contractor must bear a breaching cost, or the Government and locals if a contract modification must pay for the potential damage.

The contracts for the supply of the pumps, motors and gearboxes must also be advertised for bids at the proper time to insure their delivery will not hinder the construction of the stations. A scheduling delay in these contracts or an error in the manufacture or design of the machinery could lead to cost impact claims by the contractor responsible for the main pumping station construction. The costs computed in this estimate do not reflect any such construction problems or abnormal delays and the contingency would be expected to cover this construction "impact". This risk could be minimized by closing out the machinery contracts before the main station construction contract is advertised.

The quantities and the design for the New Madrid Pumping Station are considered fairly accurate and therefore warrant the 15% contingency for the contract cost. The quantities for the St. John's station are based on less detailed design but the process of using the New Madrid Station as a cost and a limited quantity model should mediate that risk. The flood control channel quantities are based upon cross sections taken about every mile and they are considered to be lacking. However, bid prices in recent years for channel projects have been low probably because of their scarcity and the resulting lack of demand for large used draglines. The costs assessed for these draglines by contractors are considerably lower than those standardized costs required by Corps regulation to be used in government estimates. This normally causes the government estimates to be on the high side. This being the case a 15% contingency would seem to be adequate.

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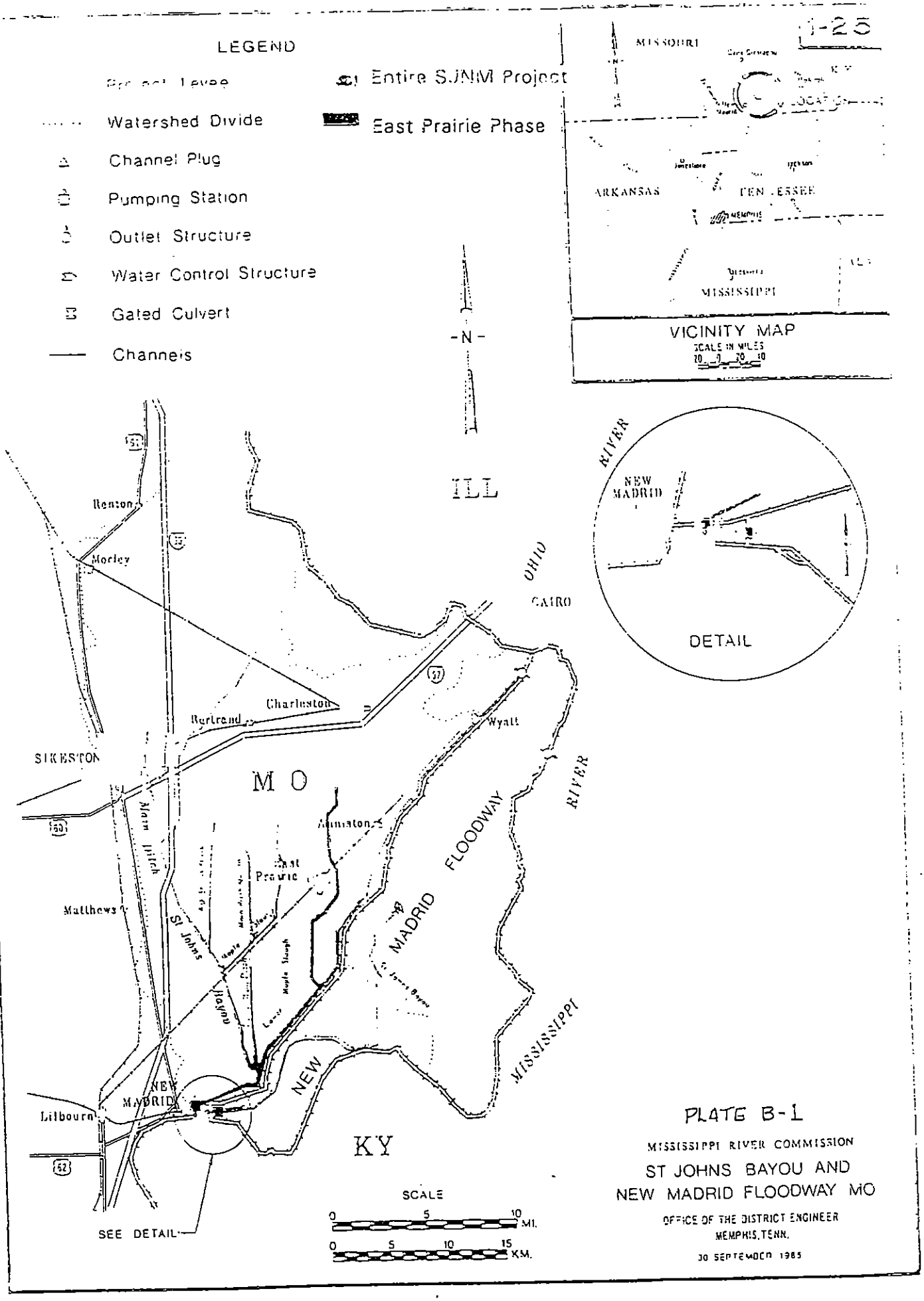

PLATE B-1

MISSISSIPPI RIVER COMMISSION

ST JOHNS BAYOU AND NEW MADRID FLOODWAY MO

OFFICE OF THE DISTRICT ENGINEER
MEMPHIS, TENN.

30 SEPTEMBER 1985

EAST PRAIRIE PHASE LRR
INCLUDING ST JOHNS & NEW MADRID
PUMPING STATIONS, AND ASSOCIATED
CHANNEL WORK, MISSISSIPPI CO &
NEW MADRID CO, MO.

Designed By: MEMPHIS DISTRICT COE
Estimated By: CHECKED BY:

Prepared By: JERRY R. WELCH
RICHARD HURST, SKIPS/ST JAMES DI

Preparation Date: 01/28/97
Effective Date of Pricing: 10/31/96

Sales Tax: 0.00%

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contained herein is For Official Use Only.

This Project is the reassessment of the St. John's New Madrid Study for specific portions of GDM 101. The costs for the Feature Design Memorandum for New Madrid Pumping Station dated Sept 1989 are also being redone in MCACES. Price levels are Oct 1996.

SUMMARY REPORTS

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No Backup Reports...

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8

** CONTRACTOR SETTINGS **

		AMOUNT	PCT	PCT S	RISK	DIFF	SIZE	PERIOD	INVES?	ASSIST	SUBCON
AA PRIME CONTR WORK EXCLUSIVELY											
FIELD OH, PRIME	P		10.00								
HOME OFF OH, PRIME	P		5.00								
PROFIT, PRIME	S		8.00	0.00							
BOND, PRIME	P		1.00								
AC PRIME CONTR, CHANNEL WORK											
FIELD OH, PRIME	P		6.00								
HOME OFF OH, PRIME	P		4.00								
PROFIT, PRIME	S		8.00	0.00							
BOND, PRIME	P		1.00								
AB PRIME CONTR ADD FOR EST SUB WORK											
FIELD OH, PRIME	P		1.00								
HOME OFF OH, PRIME	P		6.00								
PROFIT, PRIME	P		7.00								
BOND, PRIME	P		1.00								
MI MISC SUBCONTR OH & PROFIT											
FIELD OH, PRIME	P		10.00								
HOME OFF OH, PRIME	P		5.00								
PROFIT, PRIME	P		8.00								
BOND, PRIME	P		0.00								
AF PRIME CON ADD FOR PURCH/SUB QUOT											
FIELD OH, PRIME	P		1.00								
HOME OFF OH, PRIME	P		6.00								
PROFIT, PRIME	P		7.00								
BOND, PRIME	P		1.00								
00 DUMMY - NO ADD ON											
FIELD OH, PRIME	P		0.00								
HOME OFF OH, PRIME	P		0.00								
PROFIT, PRIME	P		0.00								
BOND, PRIME	P		0.00								

** PROJECT OWNER SUMMARY - Contract **

		QUANTITY	UOM	CONTRACT	CONTINGN	ESCALATN	TOTAL COST	UNIT COST
10	ITEM 1, VAR CHR BPLD MI 5.1 12.4	4.30	MI	294,051	44,108	0	338,159	78641.46
20	ITEM 2, NEW MADRID FLWY PUMP STA	1.00	JB	18,600,378	2,800,210	0	21,400,587	21400587
30	ITEM 3, CHAN IMPROV ST JOHNS BAY	3.00	MI	2,497,990	324,255	0	2,822,24	940748.40
40	ITEM 4, CHAN IMPROV SJB & BPLD	9.60	MI	2,686,556	357,463	0	3,044,01	317085.34
50	ITEM 5, ST. JOHNS BAYOU PUMP STA	1.00	JB	15,628,510	2,299,727	0	17,928,25	17928258
60	ITEM 6, CHAN IMPROV ST JAMES DIT	10.00	MI	3,648,226	547,234	0	4,195,46	388468.55
	TOTAL EAST PRAIRIE PHASE LRR	1.00	EA	43,355,731	6,372,997	0	49,728,72	49728728

** PROJECT OWNER SUMMARY Element **

	QUANTITY	UOM	CONTRACT	CONTINGN	ESCALATN	TOTAL COS	UNIT COST
10 ITEM 1, VEG CLR BPLD MI 8.1-12.4							
10/ 10 01 LANDS AND DAMAGES							
10/ 10. 1 LANDS AND DAMAGES	1.00	JB	188,696	28,304	0	217,00	217000.40
TOTAL 01 LANDS AND DAMAGES	1.00	JB	188,696	28,304	0	217,00	217000.40
10/ 20 02 RELOCATIONS							
10/ 20. 1 RELOCATIONS	1.00	JB	6,950	1,043	0	7,993	7992.50
TOTAL 02 RELOCATIONS	1.00	JB	6,950	1,043	0	7,993	7992.50
10/ 30 09 VEG CLEAR ST JOHNS BAYOU							
10/ 30. 10 09 VEG CLR BPLD MI 8.10 12.4							
10/ 30. 10. 10 CLEARING	227.04	ST	43,727	6,559	0	50,28	221.4
10/ 30. 10. 30 ENVIRONMENTAL PROTECTION	22704.00	LF	12,978	1,947	0	14,9	0.6
TOTAL 09 VEG CLR BPLD MI 8.10-12.4	4.30	MI	56,705	8,506	0	65,21	15165.21
TOTAL 09 VEG CLEAR ST JOHNS BAYOU	4.30	MI	56,705	8,506	0	65,21	15165.21
10/ 40 30 PLANNING, ENGINEERING & DES							
10/ 40. 1 PLANNING, ENGINEERING & DESIGN	1.00	JB	23,500	3,525	0	27,02	27025.00
TOTAL 30 PLANNING, ENGINEERING & DES	1.00	JB	23,500	3,525	0	27,02	27025.00
10/ 50 31 SUPERVISION & ADMINISTRATION							
10/ 50. 1 SUPERVISION & ADMINISTRATION	1.00	JB	18,200	2,730	0	20,93	20930.00
TOTAL 31 SUPERVISION & ADMINISTRATION	1.00	JB	18,200	2,730	0	20,93	20930.00
TOTAL ITEM 1, VEG CLR BPLD MI 8.1 12.4	4.30	MI	294,051	44,108	0	338,15	78641.46
20 ITEM 2, NEW MADRID FLWY PUMP STA							
20/ 10 01 LANDS AND DAMAGES							
20/ 10. 1 LANDS AND DAMAGES	1.00	JB	235,652	35,348	0	271,000	270999.80

** PROJECT OWNER SUMMARY - Element **

	QUANTITY	UOM	CONTRACT	CONTINGN	ESCALATN	TOTAL	UNIT COST
TOTAL 01 LANDS AND DAMAGES	1.00	JB	235,652	35,348	0	271,0	270999.00
20/ 20 02 RELOCATIONS							
20/ 20. 1 RELOCATIONS							
20/ 25 13 NEW MADRID PU STA MECH EQ PUR							
20/ 25. 10 MAIN PUMPS	3.00	EA	965,811	144,875	0	1,110,706	370235.66
20/ 25. 20 MAIN PUMP TRANSMISSION GEARS	3.00	EA	624,147	93,622	0	717,769	239256.41
20/ 25. 30 MAIN PUMP MOTORS	3.00	EA	201,703	30,255	0	231,958	77319.12
TOTAL 13 NEW MADRID PU STA MECH EQ PUR	1.00	JB	1,791,681	268,752	0	2,060,4..	2060433
20/ 30 13 NEW MADRID FLWY PUMP STATION							
20/ 30. 10 GENERAL CONDITIONS							
20/ 30. 10. 10 MOBILIZATION/DEMOBILIZATION	1.00	EA	30,552	4,583	0	35,1..	35134.45
20/ 30. 10. 20 CONCRETE LAB TESTING	1.00	EA	3,150	472	0	3,6..	3622.14
20/ 30. 10. 30 SOIL COMPACTION TESTING	1.00	EA	1,890	283	0	2,1..	2173.20
TOTAL GENERAL CONDITIONS	1.00	JB	35,591	5,339	0	40,9	40929.87
20/ 30. 20 SITEWORK							
20/ 30. 20. 10 EMBANKMENT, LEVEE CLOSURE	231000.00	BCY	614,950	92,244	0	707,2..	3.01
20/ 30. 20. 15 TURFING, LEVEE CLOSURE	10.00	AC	11,339	1,701	0	13,0..	1303.97
20/ 30. 20. 20 TURFING, GENERAL	40.00	AC	35,276	5,291	0	40,5..	1014.20
20/ 30. 20. 30 CLEARING	50.00	AC	65,727	9,859	0	75,5..	1511.71
20/ 30. 20. 40 EXCAVATION, DIVERSION CHANNEL	253000.00	BCY	302,811	45,422	0	348,2..	1.38
20/ 30. 20. 50 EMBANKMENT, DIVERSION CHAN REFIL	184000.00	BCY	422,910	63,436	0	486,3..	2.64
20/ 30. 20. 60 EMBANKMENT, COFFERDAM	172000.00	BCY	341,105	51,166	0	392,2..	2.28
20/ 30. 20. 70 DEWATERING	1.00	LS	2,221,435	333,215	0	2,554,6..	2554650
20/ 30. 20. 80 EXCAVATION, CHANNEL TRANSITION	120000.00	BCY	71,813	10,772	0	82,59	0.69
20/ 30. 20. 90 EXCAVATION, STRUCTURAL ROUGH	47000.00	BCY	98,550	19,710	0	118,26	2.52
20/ 30. 20.100 EXCAVATION, STRUCTURAL FINISH	4000.00	BCY	40,274	6,041	0	46,31	11.58
20/ 30. 20.110 AGGREGATE SURFACING	1945.00	CCY	34,003	6,817	0	40,89	21.03
20/ 30. 20.115 FILTER FABRIC	7300.00	SY	23,350	3,503	0	26,85	3.68
20/ 30. 20.120 RIPRAP	9000.00	TN	120,501	18,075	0	138,57	15.40
20/ 30. 20.130 EMBANKMENT, PERVIOUS WASHED	61500.00	TN	870,543	130,581	0	1,001,12	16.28
20/ 30. 20.135 EMBANKMENT, IMPERVIOUS	9800.00	CY	79,589	11,938	0	91,52	9.34
20/ 30. 20.140 EMBANKMENT, RANDOM	22500.00	CY	55,039	8,256	0	63,29	2.81
20/ 30. 20.145 PILING; SHEET PSA 23	2020.00	SF	37,921	5,688	0	43,60	21.59
20/ 30. 20.150 VIBROFLOTATION DENSIFICATION	1.00	LS	347,099	52,065	0	399,16	399164.11
TOTAL SITEWORK	1.00	JB	5,794,323	875,780	0	6,670,10	6670103

** PROJECT OWNER SUMMARY - Element **

		QUANTITY	UOM	CONTRACT	CONTINGN	ESCALATN	TOTAL CO	UNIT COST
20/ 30. 30	CONCRETE							
20/ 30. 30. 10	SLAB ON GRADE	4085.00	CY	961,671	144,251	0	1,105,9	270.7
20/ 30. 30. 20	WALLS	6560.00	CY	2,590,438	388,566	0	2,979,0	454.1
20/ 30. 30. 30	FOOTINGS	10.00	CY	2,304	346	0	2,6	264.91
20/ 30. 30. 40	RETAINING WALLS	1280.00	CY	431,507	64,726	0	496,2	387.68
20/ 30. 30. 50	ELEVATED SLAB	2381.00	CY	787,599	118,140	0	905,7	380.40
20/ 30. 30. 60	STAIRS	18.00	CY	12,331	1,850	0	14,1	787.80
20/ 30. 30. 70	BEAMS	155.00	CY	103,807	15,571	0	119,3	770.18
20/ 30. 30. 80	COLUMNS	115.00	CY	53,994	8,099	0	62,0	539.94
20/ 30. 30. 90	PRESTRESSED WALKWAY SLAB	14.00	CY	18,130	2,719	0	20,8	1489.21
20/ 30. 30.100	WATERSTOP	2150.00	LF	22,014	3,302	0	25,3	11.77
20/ 30. 30.110	WALL DRAINS	900.00	LF	23,484	3,523	0	27,00	30.01
	TOTAL CONCRETE	14632.00	CY	5,007,279	751,092	0	5,758,3	393.55
20/ 30. 40	MASONRY	17410.00	SF	115,919	17,388	0	133,3	7.65
20/ 30. 50	METALS	1.00	JB	459,993	68,999	0	528,9	528991.72
20/ 30. 60	WOOD/PLASTICS	1.00	JB	33,239	4,986	0	38,22	38224.56
20/ 30. 70	THERMAL/MOISTURE PROTECTION							
20/ 30. 70. 10	ROOFING, 4 PLY	5376.00	SF	24,880	3,732	0	28,61	5.32
20/ 30. 70. 20	INSULATION, 1"	14026.00	SF	20,285	3,043	0	23,32	1.66
20/ 30. 70. 30	SEALANTS	1.00	JB	9,460	1,419	0	10,87	10878.95
	TOTAL THERMAL/MOISTURE PROTECTION	1.00	LS	54,625	8,194	0	62,81	62818.85
20/ 30. 80	DOORS/WINDOWS/GLASS	1.00	JB	11,079	1,662	0	12,74	12741.18
20/ 30. 90	FINISHES	26000.00	SF	70,427	14,085	0	84,51	3.25
20/ 30.100	SPECIALTIES	1.00	JB	1,752	263	0	2,01	2014.55
20/ 30.110	EQUIPMENT (not used)							
20/ 30.120	FURNISHINGS							
20/ 30.120. 10	BATH CABINET/COUNTERTOP	1.00	EA	1,096	164	0	1,26	1260.26
	TOTAL FURNISHINGS	1.00	JB	1,096	164	0	1,26	1260.26
20/ 30.150	MECHANICAL							
20/ 30.150. 10	STATION CRANE	1.00	JB	113,901	17,085	0	130,98	130985.70
20/ 30.150. 30	ROLLER GATES	3.00	EA	309,956	46,493	0	356,45	118816.52
20/ 30.150. 40	SUMP DEWATERING SYSTEM	1.00	JB	79,693	11,954	0	91,64	91646.75
20/ 30.150. 50	WATER SUPPLY & PLUMBING SYSTEM	1.00	JB	78,752	11,813	0	90,56	90565.01
20/ 30.150. 60	HEATING AND VENTILATION	1.00	JB	51,718	7,758	0	59,47	59475.45
20/ 30.150. 70	FLAP GATES, DISCHARGE	3.00	EA	40,906	6,136	0	47,04	15680.50
20/ 30.150. 80	SLUICE GATES WITH OPERATOR	6.00	EA	452,062	67,809	0	519,87	86645.22

** PROJECT ORDER SUMMARY Element **

	QUANTITY	UOM	CONTRACT	CONTIGN	ESCALATN	TOTAL COST	UR COST
20/ 30.150. 90 TRASH RAKES	1.00	EA	251,889	38,083	0	291,973	9 24.19
TOTAL MECHANICAL	1.00	JB	1,300,876	207,131	0	1,508,008	1 28008
20/ 30.160 ELECTRICAL							
20/ 30.160. 10 TRANSFORMERS	1.00	JB	3,380	507	0	3,887	3 86.53
20/ 30.160. 20 MOTOR CONTROL CENTER	1.00	JB	43,214	6,482	0	49,696	49 95.93
20/ 30.160. 30 SWITCHGEAR AND BUSWORK	1.00	JB	183,658	27,549	0	211,207	211 07.04
20/ 30.160. 40 DISCONNECTORS METERS	1.00	JB	126,219	18,936	0	145,175	145 74.66
20/ 30.160. 50 LIGHTING AND GROUNDING	1.00	JB	69,937	10,491	0	80,428	80 27.58
20/ 30.160. 60 SUBSTATION & TRANSMISSION LINE	1.00	JB	630,419	94,563	0	724,982	724 1.81
TOTAL ELECTRICAL	1.00	JB	1,056,847	158,527	0	1,215,374	1 15374
TOTAL 13 NEW MADRID PUMP STATION	1.00	JB	14,023,044	2,113,610	0	16,136,654	16 36654
20/ 40 10 PLANNING, ENGINEERING & DES							
20/ 40 1 10 PLANNING, ENGINEERING & DES	1.00	JB	1,400,000	210,000	0	1,610,000	1610000
TOTAL 10 PLANNING, ENGINEERING & DES	1.00	JB	1,400,000	210,000	0	1,610,000	16 0000
20/ 50 11 SUPERVISION & ADMINISTRATION							
20/ 50. 1 SUPERVISION & ADMINISTRATION	1.00	JB	1,150,000	172,500	0	1,322,500	1 500
TOTAL 11 SUPERVISION & ADMINISTRATION	1.00	JB	1,150,000	172,500	0	1,322,500	1 2500
TOTAL ITEM 2, NEW MADRID PUMP STA	1.00	JB	18,600,378	2,800,210	0	21,400,587	21 00587
30 ITEM 1, CHAN IMPROV ST JOHNS BAY							
30/ 10 01 LANDS AND DAMAGES							
30/ 10. 1 LANDS AND DAMAGES	1.00	JB	334,590	50,189	0	384,779	384 9.50
30/ 10. 2 MITIGATION	1.00	JB	88,019	13,203	0	101,222	101 21.85
TOTAL 01 LANDS AND DAMAGES	1.00	JB	422,609	63,391	0	486,000	4860 3.35
30/ 20 02 RELOCATIONS							
30/ 20. 1 RELOCATIONS							
30/ 30 09 CHAN IMPRV CONTR ST JOHNS BY							
30/ 30. 10 MOBILIZATION AND DEMOBILIZATION	1.00	JB	44,982	6,747	0	51,730	517 1.76

** PROJECT OWNER SUMMARY - Element **

	QUANTITY	UOM	CONTRACT	CONTINGN	ESCALATN	TOTAL C	UNIT CO
30/ 30. 20 CLEARING	316.80	STA	58,435	8,765	0	67,	212.
30/ 30. 30 EXCAVATION	1400000	BCY	1,008,865	100,887	0	1,109,	0.
30/ 30. 40 FINISH DRESS, FERT, SEED, & MULC	5.00	AC	5,411	812	0	6,	1244.
30/ 30. 50 ROUGH DRESS, FERT, & SEEDING	122.00	AC	29,341	4,401	0	33,	276.
30/ 30. 60 CORRUGATED METAL PIPE, 24 INCH	200.00	LF	5,236	785	0	6,	30.11
30/ 30. 70 FLARED END SECTION, 24 INCH	10.00	EA	496	74	0		56.99
30/ 30. 80 RIPRAP	100.00	TN	1,692	254	0	1,945	19.45
30/ 30.100 FILTER MATERIAL	55.00	TN	930	140	0	1,070	19.45
30/ 30.110 ENVIRONMENTAL PROTECTION	31600.00	LF	539,992	80,999	0	620,9	19.69
TOTAL 09 CHAN IMPRV CONTR ST JOHNS BY	3.00	MI	1,695,381	203,864	0	1,899,2	633081.62
30/ 40 30 PLANNING, ENGINEERING & DES							
30/ 40. 1 PLANNING, ENGINEERING & DESIGN	1.00	JB	210,000	31,500	0	241,5	241500.00
TOTAL 30 PLANNING, ENGINEERING & DES	1.00	JB	210,000	31,500	0	241,5	241500.00
30/ 50 31 SUPERVISION & ADMINISTRATION							
30/ 50. 1 SUPERVISION & ADMINISTRATION	1.00	JB	170,000	25,500	0	195,5	195500.00
TOTAL 31 SUPERVISION & ADMINISTRATION	1.00	JB	170,000	25,500	0	195,500	195500.00
TOTAL ITEM 1, CHAN IMPROV ST JOHNS BAY	3.00	MI	2,497,990	324,255	0	2,822,245	940748.40
40 ITEM 4, CHAN IMPROV SJB & BPLD							
40/ 10 01 LANDS AND DAMAGES							
40/ 10. 1 01 LANDS & DAM ST JOHNS MI 3-4.5	1.00	JB	158,044	23,027	0	182,6	182670.60
40/ 10. 2 01 LANDS & DAM BPHMLD 0-8.1	1.00	JB	266,456	39,968	0	306,4	306424.40
40/ 10. 3 01 MITIGATION ST JOHNS MI 3-4.5	1.00	JB	41,700	6,255	0	47,9	47955.00
40/ 10. 4 01 MITIGATION BPHMLD 0-8.1	1.00	JB	53,000	7,950	0	60,9	60950.00
TOTAL 01 LANDS AND DAMAGES	1.00	JB	520,000	78,000	0	598,0	598000.00
40/ 20 02 RELOCATIONS							
40/ 20. 1 02 RELOC ST JOHNS BAY 3.0-4.5	1.00	JB	562,300	84,345	0	646,6	646645.00
40/ 20. 2 02 RELOC BIRD PT NMLD 0-8.1	1.00	JB	48,850	7,328	0	56,17	56177.50
TOTAL 02 RELOCATIONS	1.00	JB	611,150	91,673	0	702,82	702822.50
40/ 30 09 CHAN IMPRV CONTR SJB & BPLD							

** PROJECT OWNER SUMMARY - Element **

	QUANTITY	UOM	CONTRACT	CONTINGN	ESCALATN	TOTAL COST	UNIT COST
40/ 30. 10 09 CHAN IMPR CTR SJB MI 3.0-4.5							
40/ 30. 10. 10 MOBILIZATION AND DEMOBILIZATION	1.00	JB	47,506	7,138	0	54,724	54723.68
40/ 30. 10. 20 CLEARING	158.40	STA	29,217	4,383	0	33,600	212.12
40/ 30. 10. 30 EXCAVATION	700000.00	BCY	504,433	50,443	0	554,876	0.79
40/ 30. 10. 40 FINISH DRESS, FERT, SEED, & MULC	3.00	AC	3,247	487	0	3,734	1244.59
40/ 30. 10. 50 ROUGH DRESS, FERT, & SEEDING	60.00	AC	14,430	2,164	0	16,594	276.57
40/ 30. 10. 60 CORRUGATED METAL PIPE, 24-INCH	100.00	LF	2,618	393	0	3,011	30.11
40/ 30. 10. 70 FLARED END SECTION, 24-INCH	6.00	EA	846	127	0	97[illegible]	162.09
40/ 30. 10. 80 RIPRAP	50.00	TN	846	127	0	97[illegible]	19.45
40/ 30. 10. 90 RIPRAP, BRIDGE PROTECTION	3210.00	TN	45,856	6,878	0	52,73[illegible]	16.43
40/ 30. 10.100 FILTER MATERIAL	27.00	TN	457	69	0	52[illegible]	19.45
40/ 30. 10.105 FILTER MATERIAL, BRIDGE PROT	1075.00	TN	15,357	2,304	0	17,66[illegible]	16.43
40/ 30. 10.110 ENVIRONMENTAL PROTECTION	15840.00	LF	52,584	7,888	0	60,47[illegible]	3.82
TOTAL 09 CHAN IMPR CTR SJB MI 3.0-4.5	1.50	MI	717,477	82,400	0	799,87[illegible]	533251.00
40/ 30. 15 09 CHAN IMPR CTR BPLD 0.0 8 1							
40/ 30. 15. 20 CLEARING	427.68	STA	78,887	11,833	0	90,72[illegible]	212.12
40/ 30. 15. 30 EXCAVATION	630000.00	BCY	405,973	40,597	0	446,571	0.71
40/ 30. 15. 40 FINISH DRESS, FERT, SEED, & MULC	10.00	AC	10,822	1,623	0	12,44[illegible]	1244.59
40/ 30. 15. 50 ROUGH DRESS, FERT, & SEEDING	160.00	AC	38,480	5,772	0	44,25[illegible]	276.57
40/ 30. 15. 60 CORRUGATED METAL PIPE, 24 INCH	100.00	LF	2,618	393	0	3,01[illegible]	30.11
40/ 30. 15. 70 FLARED END SECTION, 24 INCH	10.00	EA	496	74	0	57[illegible]	56.99
40/ 30. 15. 80 RIPRAP	50.00	TN	846	127	0	97	19.45
40/ 30. 15. 90 RIPRAP, BRIDGE PROTECTION	1260.00	TN	19,704	2,956	0	22,65[illegible]	17.98
40/ 30. 15.100 FILTER MATERIAL	27.00	TN	457	69	0	52[illegible]	19.45
40/ 30. 15.105 FILTER MATERIAL, BRIDGE PROT	550.00	TN	8,601	1,290	0	9,89[illegible]	17.98
40/ 30. 15.110 ENVIRONMENTAL PROTECTION	42768.00	LF	62,746	9,412	0	72,15[illegible]	1.69
TOTAL 09 CHAN IMPR CTR BPLD 0.0-8.1	8.10	MI	629,630	74,146	0	703,77[illegible]	86885.84
TOTAL 09 CHAN IMPRV CONTR SJB & BPLD	9.60	MI	1,347,106	156,546	0	1,503,65[illegible]	156630.19
40/ 40 30 PLANNING, ENGINEERING & DES							
40/ 40. 1 30 PED JOHNS BAY 3.0 4.5	1.00	JB	72,000	10,800	0	82,80[illegible]	82800.00
40/ 40. 2 30 PED BIRD PT NMLD 0-8.1	1.00	JB	44,500	6,675	0	51,17[illegible]	51175.00
TOTAL 30 PLANNING, ENGINEERING & DES	1.00	JB	116,500	17,475	0	133,97[illegible]	133975.00
40/ 50 31 SUPERVISION & ADMINISTRATION							
40/ 50. 1 31 PED JOHNS BAY 3.0 4.5	1.00	JB	56,345	8,452	0	64,79[illegible]	64796.75
40/ 50. 2 31 PED BPNMLD 0 8.1	1.00	JB	35,455	5,318	0	40,77[illegible]	40773.25

** PROJECT OWNER SUMMARY - Element **

	QUANTITY	UOM	CONTRACT	CONTINGN	ESCALATN	TOTAL COST	UNIT COST
TOTAL 31 SUPERVISION & ADMINISTRATION	1.00	JB	91,800	13,770	0	105,57[illegible]	105570.00
TOTAL ITEM 4, CHAN IMPROV SJB & BPLD	9.60	MI	2,686,556	357,463	0	3,044,01[illegible]	317085.34
50 ITEM 5, ST. JOHNS BAYOU PUMP STA							
50/ 10 01 LANDS AND DAMAGES							
50/ 10. 1 LANDS AND DAMAGES	1.00	JB	371,304	55,696	0	427,00	426999.60
TOTAL 01 LANDS AND DAMAGES	1.00	JB	371,304	55,696	0	427,00	426999.60
50/ 20 02 RELOCATIONS							
50/ 20. 1 RELOCATIONS, HWY WW	1.00	JB	108,300	16,245	0	124,54	124545.00
TOTAL 02 RELOCATIONS	1.00	JB	108,300	16,245	0	124,54	124545.00
50/ 25 13 ST JOHNS PU STA MECH EQ PUR							
50/ 25. 10 MAIN PUMPS	3.00	EA	825,655	123,848	0	949,50[illegible]	316501.21
50/ 25. 20 MAIN PUMP TRANSMISSION GEARS	3.00	EA	353,854	53,078	0	406,93	135643.95
50/ 25. 30 MAIN PUMP MOTORS	3.00	EA	179,999	27,000	0	206,99	68999.51
TOTAL 13 ST JOHNS PU STA MECH EQ PUR	1.00	JB	1,359,508	203,926	0	1,563,43[illegible]	1563431
50/ 30 13 ST JOHNS PUMP STATION							
50/ 30. 10 GENERAL CONDITIONS							
50/ 30. 10. 10 MOBILIZATION/DEMOBILIZATION	1.00	EA	30,552	4,583	0	35,134	35134.45
50/ 30. 10. 20 CONCRETE LAB TESTING	1.00	EA	3,150	472	0	3,6[illegible]	3622.14
50/ 30. 10. 30 SOIL COMPACTION TESTING	1.00	EA	1,890	283	0	2,17	2173.28
TOTAL GENERAL CONDITIONS	1.00	EA	35,591	5,339	0	40,93	40929.87
50/ 30. 20 SITEWORK							
50/ 30. 20. 5 CLEARING	32.00	AC	54,971	8,246	0	63,21	1975.53
50/ 30. 20. 10 EXCAVATION, STRUCTURAL ROUGH	20100.00	BCY	42,146	6,322	0	48,46[illegible]	2.41
50/ 30. 20. 15 EXCAVATION, STRUCTURAL FINISH	2000.00	BCY	20,137	3,021	0	23,15	11.58
50/ 30. 20. 30 EMBANKMENT, COFFERDAM	72300.00	ECY	205,857	0	0	205,85[illegible]	2.85
50/ 30. 20. 40 DEWATERING	1.00	JB	2,094,165	314,125	0	2,408,29	2408290
50/ 30. 20. 50 VIBROFLOTATION DENSIFICATION	1.00	EA	347,099	52,065	0	399,16[illegible]	399164.11
50/ 30. 20. 60 EMBANKMENT, PERVIOUS WASHED	114600.00	TN	1,573,119	235,968	0	1,809,08[illegible]	15.79
50/ 30. 20. 70 EMBANKMENT, RANDOM	20000.00	CY	48,923	0	0	48,923	2.45

** PROJECT OWNER SUMMARY - Element **

		QUANTITY	UOM	CONTRACT	CONTINGN	ESCALATN	TOTAL COST	UNIT COST
50/ 30. 20. 50	EMBANKMENT, IMPERVIOUS	8000.00	CY	64,971	9,746	0	74,71[illegible]	9.34
50/ 30. 20. 55	AGGREGATE SURFACING	640.00	CCY	11,215	1,682	0	12,8[illegible]	20.15
50/ 30. 20.100	EXCAVATION, INLET CHANNEL	3900.00	BCY	2,334	350	0	2,6[illegible]	0.69
50/ 30. 20.105	EXCAVATION, OUTLET CHANNEL	11600.00	BCY	31,871	4,781	0	36,6[illegible]	3.16
50/ 30. 20.107	EMBANKMENT, INLET CHANNEL	30000.00	BCY	42,234	0	0	42,2[illegible]	1.41
50/ 30. 20.115	FILTER FABRIC	12670.00	SY	40,516	6,077	0	46,5[illegible]	3.68
50/ 30. 20.125	PERVIOUS BEDDING MATERIAL	4250.00	TN	47,971	7,196	0	55,1[illegible]	16.98
50/ 30. 20.120	RIPRAP	11020.00	TN	198,140	29,721	0	227,8[illegible]	17.50
50/ 30. 20.130	RELIEF WELLS, INLET CHANNEL	6.00	EA	166,608	24,991	0	191,5[illegible]	31933.11
50/ 30. 20.140	PILING; SHEET PSA 23	1540.00	SF	28,910	4,336	0	33,2[illegible]	21.59
50/ 30. 20.144	PILING; CONC/PRECAST/PRESTR, 16"	150.00	LF	7,080	1,062	0	8,1[illegible]	54.28
50/ 30. 20.150	TURFING, LEVEE	7.00	AC	7,937	1,191	0	9,1[illegible]	1303.97
50/ 30. 20.160	TURFING, GENERAL	22.00	AC	19,402	2,910	0	22,31	1014.20
TOTAL SITEWORK		1.00	EA	5,055,609	713,789	0	5,769,39[illegible]	5769390
50/ 30. 30	CONCRETE							
50/ 30. 30. 10	FOOTINGS	10.00	CY	2,304	346	0	2,6[illegible]	264.94
50/ 30. 30. 20	SLAB ON GRADE	2232.00	CY	525,447	78,817	0	604,2[illegible]	270.71
50/ 30. 30. 30	WALLS	2248.00	CY	887,699	133,155	0	1,020,8[illegible]	454.12
50/ 30. 30. 40	ELEVATED SLAB	806.00	CY	266,613	39,992	0	306,60[illegible]	380.40
50/ 30. 30. 50	COLUMNS	100.00	CY	46,951	7,043	0	53,99	539.94
50/ 30. 30. 60	BEAMS	70.00	CY	46,881	7,032	0	53,91[illegible]	770.18
50/ 30. 30. 70	STAIRS	9.00	CY	6,165	925	0	7,09[illegible]	787.80
50/ 30. 30. 80	RETAINING WALLS	122.00	CY	41,128	6,169	0	47,29[illegible]	387.68
50/ 30. 30. 90	WATERSTOP	475.00	LF	4,704	706	0	5,4[illegible]	11.39
50/ 30. 30.100	WALL DRAINS	600.00	LF	43,682	6,552	0	50,23[illegible]	83.72
TOTAL CONCRETE		5600.00	CY	1,871,573	280,736	0	2,152,30[illegible]	384.34
50/ 30. 40	MASONRY	7300.00	SF	48,548	7,282	0	55,83[illegible]	7.65
50/ 30. 50	METALS	1.00	EA	404,281	60,642	0	464,92[illegible]	464923.35
50/ 30. 60	WOOD/PLASTICS (Not Used)							
50/ 30. 70	THERMAL/MOISTURE PROTECTION							
50/ 30. 70. 10	ROOFING, 4 PLY	4200.00	SF	19,438	2,916	0	22,353	5.32
50/ 30. 70. 20	INSULATION, 1"	10520.00	SF	15,215	2,282	0	17,497	1.66
50/ 30. 70. 30	SEALANTS, CAULKING	1.00	JB	7,095	1,064	0	8,159	8159.21
TOTAL THERMAL/MOISTURE PROTECTION		1.00	LS	41,747	6,262	0	48,00[illegible]	48009.10
50/ 30. 80	DOORS/WINDOWS/GLASS	1.00	EA	9,966	1,495	0	11,46[illegible]	11460.58
50/ 30. 85	FINISHES	19500.00	SF	52,820	7,923	0	60,74[illegible]	3.12
50/ 30.100	SPECIALTIES	1.00	JB	1,752	263	0	2,01[illegible]	2014.55
50/ 30.110	EQUIPMENT (Not Used)							

** PROJECT OWNER SUMMARY - Element **

	QUANTITY	UOM	CONTRACT	CONTINGN	ESCALATN	TOTAL COST	UNIT COST
50/ 30.120 FURNISHINGS							
50/ 30.120. 10 BATH CABINET/COUNTERTOP	1.00	EA	1,096	164	0	1,26	1260.26
TOTAL FURNISHINGS	1.00	LS	1,096	164	0	1,26	1260.26
50/ 30.150 MECHANICAL							
50/ 30.150. 10 STATION CRANE	1.00	JB	111,398	16,710	0	128,16	128107.41
50/ 30.150. 20 DISCHARGE PIPES	1.00	JB	965,886	144,883	0	1,110,76	1110769
50/ 30.150. 30 ROLLER GATES	3.00	EA	283,004	42,463	0	325,56	108515.42
50/ 30.150. 40 SUMP DEWATERING SYSTEM	1.00	JB	39,317	5,898	0	45,21	45214.65
50/ 30.150. 50 WATER SUPPLY & PLUMBING SYSTEM	1.00	JB	52,424	7,864	0	60,29	60287.09
50/ 30.150. 60 HEATING AND VENTILATION	1.00	JB	22,280	3,342	0	25,62	25622.34
50/ 30.150. 90 TRASH RAKES	3.00	EA	245,340	36,801	0	282,141	94047.06
TOTAL MECHANICAL	1.00	JB	1,719,728	257,959	0	1,977,688	1977688
50/ 30.160 ELECTRICAL							
50/ 30.160. 10 TRANSFORMERS	1.00	JB	3,380	507	0	3,887	3886.53
50/ 30.160. 20 MOTOR CONTROL CENTER	1.00	JB	43,214	6,482	0	49,69	49695.93
50/ 30.160. 30 SWITCHGEAR AND BUSWORK	1.00	JB	183,658	27,549	0	211,20	211207.04
50/ 30.160. 40 MISCELLANEOUS WIRING	1.00	JB	126,219	18,936	0	145,17	145174.66
50/ 30.160. 50 LIGHTING AND GROUNDING	1.00	JB	69,937	10,491	0	80,42	80427.58
50/ 30.160. 60 SUBSTATION & TRANSMISSION LINE	1.00	JB	420,279	63,042	0	483,32	483321.21
TOTAL ELECTRICAL	1.00	JB	846,707	127,006	0	973,71	973712.95
TOTAL 13 ST JOHNS PUMP STATION	1.00	JB	10,089,418	1,468,861	0	11,558,27	11558279
50/ 40 30 PLANNING, ENGINEERING & DES							
50/ 40. 1 PLANNING, ENGINEERING & DESIGN	1.00	JB	2,200,000	330,000	0	2,530,00	2530000
TOTAL 30 PLANNING, ENGINEERING & DES	1.00	JB	2,200,000	330,000	0	2,530,00	2530000
50/ 50 31 SUPERVISION & ADMINISTRATION							
50/ 50. 1 SUPERVISION & ADMINISTRATION	1.00	JB	1,500,000	225,000	0	1,725,00	1725000
TOTAL 31 SUPERVISION & ADMINISTRATION	1.00	LS	1,500,000	225,000	0	1,725,00	1725000
TOTAL ITEM 5, ST. JOHNS BAYOU PUMP STA	1.00	JB	15,620,530	2,299,727	0	17,928,25	17928258
60 ITEM 6, CHAN IMPROV ST JAMES DIT							

** PROJECT OWNER SUMMARY - Element **

	QUANTITY	UOM	CONTRACT	CONTIGN	ESCALATN	TOTAL C	UNIT COST
60/ 10 01 LANDS AND DAMAGES							
60/ 10. 1 01 LANDS/DAM ST JAMES MI 0-10.8	1.00	JB	553,009	82,951	0	635,9	635960.35
60/ 10. 2 02 MITIGATION JAMES MI 0-10.8	1.00	JB	169,600	25,440	0	195,0	195040.00
TOTAL 01 LANDS AND DAMAGES	1.00	JB	722,609	108,191	0	831,0	831000.35
60/ 20 02 RELOCATIONS							
60/ 20. 1 02 RELOCATIONS	1.00	JB	1,860,000	279,000	0	2,139,0	2139000
TOTAL 02 RELOCATIONS	1.00	JB	1,860,000	279,000	0	2,139,0	2139000
60/ 30 09 CHAN IMPROV, ST JAMES DITCH							
60/ 30. 10 MOBILIZATION AND DEMOBILIZATION	1.00	JB	24,790	3,719	0	28,50	28508.98
60/ 30. 20 CLEARING	570.24	STA	105,183	15,777	0	120,96	212.12
60/ 30. 30 EXCAVATION	675600.00	BCY	419,624	62,944	0	482,568	0.71
60/ 30. 40 FINISH DRESS, FERT, SEED, & MULC	14.00	AC	15,151	2,273	0	17,424	1244.59
60/ 30. 50 ROUGH DRESS, FERT, & SEEDING	230.00	AC	55,315	8,297	0	63,612	276.57
60/ 30. 60 CORRUGATED METAL PIPE, 24-INCH	120.00	LF	3,142	471	0	3,613	30.11
60/ 30. 70 FLARED END SECTION, 24 INCH	12.00	EA	1,691	254	0	1,945	162.09
60/ 30. 80 RIPRAP	60.00	TN	1,015	152	0	1,167	19.45
60/ 30. 90 RIPRAP, BRIDGE PROTECTION	4860.00	TN	76,001	11,400	0	87,40	17.98
60/ 30.100 FILTER MATERIAL	30.00	TN	507	76	0	58	19.45
60/ 30.105 FILTER MATERIAL, BRIDGE PROT	2040.00	TN	31,902	4,785	0	36,68	17.98
60/ 30.110 ENVIRONMENTAL PROTECTION	57024.00	LF	81,296	12,194	0	93,49	1.64
TOTAL 09 CHAN IMPROV, ST JAMES DITCH	10.80	MI	815,617	122,343	0	937,96	86848.15
60/ 40 30 PLANNING, ENGINEERING & DES							
60/ 40. 1 30 PED ST. JAMES DITCH	1.00	JB	150,000	22,500	0	172,500	172500.00
TOTAL 30 PLANNING, ENGINEERING & DES	1.00	JB	150,000	22,500	0	172,500	172500.00
60/ 50 31 SUPERVISION & ADMINISTRATION							
60/ 50. 1 31 S&A ST. JAMES DITCH	1.00	JB	100,000	15,000	0	115,000	115000.00
TOTAL 31 SUPERVISION & ADMINISTRATION	1.00	JB	100,000	15,000	0	115,000	115000.00
TOTAL ITEM 6, CHAN IMPROV ST JAMES DIT	10.80	MI	3,648,226	547,234	0	4,195,460	98468.55
TOTAL EAST PRAIRIE PHASE LRR	1.00	EA	43,355,711	6,372,997	0	49,728,728	19728728

** PROJECT INDIRECT SUMMARY - Contract **

		QUANTITY	UOM	DIRECT	FIELD OH	HOME OFC	PROFIT	BOND	TOTAL COS	UNIT COST
10	ITEM 1, VEG CLR BPLD MI 8 1 12.4	4.30	MI	284,502	2,829	1,999	4,159	561	294,0[illegible]1	68383.80
20	ITEM 2, NEW MADRID FLWY PUMP STA	1.00	JB	15,822,067	770,417	750,181	1101131	156,501	18,600,3[illegible]	18600370
30	ITEM 3, CHAN IMPROV ST JOHNS BAY	3.00	MI	2,212,492	84,593	59,779	124,340	16,786	2,497,9[illegible]	832663.31
40	ITEM 4, CHAN IMPROV SJB & BPLD	9.60	MI	2,459,707	67,215	47,499	98,798	13,338	2,686,5[illegible]	279849.60
50	ITEM 5, ST. JOHNS BAYOU PUMP STA	1.00	JB	13,731,202	443,483	557,176	783,314	113,356	15,628,52	15628530
60	ITEM 6, CHAN IMPROV ST JAMES DIT	10.80	MI	3,510,878	40,696	20,759	59,810	0,075	3,648,22	337798.74
	TOTAL EAST PRAIRIE PHASE LRR	1.00	EA	38,020,847	1409234	1445393	2171560	308,698	43,355,73	43355731
	CONTINGN								6,372,99	
	TOTAL INCL OWNER COSTS								49,728,7[illegible]	

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** PROJECT INDIRECT SUMMARY - Element **

	QUANTITY UOM	DIRECT	FIELD OH	HOME OFC	PROFIT	BOND	TOTAL COS	UNIT COST
10 ITEM 1, VEG CLR BPLD MI 8.1 12.4								
10/ 10 01 LANDS AND DAMAGES								
10/ 10. 1 LANDS AND DAMAGES	1.00 JB	188,696	0	0	0	0	188,696	188696.00
TOTAL 01 LANDS AND DAMAGES	1.00 JB	188,696	0	0	0	0	188,696	188696.00
10/ 20 02 RELOCATIONS								
10/ 20. 1 RELOCATIONS	1.00 JB	6,950	0	0	0	0	6,95	6950.00
TOTAL 02 RELOCATIONS	1.00 JB	6,950	0	0	0	0	6,95	6950.00
10/ 30 09 VEG CLEAR ST JOHNS BAYOU								
10/ 30. 10 09 VEG CLR BPLD MI 8.10 12.4								
10/ 30. 10. 10 CLEARING	227.04 ST	36,364	2,182	1,542	3,207	433	43,73	192.60
10/ 30. 10. 30 ENVIRONMENTAL PROTECTION	22704.00 LF	10,792	648	458	952	128	12,97	0.57
TOTAL 09 VEG CLR BPLD MI 8.10 12.4	4.30 MI	47,156	2,829	1,999	4,159	561	56,70	13187.14
TOTAL 09 VEG CLEAR ST JOHNS BAYOU	4.30 MI	47,156	2,829	1,999	4,159	561	56,70	13187.14
10/ 40 30 PLANNING, ENGINEERING & DES								
10/ 40. 1 PLANNING, ENGINEERING & DESIGN	1.00 JB	23,500	0	0	0	0	23,50	23500.00
TOTAL 30 PLANNING, ENGINEERING & DES	1.00 JB	23,500	0	0	0	0	23,50	23500.00
10/ 50 31 SUPERVISION & ADMINISTRATION								
10/ 50. 1 SUPERVISION & ADMINISTRATION	1.00 JB	18,200	0	0	0	0	18,20	18200.00
TOTAL 31 SUPERVISION & ADMINISTRATION	1.00 JB	18,200	0	0	0	0	18,20	18200.00
TOTAL ITEM 1, VEG CLR BPLD MI 8.1 12.4	4.30 MI	284,502	2,829	1,999	4,159	561	294,05	68383.88
20 ITEM 2, NEW MADRID FLWY PUMP STA								
20/ 10 01 LANDS AND DAMAGES								
20/ 10. 1 LANDS AND DAMAGES	1.00 JB	235,652	0	0	0	0	235,65	235652.00

** PROJECT INDIRECT SUMMARY - Element **

	QUANTITY	UOM	DIRECT	FIELD OH	HOME OFC	PROFIT	BOND	TOTAL COS	UNIT COST
TOTAL 01 LANDS AND DAMAGES	1.00	JB	235,652	0	0	0	0	235,65	235652.00
20/ 20 02 RELOCATIONS									
20/ 20. 1 RELOCATIONS									
20/ 25 13 NEW MADRID PU STA MECH EQ PUR									
20/ 25. 10 MAIN PUMPS	1.00	EA	834,774	8,118	50,587	62,560	9,563	965,01	321911.79
20/ 25. 20 MAIN PUMP TRANSMISSION GEARS	1.00	EA	519,454	5,395	32,691	40,428	6,180	624,14	208048.96
20/ 25. 30 MAIN PUMP MOTORS	1.00	EA	174,133	1,743	10,565	13,065	1,997	201,70	67234.28
TOTAL 13 NEW MADRID PU STA MECH EQ PUR	1.00	JB	1,548,561	15,486	93,843	116,052	17,739	1,791,68	1791681
20/ 30 13 NEW MADRID FLWY PUMP STATION									
20/ 30. 10 GENERAL CONDITIONS									
20/ 30. 10. 10 MOBILIZATION/DEMOBILIZATION	1.00	EA	24,250	2,425	1,334	2,241	302	30,55	30551.70
20/ 30. 10. 20 CONCRETE LAB TESTING	1.00	EA	2,500	250	138	231	31	3,15	3149.69
20/ 30. 10. 30 SOIL COMPACTION TESTING	1.00	EA	1,500	150	83	139	19	1,89	1889.81
TOTAL GENERAL CONDITIONS	1.00	JB	28,250	2,825	1,554	2,610	352	35,591	35591.19
20/ 30. 20 SITEWORK									
20/ 30. 20. 10 EMBANKMENT, LEVEE CLOSURE	233000.00	ECY	488,111	48,811	26,846	45,101	6,089	614,95	2.64
20/ 30. 20. 15 TURFING, LEVEE CLOSURE	10.00	AC	9,000	900	495	832	112	11,33	1133.89
20/ 30. 20. 20 TURFING, GENERAL	40.00	AC	28,000	2,800	1,540	2,587	349	35,27	881.91
20/ 30. 20. 30 CLEARING	50.00	AC	52,170	5,217	2,869	4,820	651	65,72	1314.55
20/ 30. 20. 40 EXCAVATION, DIVERSION CHANNEL	253000.00	BCY	240,350	24,035	13,219	22,208	2,998	302,81	1.20
20/ 30. 20. 50 EMBANKMENT, DIVERSION CHAN REFIL	184000.00	ECY	335,676	33,568	18,462	31,016	4,187	422,91	2.30
20/ 30. 20. 60 EMBANKMENT, COFFERDAM	172000.00	ECY	270,745	27,075	14,891	25,017	3,377	341,10	1.98
20/ 30. 20. 70 DEWATERING	1.00	LS	1,920,000	19,200	116,352	143,889	21,994	2,221,43	2221435
20/ 30. 20. 80 EXCAVATION, CHANNEL TRANSITION	120000.00	BCY	57,000	5,700	3,135	5,267	711	71,81	0.60
20/ 30. 20. 90 EXCAVATION, STRUCTURAL ROUGH	47000.00	BCY	78,222	7,822	4,302	7,228	976	98,55	2.10
20/ 30. 20.100 EXCAVATION, STRUCTURAL FINISH	4000.00	BCY	31,967	3,197	1,758	2,954	399	40,27	10.07
20/ 30. 20.110 AGGREGATE SURFACING	1945.00	CCY	27,053	2,705	1,488	2,500	337	34,08	17.52
20/ 30. 20.115 FILTER FABRIC	7300.00	SY	18,534	1,853	1,019	1,713	231	23,35	3.20
20/ 30. 20.120 RIPRAP	9000.00	TN	95,646	9,565	5,261	8,838	1,193	120,50	13.39
20/ 30. 20.130 EMBANKMENT, PERVIOUS WASHED	61500.00	TN	690,976	69,098	38,004	63,846	8,619	870,54	14.16
20/ 30. 20.135 EMBANKMENT, IMPERVIOUS	9800.00	CY	63,172	6,317	3,474	5,837	788	79,58	8.12
20/ 30. 20.140 EMBANKMENT, RANDOM	22500.00	CY	43,686	4,369	2,403	4,037	545	55,03	2.45
20/ 30. 20.145 PILING; SHEET PSA 23	2020.00	SF	30,099	3,010	1,655	2,781	375	37,921	18.77
20/ 30. 20.150 VIBROFLOTATION DENSIFICATION	1.00	LS	300,000	3,000	18,180	22,483	3,437	347,09	347099.21
TOTAL SITEWORK	1.00	JB	4,780,406	278,241	275,354	402,953	57,370	5,794,32	5794321

** PROJECT INDIRECT SUMMARY - Element **

	QUANTITY	UOM	DIRECT	FIELD OH	HOME OFC	PROFIT	BOND	TOTAL COS	UNIT COST
20/ 30. 30 CONCRETE									
20/ 30. 30. 10 SLAB ON GRADE	4085.00	CY	763,307	76,331	41,982	70,530	9,521	961,67	235.42
20/ 30. 30. 20 WALLS	6560.00	CY	2,056,109	205,611	113,086	189,984	25,648	2,590,43	394.88
20/ 30. 30. 30 FOOTINGS	10.00	CY	1,829	183	101	169	23	2,30	230.39
20/ 30. 30. 40 RETAINING WALLS	1280.00	CY	342,500	34,250	18,838	31,647	4,272	431,50	337.12
20/ 30. 30. 50 ELEVATED SLAB	2381.00	CY	625,141	62,514	34,383	57,763	7,798	787,59	330.78
20/ 30. 30. 60 STAIRS	18.00	CY	9,787	979	538	904	122	12,33	685.04
20/ 30. 30. 70 BEAMS	155.00	CY	82,595	8,240	4,532	7,613	1,028	103,80	669.72
20/ 30. 30. 80 COLUMNS	115.00	CY	42,856	4,286	2,357	3,960	535	53,994	469.51
20/ 30. 30. 90 PRESTRESSED WALKWAY SLAB	14.00	CY	14,390	1,439	791	1,330	180	18,130	1294.98
20/ 30. 30.100 WATERSTOP	2150.00	LF	17,473	1,747	961	1,614	218	22,014	10.24
20/ 30. 30.110 WALL DRAINS	900.00	LF	18,640	1,864	1,025	1,722	233	23,484	26.09
TOTAL CONCRETE	14632.00	CY	3,974,428	397,443	218,594	367,237	49,577	5,007,27	342.21
20/ 30. 40 MASONRY	17430.00	SF	92,008	9,201	5,060	8,502	1,148	115,91	6.65
20/ 30. 50 METALS	1.00	JB	365,273	36,347	20,101	33,716	4,554	459,9	459992.80
20/ 30. 60 WOOD/PLASTICS	1.00	JB	26,383	2,638	1,451	2,438	329	33,23	33238.75
20/ 30. 70 THERMAL/MOISTURE PROTECTION									
20/ 30. 70. 10 ROOFING, 4 PLY	5376.00	SF	21,504	215	1,303	1,612	246	24,88	4.63
20/ 30. 70. 20 INSULATION, 1"	14026.00	SF	17,533	175	1,062	1,314	201	20,28	1.45
20/ 30. 70. 30 SEALANTS	1.00	JB	8,176	82	495	613	94	9,46	9459.96
TOTAL THERMAL/MOISTURE PROTECTION	1.00	LS	47,213	472	2,861	3,538	541	54,6	54625.09
20/ 30. 80 DOORS/WINDOWS/GLASS	1.00	JB	8,794	879	484	813	110	11,07	11079.29
20/ 30. 90 FINISHES	26000.00	SF	55,900	5,590	3,075	5,165	697	70,42	2.71
20/ 30.100 SPECIALTIES	1.00	JB	1,390	139	76	128	17	1,7	1751.78
20/ 30.110 EQUIPMENT (not used)									
20/ 30.120 FURNISHINGS									
20/ 30.120. 10 BATH CABINET/COUNTERTOP	1.00	EA	870	87	48	80	11	1,09	1095.88
TOTAL FURNISHINGS	1.00	JB	870	87	48	80	11	1,09	1095.88
20/ 30.150 MECHANICAL									
20/ 30.150. 10 STATION CRANE	1.00	JB	98,445	984	5,966	7,378	1,128	113,90	113900.61
20/ 30.150. 30 ROLLER GATES	3.00	EA	267,897	2,679	16,235	20,077	3,069	309,95	103318.71
20/ 30.150. 40 SUMP DEWATERING SYSTEM	1.00	JB	68,879	689	4,174	5,162	789	79,69	79692.83
20/ 30.150. 50 WATER SUPPLY & PLUMBING SYSTEM	1.00	JB	68,066	681	4,125	5,101	780	78,75	78752.19
20/ 30.150. 60 HEATING AND VENTILATION	1.00	JB	44,700	447	2,709	3,350	512	51,71	51717.78
20/ 30.150. 70 FLAP GATES, DISCHARGE	3.00	EA	35,355	354	2,143	2,650	405	40,90	13635.23
20/ 30.150. 80 SLIDE GATES WITH OPERATOR	6.00	EA	390,720	3,907	23,678	29,281	4,476	452,06	75343.67

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** PROJECT INDIRECT SUMMARY - Element **

	QUANTITY UOM	DIRECT	FIELD OH	HOME OFC	PROFIT	BOND	TOTAL COST	UNIT COST
20/ 30.150. 90 TRASH RAKES	3.00 EA	219,438	2,194	13,298	16,445	2,514	253,8	84629.7
TOTAL MECHANICAL	1.00 JB	1,193,500	11,935	72,326	89,443	13,672	1,380,8	138087
20/ 30.160 ELECTRICAL								
20/ 30.160. 10 TRANSFORMERS	1.00 JB	2,921	29	177	219	33	3,38	3379.59
20/ 30.160. 20 MOTOR CONTROL CENTER	1.00 JB	37,150	374	2,263	2,799	428	43,21	43213.8
20/ 30.160. 30 SWITCHGEAR AND BUSWORK	1.00 JB	150,737	1,507	9,619	11,896	1,818	183,6	183658.30
20/ 30.160. 40 MISCELLANEOUS WIRING	1.00 JB	109,109	1,091	6,612	8,177	1,250	126,2	126238.81
20/ 30.160. 50 LIGHTING AND GROUNDING	1.00 JB	60,447	604	3,663	4,530	692	69,9	69937.0
20/ 30.160. 60 SUBSTATION & TRANSMISSION LINE	1.00 JB	544,875	5,449	33,019	40,834	6,242	630,4	630418.99
TOTAL ELECTRICAL	1.00 JB	913,439	9,134	55,154	68,455	10,464	1,056,8	1056847
TOTAL 11 NEW MADRID FLWY PUMP STATION	1.00 JB	11,487,854	754,932	656,338	985,079	138,842	14,023,0	14021044
20/ 40 30 PLANNING, ENGINEERING & DES								
20/ 40. 1 30 PLANNING, ENGINEERING & DES	1.00 JB	1,400,000	0	0	0	0	1,400,00	1400000
TOTAL 30 PLANNING, ENGINEERING & DES	1.00 JB	1,400,000	0	0	0	0	1,400,00	1400000
20/ 50 31 SUPERVISION & ADMINISTRATION								
20/ 50. 1 SUPERVISION & ADMINISTRATION	1.00 JB	1,150,000	0	0	0	0	1,150,00	1150000
TOTAL 31 SUPERVISION & ADMINISTRATION	1.00 JB	1,150,000	0	0	0	0	1,150,0	1150000
TOTAL ITEM 2, NEW MADRID FLWY PUMP STA	1.00 JB	15,822,067	770,417	750,181	1101131	156,581	18,600,37	18600378
30 ITEM 3, CHAN IMPROV ST JOHNS BAY								
30/ 10 01 LANDS AND DAMAGES								
30/ 10. 1 LANDS AND DAMAGES	1.00 JB	334,590	0	0	0	0	334,59	334590.00
30/ 10. 2 MITIGATION	1.00 JB	88,019	0	0	0	0	88,01	88019.00
TOTAL 01 LANDS AND DAMAGES	1.00 JB	422,609	0	0	0	0	422,60	422609.00
30/ 20 02 RELOCATIONS								
30/ 20. 1 RELOCATIONS								
30/ 30 09 CHAN IMPRV CONTR ST JOHNS BY								
30/ 30. 10 MOBILIZATION AND DEMOBILIZATION	1.00 JB	37,407	2,244	1,586	3,299	445	44,98	44982.40

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** PROJECT INDIRECT SUMMARY - Element **

		QUANTITY	UOM	DIRECT	FIELD OH	HOME OFC	PROFIT	BOND	TOTAL COST	UNIT COST
30/ 30. 20	CLEARING	316.80	STA	48,595	2,916	2,060	4,286	579	58,4	184.45
30/ 30. 30	EXCAVATION	1400000	BCY	838,975	50,338	35,573	73,991	9,989	1,008,8	0.72
30/ 30. 40	FINISH DRESS, FERT, SEED, & MULC	5.00	AC	4,500	270	191	397	54	5,4	1082.25
30/ 30. 50	ROUGH DRESS, FERT, & SEEDING	122.00	AC	24,400	1,464	1,035	2,152	291	29,3	240.50
30/ 30. 60	CORRUGATED METAL PIPE, 24-INCH	200.00	LF	4,355	261	185	384	52	5,23	26.18
30/ 30. 70	FLARED END SECTION, 24 INCH	10.00	EA	412	25	17	36	5	49	49.54
30/ 30. 80	RIPRAP	100.00	TN	1,407	84	60	124	17	1,6	16.92
30/ 30.100	FILTER MATERIAL	55.00	TN	774	46	33	68	9	93	16.92
30/ 30.110	ENVIRONMENTAL PROTECTION	31680.00	LF	445 059	26,944	19,040	39,603	5,346	539,95	17.04
	TOTAL 09 CHAN IMPRV CONTR ST JOHNS BY	3.00	MI	1,405,883	84,593	59,779	124,340	16,786	1,695,35	565126.99
30/ 40	30 PLANNING, ENGINEERING & DES									
30/ 40. 1	PLANNING, ENGINEERING & DESIGN	1.00	JB	210,000	0	0	0	0	210,000	210000.00
	TOTAL 30 PLANNING, ENGINEERING & DES	1.00	JB	210,000	0	0	0	0	210,000	210000.00
30/ 50	31 SUPERVISION & ADMINISTRATION									
30/ 50. 1	SUPERVISION & ADMINISTRATION	1.00	JB	170,000	0	0	0	0	170,00	170000.00
	TOTAL 31 SUPERVISION & ADMINISTRATION	1.00	JB	170,000	0	0	0	0	170,00	170000.00
	TOTAL ITEM 3, CHAN IMPROV ST JOHNS BAY	3.00	MI	2,212,492	84,593	59,779	124,340	16,786	2,497,95	832663.33
40	ITEM 4, CHAN IMPROV SJB & BPLD									
40/ 10	01 LANDS AND DAMAGES									
40/ 10. 1	01 LANDS & DAM ST JOHNS MI 3 4.5	1.00	JB	158,844	0	0	0	0	158,84	158844.00
40/ 10. 2	01 LANDS & DAM BPHMLD 0 8.1	1.00	JB	266,456	0	0	0	0	266,45	266456.00
40/ 10. 3	01 MITIGATION ST JOHNS MI 3 4.5	1.00	JB	41,700	0	0	0	0	41,70	41700.00
40/ 10. 4	01 MITIGATION BPHMLD 0 8.1	1.00	JB	53,000	0	0	0	0	53,00	53000.00
	TOTAL 01 LANDS AND DAMAGES	1.00	JB	520,000	0	0	0	0	520,00	520000.00
40/ 20	02 RELOCATIONS									
40/ 20. 1	02 RELOC ST JOHNS BAY 3.0-4.5	1.00	JB	562,300	0	0	0	0	562,30	562300.00
40/ 20. 2	02 RELOC BIRD PT HMLD 0 8.1	1.00	JB	48,850	0	0	0	0	48,85	48850.00
	TOTAL 02 RELOCATIONS	1.00	JB	611,150	0	0	0	0	611,15	611150.00
40/ 30	09 CHAN IMPRV CONTR SJB & BPLD									

** PROJECT INDIRECT SUMMARY - Element **

		QUANTITY	UOM	DIRECT	FIELD OH	HOME OFC	PROFIT	BOND	TOTAL COST	UNIT COST
40/ 30. 10 09 CHAN IMPR CTR SJB MI 3.0 4.5										
40/ 30. 10. 10	MOBILIZATION AND DEMOBILIZATION	1.00	JB	39,572	2,374	1,678	3,490	471	47,5[illegible]	47585.81
40/ 30. 10. 20	CLEARING	158.40	STA	24,297	1,458	1,030	2,143	289	29,2[illegible]	184.45
40/ 30. 10. 30	EXCAVATION	700000.00	BCY	41[illegible]487	25,169	17,786	36,995	4,994	504,4[illegible]	0.72
40/ 30. 10. 40	FINISH DRESS, FERT, SEED, & MULC	3.00	AC	[illegible]700	162	114	238	32	3,2[illegible]	1082.25
40/ 30. 10. 50	ROUGH DRESS, FERT, & SEEDING	60.00	AC	1[illegible]300	720	509	1,058	143	14,4[illegible]	240.50
40/ 30. 10. 60	CORRUGATED METAL PIPE, 24-INCH	100.00	LF	[illegible]177	131	92	192	26	2,6[illegible]	26.18
40/ 30. 10. 70	FLARED END SECTION, 24-INCH	6.00	EA	703	42	30	62	8	846	140.95
40/ 30. 10. 80	RIPRAP	50.00	TN	703	42	30	62	8	846	16.92
40/ 30. 10. 90	RIPRAP, BRIDGE PROTECTION	3210.00	TN	38,734	2,288	1,617	3,363	454	45,8[illegible]	14.29
40/ 30. 10.100	FILTER MATERIAL	27.00	TN	380	23	16	33	5	457	16.92
40/ 30. 10.105	FILTER MATERIAL, BRIDGE PROT	1075.00	TN	12,771	766	541	1,126	152	15,357	14.29
40/ 30. 10.110	ENVIRONMENTAL PROTECTION	15840.00	LF	43,729	2,624	1,854	3,857	521	52,584	3.32
TOTAL 09 CHAN IMPR CTR SJB MI 3.0 4.5		1.50	MI	596,655	35,799	25,298	52,620	7,104	717,4[illegible]	478317.75
40/ 30. 15 09 CHAN IMPR CTR BPLD 0.0 0.1										
40/ 30. 15. 20	CLEARING	427.60	STA	65,601	3,936	2,782	5,786	781	78,887	184.45
40/ 30. 15. 30	EXCAVATION	630000.00	BCY	337,608	20,256	14,315	29,774	4,020	405,973	0.64
40/ 30. 15. 40	FINISH DRESS, FERT, SEED, & MULC	10.00	AC	9,000	540	382	794	107	10,8[illegible]	1082.25
40/ 30. 15. 50	ROUGH DRESS, FERT, & SEEDING	160.00	AC	32,000	1,920	1,357	2,822	381	38,4[illegible]	240.50
40/ 30. 15. 60	CORRUGATED METAL PIPE, 24 INCH	100.00	LF	2,177	131	92	192	26	2,6[illegible]	26.18
40/ 30. 15. 70	FLARED END SECTION, 24 INCH	10.00	EA	412	25	17	36	5	49	49.56
40/ 30. 15. 80	RIPRAP	50.00	TN	703	42	30	62	8	8[illegible]	16.92
40/ 30. 15. 90	RIPRAP, BRIDGE PROTECTION	1260.00	TN	16,386	983	695	1,445	195	19,70	15.64
40/ 30. 15.100	FILTER MATERIAL	27.00	TN	380	23	16	33	5	45	16.92
40/ 30. 15.105	FILTER MATERIAL, BRIDGE PROT	550.00	TN	7,153	429	303	631	85	8,60	15.64
40/ 30. 15.110	ENVIRONMENTAL PROTECTION	42768.00	LF	52,179	3,131	2,212	4,602	621	62,74	1.47
TOTAL 09 CHAN IMPR CTR BPLD 0.0 0.1		8.10	MI	523,601	31,416	22,201	46,177	6,234	629,63[illegible]	77732.04
TOTAL 09 CHAN IMPRV COFFR SJB & BPLD		9.60	MI	1,120,257	67,215	47,499	98,798	13,338	1,347,10[illegible]	140323.56
40/ 40 30 PLANNING, ENGINEERING & DES										
40/ 40. 1 30 PED JOHNS BAY 3.0 4.5		1.00	JB	72,000	0	0	0	0	72,00	72000.00
40/ 40. 2 30 PED BIRD PT NMLD 0 0.1		1.00	JB	44,500	0	0	0	0	44,50	44500.00
TOTAL 30 PLANNING, ENGINEERING & DES		1.00	JB	116,500	0	0	0	0	116,50	116500.00
40/ 50 31 SUPERVISION & ADMINISTRATION										
40/ 50. 1 31 PED JOHNS BAY 3.0 4.5		1.00	JB	56,345	0	0	0	0	56,34	56345.00
40/ 50. 2 31 PED BPNMLD 0-0.1		1.00	JB	35,455	0	0	0	0	35,45	35455.00

** PROJECT INDIRECT SUMMARY Element **

	QUANTITY	UOM	DIRECT	FIELD OH	HOME OFC	PROFIT	BOND	TOTAL COST	UNIT COST
TOTAL 31 SUPERVISION & ADMINISTRATION	1.00	JB	91,800	0	0	0	0	91,8[illegible]	91800.00
TOTAL ITEM 4, CHAN IMPROV SJB & BPLD	9.60	MI	2,459,707	67,215	47,499	98,798	13,338	2,686,556	279849.60
50 ITEM 5, ST. JOHNS BAYOU PUMP STA									
50/ 10 01 LANDS AND DAMAGES									
50/ 10. 1 LANDS AND DAMAGES	1.00	JB	37[illegible],304	0	0	0	0	371,3[illegible]	371304.00
TOTAL 01 LANDS AND DAMAGES	1.00	JB	371,304	0	0	0	0	371,[illegible]	371304.00
50/ 20 02 RELOCATIONS									
50/ 20. 1 RELOCATIONS, HWY WW	1.00	JB	108,300	0	0	0	0	108,3[illegible]	108300.00
TOTAL 02 RELOCATIONS	1.00	JB	108,300	0	0	0	0	108,3[illegible]	108300.00
50/ 25 13 ST JOHNS PU STA MECH EQ PUR									
50/ 25. 10 MAIN PUMPS	3.00	EA	713,619	7,136	43,245	53,480	8,175	825,65[illegible]	275218.45
50/ 25. 20 MAIN PUMP TRANSMISSION GEARS	3.00	EA	305,038	3,058	18,534	22,920	3,504	353,8[illegible]	117951.26
50/ 25. 30 MAIN PUMP MOTORS	3.00	EA	155,574	1,556	9,428	11,659	1,782	179,9[illegible]	59999.57
TOTAL 13 ST JOHNS PU STA MECH EQ PUR	1.00	JB	1,175,031	11,750	71,207	88,059	13,460	1,359,50[illegible]	1359508
50/ 30 13 ST JOHNS PUMP STATION									
50/ 30. 10 GENERAL CONDITIONS									
50/ 30. 10. 10 MOBILIZATION/DEMOBILIZATION	1.00	EA	24,250	2,425	1,334	2,241	302	30,55	30551.70
50/ 30. 10. 20 CONCRETE LAB TESTING	1.00	EA	2,500	250	138	211	31	3,1[illegible]	3149.69
50/ 30. 10. 30 SOIL COMPACTION TESTING	1.00	EA	1,500	150	83	119	19	1,8[illegible]	1889.81
TOTAL GENERAL CONDITIONS	1.00	EA	28,250	2,825	1,554	2,610	352	35,59[illegible]	35591.19
50/ 30. 20 SITEWORK									
50/ 30. 20. 5 CLEARING	32.00	AC	43,632	4,363	2,400	4,032	544	54,97[illegible]	1717.85
50/ 30. 20. 10 EXCAVATION, STRUCTURAL ROUGH	20100.00	BCY	33,452	3,345	1,840	3,091	417	42,14[illegible]	2.10
50/ 30. 20. 15 EXCAVATION, STRUCTURAL FINISH	2000.00	BCY	15,983	1,598	879	1,477	199	20,13[illegible]	10.07
50/ 30. 20. 30 EMBANKMENT, COFFERDAM	72300.00	ECY	163,395	16,339	8,987	15,098	2,038	205,85[illegible]	2.85
50/ 30. 20. 40 DEWATERING	1.00	JB	1,810,000	18,100	109,686	135,645	20,734	2,094,16	2094165
50/ 30. 20. 50 VIBROFLOTATION DENSIFICATION	1.00	EA	300,000	3,000	18,180	22,483	3,437	347,09	347099.23
50/ 30. 20. 60 EMBANKMENT, PERVIOUS WASHED	114600.00	TN	1,248,632	124,863	68,675	115,374	15,575	1,573,13	13.73
50/ 30. 20. 70 EMBANKMENT, RANDOM	20000.00	CY	38,832	3,883	2,136	3,588	484	48,92	2.45

** PROJECT INDIRECT SUMMARY - Element **

		QUANTITY	UOM	DIRECT	FIELD OH	HOME OFC	PROFIT	BOND	TOTAL CO	UNIT COST
50/ 30. 20. 80	EMBANKMENT, IMPERVIOUS	8000.00	CY	51,569	5,157	2,836	4,765	643	64,9	8.1
50/ 30. 20. 90	AGGREGATE SURFACING	640.00	CCY	8,902	890	490	823	111	11,2	17.5
50/ 30. 20.100	EXCAVATION, INLET CHANNEL	3900.00	BCY	1,851	185	102	171	23	2,3	0.60
50/ 30. 20.105	EXCAVATION, OUTLET CHANNEL	11600.00	BCY	25,297	2,530	1,391	2,337	316	31,8	2.7
50/ 30. 20.107	EMBANKMENT, INLET CHANNEL	30000.00	BCY	33,522	3,352	1,844	3,097	418	42,2	1.41
50/ 30. 20.110	FILTER FABRIC	12670.00	SY	31,159	3,216	1,769	2,971	401	40,5	3.20
50/ 30. 20.115	PERVIOUS BEDDING MATERIAL	1250.00	TN	38,078	3,808	2,094	1,518	475	47,9	14.7
50/ 30. 20.120	RIPRAP	13020.00	TN	157,270	15,727	8,650	14,532	1,962	198,1	15.2
50/ 30. 20.130	RELIEF WELLS, INLET CHANNEL	6.00	EA	145,000	1,440	8,726	10,792	1,650	166,6	27767.94
50/ 30. 20.140	PILING; SHEET PSA 23	1540.00	SF	22,947	2,295	1,262	2,120	286	28,9	18.77
50/ 30. 20.144	PILING; CONC/PRECAST/PRESTR, 16"	150.00	LF	5,620	562	309	519	70	7,0	47.20
50/ 30. 20.150	TURFING, LEVEE	7.00	AC	6,300	630	347	582	79	7,9	1133.89
50/ 30. 20.160	TURFING, GENERAL	22.00	AC	15,400	1,540	847	1,423	192	19,4	881.91
TOTAL SITEWORK		1.00	EA	4,196,843	216,824	243,449	348,438	50,056	5,055,609	5055609
50/ 30. 30	CONCRETE									
50/ 30. 30. 10	FOOTINGS	10.00	CY	1,829	181	101	169	23	2,3	230.39
50/ 30. 30. 20	SLAB ON GRADE	2232.00	CY	417,063	41,706	22,938	38,537	5,202	525,4	235.42
50/ 30. 30. 30	WALLS	2248.00	CY	704,593	70,459	38,753	65,104	8,789	887,6	394.88
50/ 30. 30. 40	ELEVATED SLAB	806.00	CY	211,619	21,162	11,639	19,554	2,640	266,6	330.79
50/ 30. 30. 50	COLUMNS	100.00	CY	37,266	3,727	2,050	3,443	465	46,9	469.51
50/ 30. 30. 60	BEAMS	70.00	CY	37,211	3,721	2,047	3,438	464	46,8	669.7
50/ 30. 30. 70	STAIRS	9.00	CY	4,894	489	269	452	61	6,1	685.04
50/ 30. 30. 80	RETAINING WALLS	122.00	CY	32,645	3,264	1,795	3,016	407	41,1	337.1
50/ 30. 30. 90	WATERSTOP	475.00	LF	3,734	373	205	345	47	4,7	9.90
50/ 30. 30.100	WALL DRAINS	600.00	LF	34,671	3,467	1,907	3,204	432	43,6	72.80
TOTAL CONCRETE		5600.00	CY	1,485,524	148,552	81,704	137,262	18,530	1,871,5	334.21
50/ 30. 40	MASONRY	7300.00	SF	38,534	3,853	2,119	3,561	481	48,5	6.65
50/ 30. 50	METALS	1.00	EA	321,053	31,925	17,669	29,630	4,003	404,2	404281.17
50/ 30. 60	WOOD/PLASTICS (Not Used)									
50/ 30. 70	THERMAL/MOISTURE PROTECTION									
50/ 30. 70. 10	ROOFING, 4 PLY	4200.00	SF	16,800	168	1,018	1,259	192	19,4	4.63
50/ 30. 70. 20	INSULATION, 1"	10520.00	SF	13,150	132	797	985	151	15,2	1.45
50/ 30. 70. 30	SEALANTS, CAULKING	1.00	JB	6,132	61	372	460	70	7,0	7094.97
TOTAL THERMAL/MOISTURE PROTECTION		1.00	LS	36,082	361	2,187	2,704	413	41,7	41747.04
50/ 30. 80	DOORS/WINDOWS/GLASS	1.00	EA	7,910	791	435	731	99	9,9	9965.72
50/ 30. 85	FINISHES	19500.00	SF	41,925	4,193	2,306	3,874	523	52,8	2.71
50/ 30.100	SPECIALTIES	1.00	JB	1,390	139	76	128	17	1,7	1751.78
50/ 30.110	EQUIPMENT (Not Used)									

** PROJECT INDIRECT SUMMARY - Element **

	QUANTITY	UOM	DIRECT	FIELD OH	HOME OFC	PROFIT	BOND	TOTAL COST	UNIT COST
50/ 30.120 FURNISHINGS									
50/ 30.120. 10 BATH CABINET/COUNTERTOP	1.00	EA	870	87	48	80	11	1,09	1095.88
TOTAL FURNISHINGS	1.00	15	870	87	48	80	11	1,09	1095.88
50/ 30.150 MECHANICAL									
50/ 30.150. 10 STATION CRANE	1.00	JB	96,282	963	5,835	7,216	1,103	111,39	111397.75
50/ 30.150. 20 DISCHARGE PIPES	1.00	JB	834,821	8,348	50,590	62,563	9,563	965,88	965885.74
50/ 30.150. 30 ROLLER GATES	3.00	EA	244,571	2,447	14,827	18,336	2,803	283,084	94361.24
50/ 30.150. 40 SUMP DEWATERING SYSTEM	1.00	JB	33,952	340	2,059	2,547	389	39,317	39317.09
50/ 30.150. 50 WATER SUPPLY & PLUMBING SYSTEM	1.00	JB	45,310	453	2,746	3,396	519	52,424	52423.55
50/ 30.150. 60 HEATING AND VENTILATION	1.00	JB	19,257	193	1,167	1,443	221	22,28	22280.30
50/ 30.150. 90 TRASH RAKES	3.00	EA	212,049	2,120	12,850	15,891	2,429	245,340	81780.05
TOTAL MECHANICAL	1.00	JB	1,486,372	14,864	90,074	111,392	17,027	1,719,728	1719728
50/ 30.160 ELECTRICAL									
50/ 30.160. 10 TRANSFORMERS	1.00	JB	2,921	29	177	219	33	3,38	3379.59
50/ 30.160. 20 MOTOR CONTROL CENTER	1.00	JB	37,350	374	2,263	2,799	428	43,214	43213.85
50/ 30.160. 30 SWITCHGEAR AND BUSWORK	1.00	JB	158,737	1,587	9,619	11,896	1,818	181,65	181658.30
50/ 30.160. 40 MISCELLANEOUS WIRING	1.00	JB	109,109	1,091	6,612	8,177	1,250	126,23	126238.83
50/ 30.160. 50 LIGHTING AND GROUNDING	1.00	JB	60,447	604	3,663	4,530	692	69,93	69937.02
50/ 30.160. 60 SUBSTATION & TRANSMISSION LINE	1.00	JB	363,250	3,633	22,011	27,223	4,161	420,27	20279.31
TOTAL ELECTRICAL	1.00	JB	731,814	7,318	44,348	54,844	8,383	846,70	846706.91
TOTAL 13 ST JOHNS PUMP STATION	1.00	JB	8,376,567	431,733	485,969	695,255	99,895	10,089,41	10089418
50/ 40 30 PLANNING, ENGINEERING & DES									
50/ 40. 1 PLANNING, ENGINEERING & DESIGN	1.00	JB	2,200,000	0	0	0	0	2,200,00	2200000
TOTAL 30 PLANNING, ENGINEERING & DES	1.00	JB	2,200,000	0	0	0	0	2,200,00	2200000
50/ 50 31 SUPERVISION & ADMINISTRATION									
50/ 50. 1 SUPERVISION & ADMINISTRATION	1.00	JB	1,500,000	0	0	0	0	1,500,00	1500000
TOTAL 31 SUPERVISION & ADMINISTRATION	1.00	15	1,500,000	0	0	0	0	1,500,00	1500000
TOTAL ITEM 5, ST. JOHNS BAYOU PUMP STA	1.00	JB	13,731,202	443,483	557,176	783,314	113,356	15,628,53	15628530
60 ITEM 6, CHAN IMPROV ST JAMES DIT									

** PROJECT INDIRECT SUMMARY - Element **

	QUANTITY	UOM	DIRECT	FIELD OH	HOME OFC	PROFIT	BOND	TOTAL COST	UNIT COST
60/ 10 01 LANDS AND DAMAGES									
60/ 10. 1 01 LANDS/DAM ST JAMES MI 0-10.8	1.00	JB	553,009	0	0	0	0	553,009	553009.00
60/ 10. 2 02 MITIGATION JAMES MI 0 10.8	1.00	JB	169,600	0	0	0	0	169,600	169600.00
TOTAL 01 LANDS AND DAMAGES	1.00	JB	722,609	0	0	0	0	722,609	722609.00
60/ 20 02 RELOCATIONS									
60/ 20. 1 02 RELOCATIONS	1.00	JB	1,860,000	0	0	0	0	1,860,000	1860000
TOTAL 02 RELOCATIONS	1.00	JB	1,860,000	0	0	0	0	1,860,000	1860000
60/ 30 09 CHAN IMPROV, ST JAMES DITCH									
60/ 30. 10 MOBILIZATION AND DEMOBILIZATION	1.00	JB	20,616	1,237	874	1,818	245	24,790	24790.41
60/ 30. 20 CLEARING	570.24	STA	87,470	5,248	3,709	7,714	1,041	105,183	184.45
60/ 30. 30 EXCAVATION	675600.00	BCY	348,960	20,938	14,796	30,776	4,155	419,624	0.62
60/ 30. 40 FINISH DRESS, FERT, SEED, & MULC	14.00	AC	12,600	756	534	1,111	150	15,151	1082.25
60/ 30. 50 ROUGH DRESS, FERT, & SEEDING	230.00	AC	46,000	2,760	1,950	4,057	548	55,315	240.50
60/ 30. 60 CORRUGATED METAL PIPE, 24 INCH	120.00	LF	2,613	157	111	230	31	3,142	26.18
60/ 30. 70 FLARED END SECTION, 24-INCH	12.00	EA	1,407	84	60	124	17	1,691	140.95
60/ 30. 80 RIPRAP	60.00	TN	844	51	36	74	10	1,015	16.92
60/ 30. 90 RIPRAP, BRIDGE PROTECTION	4860.00	TN	63,202	3,792	2,680	5,574	752	76,001	15.64
60/ 30.100 FILTER MATERIAL	30.00	TN	422	25	18	37	5	507	16.92
60/ 30.105 FILTER MATERIAL, BRIDGE PROT	2040.00	TN	26,529	1,592	1,125	2,340	316	31,902	15.64
60/ 30.110 ENVIRONMENTAL PROTECTION	57024.00	LF	67,606	4,056	2,866	5,962	805	81,296	1.43
TOTAL 09 CHAN IMPROV, ST JAMES DITCH	10.00	MI	678,269	40,696	28,759	59,818	8,075	815,617	75520.13
60/ 40 30 PLANNING, ENGINEERING & DES									
60/ 40. 1 30 PED ST. JAMES DITCH	1.00	JB	150,000	0	0	0	0	150,000	150000.00
TOTAL 30 PLANNING, ENGINEERING & DES	1.00	JB	150,000	0	0	0	0	150,000	0000.00
60/ 50 31 SUPERVISION & ADMINISTRATION									
60/ 50. 1 31 S&A ST. JAMES DITCH	1.00	JB	100,000	0	0	0	0	100,00	100000.00
TOTAL 31 SUPERVISION & ADMINISTRATION	1.00	JB	100,000	0	0	0	0	100,000	100000.00
TOTAL ITEM 6, CHAN IMPROV ST JAMES DIT	10.00	MI	3,510,878	40,696	28,759	59,818	8,075	3,648,226	337798.74
TOTAL EAST PRAIRIE PHASE LRR	1.00	EA	38,020,847	1409214	1445393	2171560	308,698	43,355,731	43355731
CONTINGN								6,372,997	

** PROJECT INDIRECT SUMMARY - Element **

	QUANTITY	UOM	DIRECT	FIELD OH	HOME OFC	PROFIT	BOND	TOTAL COST	UNIT COST
TOTAL INCL OWNER COSTS								49,728,729	

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** 2ND VIEW SUMMARY **

	QUANTITY	UOM	** CONTRACT ** TOTAL	UNIT	** CONTINGN ** TOTAL	UNIT	** PROJECT ** TOTAL	COL%
10 ITEM 1, VEG CLR BPLD MI 8.1 12.4								
10. 10 01 LANDS AND DAMAGES								
10. 10. 1 LANDS AND DAMAGES								
10. 10. 1.000 <<< Not Identified >>>	1.00	EA	188,696	188696	28,304	28304.40	217,000	100%
10. 10. 1 LANDS AND DAMAGES	1.00	JB	188,696	188696	28,304	28304.40	217,000	100%
10. 10 01 LANDS AND DAMAGES	1.00	JB	188,696	188696	28,304	28304.40	217,000	64.2%
10. 20 02 RELOCATIONS								
10. 20. 1 RELOCATIONS								
10. 20. 1.000 <<< Not Identified >>>	1.00	EA	6,950	6950.00	1,043	1042.50	7,993	100%
10. 20. 1 RELOCATIONS	1.00	JB	6,950	6950.00	1,043	1042.50	7,993	100%
10. 20 02 RELOCATIONS	1.00	JB	6,950	6950.00	1,043	1042.50	7,993	2.4%
10. 30 09 VEG CLEAR ST JOHNS BAYOU								
10. 30. 10 09 VEG CLR BPLD MI 8.10-12.4								
10. 30. 10. 10 CLEARING	227.04	ST	43,727	192.60	6,559	28.89	50,286	77.1%
10. 30. 10. 30 ENVIRONMENTAL PROTECTION	22704.00	LF	12,978	0.57	1,947	0.09	14,924	22.9%
10. 30. 10 09 VEG CLR BPLD MI 8.10-12.4	4.30	MI	56,705	13187.14	8,506	1978.07	65,210	100%
10. 30 09 VEG CLEAR ST JOHNS BAYOU	4.30	MI	56,705	13187.14	8,506	1978.07	65,210	19.3%
10. 40 30 PLANNING, ENGINEERING & DES								
10. 40. 1 PLANNING, ENGINEERING & DESIGN								
10. 40. 1.000 <<< Not Identified >>>	1.00	EA	23,500	23500.00	3,525	3525.00	27,025	100%
10. 40. 1 PLANNING, ENGINEERING & DESIGN	1.00	JB	23,500	23500.00	3,525	3525.00	27,025	100%
10. 40 30 PLANNING, ENGINEERING & DES	1.00	JB	23,500	23500.00	3,525	3525.00	27,025	8.0%
10. 50 31 SUPERVISION & ADMINISTRATION								
10. 50. 1 SUPERVISION & ADMINISTRATION								
10. 50. 1.000 <<< Not Identified >>>	1.00	EA	18,200	18200.00	2,730	2730.00	20,930	100%
10. 50. 1 SUPERVISION & ADMINISTRATION	1.00	JB	18,200	18200.00	2,730	2730.00	20,930	100%
10. 50 31 SUPERVISION & ADMINISTRATION	1.00	JB	18,200	18200.00	2,730	2730.00	20,930	6.2%
10 ITEM 1, VEG CLR BPLD MI 8.1-12.4	4.30	MI	294,051	68383.80	44,108	10257.58	338,158	0.7%

** 2ND VIEW SUMMARY **

	QUANTITY	UOM	** CONTRACT ** TOTAL	UNIT	** CONTINGN ** TOTAL	UNIT	** PROJECT ** TOTAL	COL%
20 ITEM 2, NEW MADRID FLWY PUMP STA								
20. 10 01 LANDS AND DAMAGES								
20. 10. 1 LANDS AND DAMAGES								
20. 10. 1.000 <<< Not Identified >>>	1.00	EA	235,652	235652	35,348	35347.80	271,000	100%
20. 10. 1 LANDS AND DAMAGES	1.00	JB	235,652	235652	35,348	35347.80	271,000	100%
20. 10 01 LANDS AND DAMAGES	1.00	JB	235,652	235652	35,348	35347.80	271,000	1.3%
20. 20 02 RELOCATIONS								
20. 20. 1 RELOCATIONS								
20. 20. 1.000 <<< Not Identified >>>	1.00	EA	0		0		0	%
20. 20. 1 RELOCATIONS	1.00	JB	0		0		0	%
20. 20 02 RELOCATIONS	1.00	JB	0		0		0	%
20. 25 13 NEW MADRID PU STA MECH EQ PUR								
20. 25. 10 MAIN PUMPS								
20. 25. 10.000 <<< Not Identified >>>	1.00	EA	965,831	965831	144,875	144875	1,110,706	100%
20. 25. 10 MAIN PUMPS	3.00	EA	965,831	321944	144,875	48291.57	1,110,706	53.9%
20. 25. 20 MAIN PUMP TRANSMISSION GEARS								
20. 25. 20.000 <<< Not Identified >>>	1.00	EA	624,147	624147	91,622	91622.03	717,769	100%
20. 25. 20 MAIN PUMP TRANSMISSION GEARS	3.00	EA	624,147	208049	91,622	31207.34	717,769	34.8%
20. 25. 30 MAIN PUMP MOTORS								
20. 25. 30.000 <<< Not Identified >>>	1.00	EA	201,703	201703	30,255	30255.42	231,958	100%
20. 25. 30 MAIN PUMP MOTORS	3.00	EA	201,703	67234.28	30,255	10085.14	231,958	11.3%
20. 25 13 NEW MADRID PU STA MECH EQ PUR	1.00	JB	1,791,681	1791681	268,752	268752	2,060,433	9.6%
20. 30 13 NEW MADRID FLWY PUMP STATION								
20. 30. 10 GENERAL CONDITIONS								
20. 30. 10. 10 MOBILIZATION/DEMOBILIZATION	1.00	EA	30,552	30551.70	4,583	4582.75	35,134	85.8%
20. 30. 10. 20 CONCRETE LAB TESTING	1.00	EA	3,150	3149.69	472	472.45	3,622	8.8%
20. 30. 10. 30 SOIL COMPACTION TESTING	1.00	EA	1,890	1889.81	283	283.47	2,173	5.3%
20. 30. 10 GENERAL CONDITIONS	1.00	JB	35,591	35591.19	5,339	5338.68	40,930	0.3%
20. 30. 20 SITEWORK								
20. 30. 20. 10 EMBANKMENT, LEVEE CLOSURE	243000.00	ECY	614,958	2.64	92,244	0.40	707,202	10.6%
20. 30. 20. 15 TURFING, LEVEE CLOSURE	10.00	AC	11,339	1133.89	1,701	170.08	13,040	0.2%
20. 30. 20. 20 TURFING, GENERAL	40.00	AC	35,276	881.91	5,291	132.29	40,568	0.6%

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** 2ND VIEW SUMMARY **

	QUANTITY	UOM	** CONTRACT ** TOTAL	UNIT	** CONTINGN ** TOTAL	UNIT	** PROJECT ** TOTAL	COL%	
20. 30. 20. 30 CLEARING	50.00	AC	65,727	1314.55	9,859	197.18	75,587	1.1%	75,587
20. 30. 20. 40 EXCAVATION, DIVERSION CHANNEL 2141	253000.00	BCY	302,811	1.20	45,422	0.18	348,232	5.2%	348,232
20. 30. 20. 50 EMBANKMENT, DIVERSION CHAN REFIL /	184000.00	ECY	422,910	2.30	63,436	0.34	486,346	7.3%	566,170
20. 30. 20. 60 EMBANKMENT, COFFERDAM 170 3	172000.00	ECY	341,105	1.98	51,166	0.30	392,271	5.9%	388,925
20. 30. 20. 70 DEWATERING	1.00	LS	2,221,435	2221435	333,215	333215	2,554,650	38.3%	
20. 30. 20. 80 EXCAVATION, CHANNEL TRANSITION	120000.00	BCY	71,813	0.60	10,772	0.09	82,585	1.2%	
20. 30. 20. 90 EXCAVATION, STRUCTURAL ROUGH	47000.00	BCY	98,550	2.10	19,710	0.42	118,260	1.8%	
20. 30. 20.100 EXCAVATION, STRUCTURAL FINISH	4000.00	BCY	40,274	10.07	6,041	1.51	46,315	0.7%	
20. 30. 20.110 AGGREGATE SURFACING	1945.00	CCY	34,083	17.52	6,817	3.50	40,899	0.6%	
20. 30. 20.115 FILTER FABRIC 6778/	7300.00	SY	23,350	3.20	3,503	0.48	26,853	0.4%	
20. 30. 20.120 RIPRAP 7080/	9000.00	TN	120,501	13.39	18,075	2.01	138,576	2.1%	
20. 30. 20.130 EMBANKMENT, PERVIOUS WASHED 14,255/	61500.00	TN	870,543	14.16	130,581	2.12	1,001,124	15.0%	
20. 30. 20.135 EMBANKMENT, IMPERVIOUS 940/	9800.00	CY	79,589	8.12	11,938	1.22	91,527	1.4%	
20. 30. 20.140 EMBANKMENT, RANDOM 27,800/	22500.00	CY	55,039	2.45	8,256	0.37	63,295	0.9%	
20. 30. 20.145 PILING; SHEET PSA 23 1600/	2020.00	SF	37,921	18.77	5,688	2.82	43,609	0.7%	
20. 30. 20.150 VIBROFLOTATION DENSIFICATION	1.00	LS	347,099	347099	52,065	52064.88	399,164	6.0%	270,000
20. 30. 20 SITEWORK	1.00	JB	5,794,323	5794323	875,780	875780	6,670,103	41.3%	
OUTLET RIPRAP									MRL
20. 30. 30 CONCRETE									595,600
20. 30. 30. 10 SLAB ON GRADE 2200/	4085.00	CY	961,671	235.42	144,251	35.31	1,105,922	19.2%	726,586
20. 30. 30. 20 WALLS 1500/	6560.00	CY	2,590,438	394.88	388,566	59.23	2,979,004	51.7%	
20. 30. 30. 30 FOOTINGS	10.00	CY	2,304	230.39	346	34.56	2,649	0.0%	
20. 30. 30. 40 RETAINING WALLS	1280.00	CY	431,507	337.12	64,726	50.57	496,233	8.6%	
20. 30. 30. 50 ELEVATED SLAB 1300/	2381.00	CY	787,599	330.78	118,140	49.62	905,739	15.7%	494,523
20. 30. 30. 60 STAIRS	18.00	CY	12,331	685.04	1,850	102.76	14,180	0.2%	
20. 30. 30. 70 BEAMS	155.00	CY	103,807	669.72	15,571	100.46	119,378	2.1%	
20. 30. 30. 80 COLUMNS 15/	115.00	CY	53,994	469.51	8,099	70.43	62,093	1.1%	8,100
20. 30. 30. 90 PRESTRESSED WALKWAY SLAB	14.00	CY	18,130	1294.98	2,719	194.25	20,849	0.4%	
20. 30. 30.100 WATERSTOP 1800/	2150.00	LF	22,014	10.24	3,302	1.54	25,316	0.4%	21,194
20. 30. 30.110 WALL DRAINS	900.00	LF	23,484	26.09	3,523	3.91	27,007	0.5%	
20. 30. 30 CONCRETE	14632.00	CY	5,007,279	342.21	751,092	51.33	5,758,370	35.7%	
20. 30. 40 MASONRY									
20. 30. 40.000 <<< Not Identified >>>	1.00	EA	115,919	115919	17,388	17387.78	133,306	100%	
20. 30. 40 MASONRY	17430.00	SF	115,919	6.65	17,388	1.00	133,306	0.8%	
20. 30. 50 METALS									
20. 30. 50.000 <<< Not Identified >>>	1.00	EA	459,993	459993	68,999	68998.92	28,500/528,992	100%	
20. 30. 50 METALS	1.00	JB	459,993	459993	68,999	68998.92	528,992	3.3%	
20. 30. 60 WOOD/PLASTICS									
20. 30. 60.000 <<< Not Identified >>>	1.00	EA	33,239	33238.75	4,986	4985.81	38,225	100%	
20. 30. 60 WOOD/PLASTICS	1.00	JB	33,239	33238.75	4,986	4985.81	38,225	0.2%	
20. 30. 70 THERMAL/MOISTURE PROTECTION									

OR 32% MRL

** 2ND VIEW SUMMARY **

	QUANTITY	UOM	** CONTRACT ** TOTAL	UNIT	** CONTINGN ** TOTAL	UNIT	** PROJECT ** TOTAL	COL%
20. 30. 70. 10 ROOFING, 4 PLY	5376.00	SF	24,880	4.63	3,732	0.69	28,612	45.5%
20. 30. 70. 20 INSULATION, 1"	14026.00	SF	20,285	1.45	3,043	0.22	23,328	37.1%
20. 30. 70. 30 SEALANTS	1.00	JB	9,460	9459.96	1,419	1418.99	10,879	17.3%
20. 30. 70 THERMAL/MOISTURE PROTECTION	1.00	LS	54,625	54625.09	8,194	8193.76	62,819	0.4%
20. 30. 80 DOORS/WINDOWS/GLASS								
20. 30. 80.000 <<< Not Identified >>>	1.00	EA	11,079	11079.29	1,662	1661.89	12,741	100%
20. 30. 80 DOORS/WINDOWS/GLASS	1.00	JB	11,079	11079.29	1,662	1661.89	12,741	0.1%
20. 30. 90 FINISHES								
20. 30. 90.000 <<< Not Identified >>>	1.00	EA	70,427	70426.96	14,085	14085.19	84,512	100%
20. 30. 90 FINISHES	26000.00	SF	70,427	2.71	14,085	0.54	84,512	0.5%
20. 30.100 SPECIALTIES								
20. 30.100.000 <<< Not Identified >>>	1.00	EA	1,752	1751.78	263	262.77	2,015	100%
20. 30.100 SPECIALTIES	1.00	JB	1,752	1751.78	263	262.77	2,015	0.0%
20. 30.110 EQUIPMENT (not used)								
20. 30.110.000 <<< Not Identified >>>	1.00	EA	0		0		0	%
20. 30.110 EQUIPMENT (not used)	1.00	JB	0		0		0	%
20. 30.120 FURNISHINGS								
20. 30.120. 10 BATH CABINET/COUNTERTOP	1.00	EA	1,096	1095.88	164	164.38	1,260	100%
20. 30.120 FURNISHINGS	1.00	JB	1,096	1095.88	164	164.38	1,260	0.0%
20. 30.150 MECHANICAL								
20. 30.150. 10 STATION CRANE	1.00	JB	113,901	113901	17,085	17085.09	130,986	8.2%
20. 30.150. 30 ROLLER GATES	3.00	EA	309,956	103319	46,493	15497.81	356,450	22.4%
20. 30.150. 40 SUMP DEWATERING SYSTEM	1.00	JB	79,693	79692.83	11,954	11951.92	91,647	5.8%
20. 30.150. 50 WATER SUPPLY & PLUMBING SYSTEM	1.00	JB	78,752	78752.19	11,813	11812.03	90,565	5.7%
20. 30.150. 60 HEATING AND VENTILATION	1.00	JB	51,718	51717.78	7,758	7757.67	59,475	3.7%
20. 30.150. 70 FLAP GATES, DISCHARGE	3.00	EA	40,906	13635.21	6,136	2045.28	47,041	3.0%
20. 30.150. 80 SLIDE GATES WITH OPERATOR	6.00	EA	452,062	75343.67	67,809	11301.55	519,871	32.7%
20. 30.150. 90 TRASH RAKES	3.00	EA	253,889	84629.73	38,083	12694.46	291,973	18.4%
20. 30.150 MECHANICAL	1.00	JB	1,380,876	1380876	207,131	207131	1,588,008	9.8%
20. 30.160 ELECTRICAL								
20. 30.160. 10 TRANSFORMERS	1.00	JB	3,380	3379.59	507	506.94	3,887	0.3%
20. 30.160. 20 MOTOR CONTROL CENTER	1.00	JB	43,214	43213.85	6,482	6482.08	49,696	4.1%
20. 30.160. 30 SWITCHGEAR AND BUSWORK	1.00	JB	183,658	183658	27,549	27548.74	211,207	17.4%
20. 30.160. 40 MISCELLANEOUS WIRING	1.00	JB	126,239	126239	18,936	18935.82	145,175	11.9%
20. 30.160. 50 LIGHTING AND GROUNDING	1.00	JB	69,937	69937.02	10,491	10490.55	80,428	6.6%
20. 30.160. 60 SUBSTATION & TRANSMISSON LINE	1.00	JB	630,419	630419	94,563	94562.05	724,982	59.7%

** 2ND VIEW SUMMARY **

	QUANTITY	UOM	** CONTRACT ** TOTAL	UNIT	** CONTINGN ** TOTAL	UNIT	** PROJECT ** TOTAL	COL%
20. 30.160 ELECTRICAL	1.00	JB	1,056,847	1056847	158,527	158527	1,215,374	7.5%
20. 30 13 NEW MADRID FLWY PUMP STATION	1.00	JB	14023044	14023044	2,113,610	2113610	16,136,654	75.4%
20. 40 30 PLANNING, ENGINEERING & DES								
20. 40. 1 30 PLANNING, ENGINEERING & DES								
20. 40. 1.000 <<< Not Identified >>>	1.00	EA	1,400,000	1400000	210,000	210000	1,610,000	100%
20. 40. 1 30 PLANNING, ENGINEERING & DES	1.00	JB	1,400,000	1400000	210,000	210000	1,610,000	100%
20. 40 30 PLANNING, ENGINEERING & DES	1.00	JB	1,400,000	1400000	210,000	210000	1,610,000	7.5%
20. 50 31 SUPERVISION & ADMINISTRATION								
20. 50. 1 SUPERVISION & ADMINISTRATION								
20. 50. 1.000 <<< Not Identified >>>	1.00	EA	1,150,000	1150000	172,500	172500	1,322,500	100%
20. 50. 1 SUPERVISION & ADMINISTRATION	1.00	JB	1,150,000	1150000	172,500	172500	1,322,500	100%
20. 50 31 SUPERVISION & ADMINISTRATION	1.00	JB	1,150,000	1150000	172,500	172500	1,322,500	6.2%
20 ITEM 2, NEW MADRID FLWY PUMP STA	1.00	JB	18600378	18600378	2,800,210	2800210	21,400,587	43.0%
30 ITEM 3, CHAN IMPROV ST JOHNS BAY								
30. 10 01 LANDS AND DAMAGES								
30. 10. 1 LANDS AND DAMAGES								
30. 10. 1.000 <<< Not Identified >>>	1.00	EA	334,590	334590	50,189	50188.50	384,779	100%
30. 10. 1 LANDS AND DAMAGES	1.00	JB	334,590	334590	50,189	50188.50	384,779	79.2%
30. 10. 2 MITIGATION								
30. 10. 2.000 <<< Not Identified >>>	1.00	EA	88,019	88019.00	13,203	13202.85	101,222	100%
30. 10. 2 MITIGATION	1.00	JB	88,019	88019.00	13,203	13202.85	101,222	20.8%
30. 10 01 LANDS AND DAMAGES	1.00	JB	422,609	422609	63,391	63391.35	486,000	17.2%
30. 20 02 RELOCATIONS								
30. 20. 1 RELOCATIONS								
30. 20. 1.000 <<< Not Identified >>>	1.00	EA	0		0		0	%
30. 20. 1 RELOCATIONS	1.00	EA	0		0		0	%
30. 20 02 RELOCATIONS	1.00	JB	0		0		0	%

Encl
Bid
MRL vs. St. John's
analysis
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** 2ND VIEW SUMMARY **

	QUANTITY	UOM	** CONTRACT ** TOTAL	UNIT	** CONTINGN ** TOTAL	UNIT	** PROJECT ** TOTAL	COL%
30. 30 09 CHAN IMPRV CONTR ST JOHNS BY								
30. 30. 10 MOBILIZATION AND DEMOBILIZATION								
30. 30. 10.000 <<< Not Identified >>>	1.00	EA	44,982	44982.40	6,747	6747.36	51,730	100%
30. 30. 10 MOBILIZATION AND DEMOBILIZATION	1.00	JB	44,982	44982.40	6,747	6747.36	51,730	2.7%
30. 30. 20 CLEARING								
30. 30. 20.000 <<< Not Identified >>>	1.00	EA	58,435	58434.93	8,765	8765.24	67,200	100%
30. 30. 20 CLEARING	316.80	STA	58,435	184.45	8,765	27.67	67,200	3.5%
30. 30. 30 EXCAVATION								
30. 30. 30.000 <<< Not Identified >>>	1.00	EA	1,008,865	1008865	100,887	100887	1,109,752	100%
30. 30. 30 EXCAVATION	1400000	BCY	1,008,865	0.72	100,887	0.07	1,109,752	58.4%
30. 30. 40 FINISH DRESS, FERT, SEED, & MULC								
30. 30. 40.000 <<< Not Identified >>>	1.00	EA	5,411	5411.24	812	811.69	6,223	100%
30. 30. 40 FINISH DRESS, FERT, SEED, & MULC	5.00	AC	5,411	1082.25	812	162.34	6,223	0.3%
30. 30. 50 ROUGH DRESS, FERT, & SEEDING								
30. 30. 50.000 <<< Not Identified >>>	1.00	EA	29,341	29340.95	4,401	4401.14	33,742	100%
30. 30. 50 ROUGH DRESS, FERT, & SEEDING	122.00	AC	29,341	240.50	4,401	36.07	33,742	1.8%
30. 30. 60 CORRUGATED METAL PIPE, 24 INCH								
30. 30. 60.000 <<< Not Identified >>>	1.00	EA	5,236	5236.48	785	785.47	6,022	100%
30. 30. 60 CORRUGATED METAL PIPE, 24 INCH	200.00	LF	5,236	26.18	785	3.93	6,022	0.3%
30. 30. 70 FLARED END SECTION, 24 INCH								
30. 30. 70.000 <<< Not Identified >>>	1.00	EA	496	495.59	74	74.34	570	100%
30. 30. 70 FLARED END SECTION, 24 INCH	10.00	EA	496	49.56	74	7.43	570	0.0%
30. 30. 80 RIPRAP								
30. 30. 80.000 <<< Not Identified >>>	1.00	EA	1,692	1691.58	254	253.74	1,945	100%
30. 30. 80 RIPRAP	100.00	TN	1,692	16.92	254	2.54	1,945	0.1%
30. 30.100 FILTER MATERIAL								
30. 30.100.000 <<< Not Identified >>>	1.00	EA	930	930.37	140	139.56	1,070	100%
30. 30.100 FILTER MATERIAL	55.00	TN	930	16.92	140	2.54	1,070	0.1%
30. 30.110 ENVIRONMENTAL PROTECTION								
30. 30.110.000 <<< Not Identified >>>	1.00	EA	539,992	539992	80,999	80998.84	620,991	100%
30. 30.110 ENVIRONMENTAL PROTECTION	31680.00	LF	539,992	17.05	80,999	2.56	620,991	32.7%

** 2ND VIEW SUMMARY **

	QUANTITY	UOM	** CONTRACT ** TOTAL	UNIT	** CONTINGN ** TOTAL	UNIT	** PROJECT ** TOTAL	COL%
30. 30 09 CHAN IMPRV CONTR ST JOHNS BY	3.00	MI	1,695,381	565127	203,864	67954.63	1,899,245	67.3%
30. 40 30 PLANNING, ENGINEERING & DES								
30. 40. 1 PLANNING, ENGINEERING & DESIGN								
30. 40. 1.000 <<< Not Identified >>>	1.00	EA	210,000	210000	31,500	31500.00	241,500	100%
30. 40. 1 PLANNING, ENGINEERING & DESIGN	1.00	JB	210,000	210000	31,500	31500.00	241,500	100%
30. 40 30 PLANNING, ENGINEERING & DES	1.00	JB	210,000	210000	31,500	31500.00	241,500	8.6%
30. 50 31 SUPERVISION & ADMINISTRATION								
30. 50. 1 SUPERVISION & ADMINISTRATION								
30. 50. 1.000 <<< Not Identified >>>	1.00	EA	170,000	170000	25,500	25500.00	195,500	100%
30. 50. 1 SUPERVISION & ADMINISTRATION	1.00	JB	170,000	170000	25,500	25500.00	195,500	100%
30. 50 31 SUPERVISION & ADMINISTRATION	1.00	JB	170,000	170000	25,500	25500.00	195,500	6.9%
30 ITEM 3, CHAN IMPROV ST JOHNS BAY	3.00	MI	2,497,990	832663	324,255	108085	2,822,245	5.7%
40 ITEM 4, CHAN IMPROV SJB & BPLD								
40. 10 01 LANDS AND DAMAGES								
40. 10. 1 01 LANDS & DAM ST JOHNS MI 3-4.5								
40. 10. 1.000 <<< Not Identified >>>	1.00	EA	158,844	158844	23,827	23826.60	182,671	100%
40. 10. 1 01 LANDS & DAM ST JOHNS MI 3-4.5	1.00	JB	158,844	158844	23,827	23826.60	182,671	30.5%
40. 10. 2 01 LANDS & DAM BPNMLD 0-8.1								
40. 10. 2.000 <<< Not Identified >>>	1.00	EA	266,456	266456	39,968	39968.40	306,424	100%
40. 10. 2 01 LANDS & DAM BPNMLD 0-8.1	1.00	JB	266,456	266456	39,968	39968.40	306,424	51.2%
40. 10. 3 01 MITIGATION ST JOHNS MI 3-4.5								
40. 10. 3.000 <<< Not Identified >>>	1.00	EA	41,700	41700.00	6,255	6255.00	47,955	100%
40. 10. 3 01 MITIGATION ST JOHNS MI 3-4.5	1.00	JB	41,700	41700.00	6,255	6255.00	47,955	8.0%
40. 10. 4 01 MITIGATION BPNMLD 0-8.1								
40. 10. 4.000 <<< Not Identified >>>	1.00	EA	53,000	53000.00	7,950	7950.00	60,950	100%
40. 10. 4 01 MITIGATION BPNMLD 0-8.1	1.00	JB	53,000	53000.00	7,950	7950.00	60,950	10.2%
40. 10 01 LANDS AND DAMAGES	1.00	JB	520,000	520000	78,000	78000.00	598,000	19.6%
40. 20 02 RELOCATIONS								

** 2ND VIEW SUMMARY **

	QUANTITY	UOM	** CONTRACT ** TOTAL	UNIT	** CONTIGN ** TOTAL	UNIT	** PROJECT ** TOTAL	COL%
40. 20. 1 02 RELOC ST JOHNS BAY 3.0-4.5								
40. 20. 1.000 <<< Not Identified >>>	1.00	EA	562,300	562300	84,345	84345.00	646,645	100%
40. 20. 1 02 RELOC ST JOHNS BAY 3.0 4.5	1.00	JB	562,300	562300	84,345	84345.00	646,645	92.0%
40. 20. 2 02 RELOC BIRD PT NMLD 0-8.1								
40. 20. 2.000 <<< Not Identified >>>	1.00	EA	48,850	48850.00	7,328	7327.50	56,178	100%
40. 20. 2 02 RELOC BIRD PT NMLD 0-8.1	1.00	JB	48,850	48850.00	7,328	7327.50	56,178	8.0%
40. 20 02 RELOCATIONS	1.00	JB	611,150	611150	91,673	91672.50	702,823	23.1%
40. 30 09 CHAN IMPRV CONTR SJB & BPLD								
40. 30. 10 09 CHAN IMPR CTR SJB MI 3.0 4.5								
40. 30. 10. 10 MOBILIZATION AND DEMOBILIZATION	1.00	JB	47,586	47585.81	7,138	7137.87	54,724	6.8%
40. 30. 10. 20 CLEARING	158.40	STA	29,217	184.45	4,383	27.67	33,600	4.2%
40. 30. 10. 30 EXCAVATION	700000.00	BCY	504,433	0.72	50,443	0.07	554,876	69.4%
40. 30. 10. 40 FINISH DRESS, FERT, SEED, & MULC	3.00	AC	3,247	1082.25	487	162.34	3,734	0.5%
40. 30. 10. 50 ROUGH DRESS, FERT, & SEEDING	60.00	AC	14,430	240.50	2,164	36.07	16,594	2.1%
40. 30. 10. 60 CORRUGATED METAL PIPE, 24-INCH	100.00	LF	2,618	26.18	393	3.93	3,011	0.4%
40. 30. 10. 70 FLARED END SECTION, 24-INCH	6.00	EA	846	140.95	127	21.14	973	0.1%
40. 30. 10. 80 RIPRAP	50.00	TN	846	16.92	127	2.54	973	0.1%
40. 30. 10. 90 RIPRAP, BRIDGE PROTECTION	3210.00	TN	45,856	14.29	6,878	2.14	52,735	6.6%
40. 30. 10.100 FILTER MATERIAL	27.00	TN	457	16.92	69	2.54	525	0.1%
40. 30. 10.105 FILTER MATERIAL, BRIDGE PROT	1075.00	TN	15,357	14.29	2,304	2.14	17,660	2.2%
40. 30. 10.110 ENVIRONMENTAL PROTECTION	15840.00	LF	52,584	3.32	7,888	0.50	60,472	7.6%
40. 30. 10 09 CHAN IMPR CTR SJB MI 3.0 4.5	1.50	MI	717,477	478318	82,400	54933.24	799,876	53.2%
40. 30. 15 09 CHAN IMPR CTR BPLD 0.0 8.1								
40. 30. 15. 20 CLEARING	427.68	STA	78,887	184.45	11,833	27.67	90,720	12.9%
40. 30. 15. 30 EXCAVATION	610000.00	BCY	405,973	0.64	40,597	0.06	446,571	63.5%
40. 30. 15. 40 FINISH DRESS, FERT, SEED, & MULC	10.00	AC	10,822	1082.25	1,623	162.34	12,446	1.8%
40. 30. 15. 50 ROUGH DRESS, FERT, & SEEDING	160.00	AC	38,480	240.50	5,772	36.07	44,252	6.3%
40. 30. 15. 60 CORRUGATED METAL PIPE, 24 INCH	100.00	LF	2,618	26.18	393	3.93	3,011	0.4%
40. 30. 15. 70 FLARED END SECTION, 24 INCH	10.00	EA	496	49.56	74	7.43	570	0.1%
40. 30. 15. 80 RIPRAP	50.00	TN	846	16.92	127	2.54	973	0.1%
40. 30. 15. 90 RIPRAP, BRIDGE PROTECTION	1260.00	TN	19,704	15.64	2,956	2.35	22,659	3.2%
40. 30. 15.100 FILTER MATERIAL	27.00	TN	457	16.92	69	2.54	525	0.1%
40. 30. 15.105 FILTER MATERIAL, BRIDGE PROT	550.00	TN	8,601	15.64	1,290	2.35	9,891	1.4%
40. 30. 15.110 ENVIRONMENTAL PROTECTION	42768.00	LF	62,746	1.47	9,412	0.22	72,157	10.3%
40. 30. 15 09 CHAN IMPR CTR BPLD 0.0 8.1	8.10	MI	629,630	77732.04	74,146	9153.80	703,775	46.8%
40. 30 09 CHAN IMPRV CONTR SJB & BPLD	9.60	MI	1,347,106	140324	156,546	16306.84	1,503,652	49.4%
40. 40 30 PLANNING, ENGINEERING & DES								
40. 40. 1 30 PED JOHNS BAY 3.0-4.5								

** 2ND VIEW SUMMARY **

	QUANTITY UOM	** CONTRACT ** TOTAL	UNIT	** CONTINGN ** TOTAL	UNIT	** PROJECT ** TOTAL	COL%
40. 40. 1.000 <<< Not Identified >>>	1.00 EA	72,000	72000.00	10,800	10800.00	82,800	100%
40. 40. 1 30 PED JOHNS BAY 3.0-4.5	1.00 JB	72,000	72000.00	10,800	10800.00	82,800	61.8%
40. 40. 2 30 PED BIRD PT NMLD 0-8.1							
40. 40. 2.000 <<< Not Identified >>>	1.00 EA	44,500	44500.00	6,675	6675.00	51,175	100%
40. 40. 2 30 PED BIRD PT NMLD 0-8.1	1.00 JB	44,500	44500.00	6,675	6675.00	51,175	38.2%
40. 40 30 PLANNING, ENGINEERING & DES	1.00 JB	116,500	116500	17,475	17475.00	133,975	4.4%
40. 50 31 SUPERVISION & ADMINISTRATION							
40. 50. 1 31 PED JOHNS BAY 3.0-4.5							
40. 50. 1.000 <<< Not Identified >>>	1.00 EA	56,345	56345.00	8,452	8451.75	64,797	100%
40. 50. 1 31 PED JOHNS BAY 3.0 4.5	1.00 JB	56,345	56345.00	8,452	8451.75	64,797	61.4%
40. 50. 2 31 PED BPNMLD 0-8.1							
40. 50. 2.000 <<< Not Identified >>>	1.00 EA	35,455	35455.00	5,318	5318.25	40,773	100%
40. 50. 2 31 PED BPNMLD 0 8.1	1.00 JB	35,455	35455.00	5,318	5318.25	40,773	38.6%
40. 50 31 SUPERVISION & ADMINISTRATION	1.00 JB	91,800	91800.00	13,770	13770.00	105,570	3.5%
40 ITEM 4, CHAN IMPROV SJB & BPLD	9.60 MI	2,686,556	279850	357,463	37235.74	3,044,019	6.1%
50 ITEM 5, ST. JOHNS BAYOU PUMP STA							
50. 10 01 LANDS AND DAMAGES							
50. 10. 1 LANDS AND DAMAGES							
50. 10. 1.000 <<< Not Identified >>>	1.00 EA	371,304	371304	55,696	55695.60	427,000	100%
50. 10. 1 LANDS AND DAMAGES	1.00 JB	371,304	371304	55,696	55695.60	427,000	100%
50. 10 01 LANDS AND DAMAGES	1.00 JB	371,304	371304	55,696	55695.60	427,000	2.4%
50. 20 02 RELOCATIONS							
50. 20. 1 RELOCATIONS, HWY WW							
50. 20. 1.000 <<< Not Identified >>>	1.00 EA	108,300	108300	16,245	16245.00	124,545	100%
50. 20. 1 RELOCATIONS, HWY WW	1.00 JB	108,300	108300	16,245	16245.00	124,545	100%
50. 20 02 RELOCATIONS	1.00 JB	108,300	108300	16,245	16245.00	124,545	0.7%
50. 25 13 ST JOHNS PU STA MECH EQ PUR							
50. 25. 10 MAIN PUMPS							

** 2ND VIEW SUMMARY **

	QUANTITY	UOM	** CONTRACT ** TOTAL	UNIT	** CONTINGN ** TOTAL	UNIT	** PROJECT ** TOTAL	COL%
50. 25. 10.000 <<< Not Identified >>>	1.00	EA	825,655	825655	123,848	123848	949,504	100%
50. 25. 10 MAIN PUMPS	3.00	EA	825,655	275218	123,848	41282.77	949,504	60.7%
50. 25. 20 MAIN PUMP TRANSMISSION GEARS								
50. 25. 20.000 <<< Not Identified >>>	1.00	EA	353,854	353854	53,078	53078.07	406,932	100%
50. 25. 20 MAIN PUMP TRANSMISSION GEARS	3.00	EA	353,854	117951	53,078	17692.69	406,932	26.0%
50. 25. 30 MAIN PUMP MOTORS								
50. 25. 30.000 <<< Not Identified >>>	1.00	EA	179,999	179999	27,000	26999.81	206,999	100%
50. 25. 30 MAIN PUMP MOTORS	3.00	EA	179,999	59999.57	27,000	8999.94	206,999	11.2%
50. 25 13 ST JOHNS PU STA MECH EQ PUR	1.00	JB	1,359,508	1359508	203,926	203926	1,563,434	8.7%
50. 10 13 ST JOHNS PUMP STATION								
50. 30. 10 GENERAL CONDITIONS								
50. 30. 10. 10 MOBILIZATION/DEMOBILIZATION	1.00	EA	30,552	30551.70	4,583	4582.75	35,134	85.8%
50. 30. 10. 20 CONCRETE LAB TESTING	1.00	EA	3,150	3149.69	472	472.45	3,622	8.8%
50. 30. 10. 30 SOIL COMPACTION TESTING	1.00	EA	1,890	1889.81	283	283.47	2,173	5.3%
50. 30. 10 GENERAL CONDITIONS	1.00	EA	35,591	35591.19	5,339	5338.68	40,930	0.4%
50. 30. 20 SITEWORK								
50. 30. 20. 5 CLEARING	32.00	AC	54,971	1717.85	8,246	257.68	63,217	1.1%
50. 30. 20. 10 EXCAVATION, STRUCTURAL ROUGH	20100.00	BCY	42,146	2.10	6,322	0.31	48,468	0.8%
50. 30. 20. 15 EXCAVATION, STRUCTURAL FINISH	2000.00	BCY	20,137	10.07	3,021	1.51	23,158	0.4%
50. 30. 20. 30 EMBANKMENT, COFFERDAM	72300.00	ECY	205,857	2.85	0		205,857	3.6%
50. 30. 20. 40 DEWATERING	1.00	JB	2,094,165	2094165	314,125	314125	2,408,290	41.7%
50. 30. 20. 50 VIBROFLOTATION DENSIFICATION	1.00	EA	347,099	347099	52,065	52064.88	399,164	6.9%
50. 30. 20. 60 EMBANKMENT, PERVIOUS WASHED	114600.00	TN	1,573,119	13.73	235,968	2.06	1,809,087	31.4%
50. 30. 20. 70 EMBANKMENT, RANDOM	20000.00	CY	48,923	2.45	0		48,923	0.8%
50. 30. 20. 80 EMBANKMENT, IMPERVIOUS	8000.00	CY	64,971	8.12	9,746	1.22	74,716	1.3%
50. 30. 20. 90 AGGREGATE SURFACING	640.00	CCY	11,215	17.52	1,682	2.63	12,897	0.2%
50. 30. 20.100 EXCAVATION, INLET CHANNEL	3900.00	BCY	2,334	0.60	350	0.09	2,684	0.0%
50. 30. 20.105 EXCAVATION, OUTLET CHANNEL	11600.00	BCY	31,871	2.75	4,781	0.41	36,652	0.6%
50. 30. 20.107 EMBANKMENT, INLET CHANNEL	30000.00	BCY	42,234	1.41	0		42,234	0.7%
50. 30. 20.110 FILTER FABRIC	12670.00	SY	40,516	3.20	6,077	0.48	46,593	0.8%
50. 30. 20.115 PERVIOUS BEDDING MATERIAL	3250.00	TN	47,973	14.76	7,196	2.21	55,169	1.0%
50. 30. 20.120 RIPRAP	13020.00	TN	198,140	15.22	29,721	2.28	227,861	3.9%
50. 30. 20.130 RELIEF WELLS, INLET CHANNEL	6.00	EA	166,608	27767.94	24,991	4165.19	191,599	3.3%
50. 30. 20.140 PILING; SHEET PSA 23	1540.00	SF	28,910	18.77	4,336	2.82	33,246	0.6%
50. 30. 20.144 PILING; CONC/PRECAST/PRESTR, 16"	150.00	LF	7,080	47.20	1,062	7.08	8,142	0.1%
50. 30. 20.150 TURFING, LEVEE	7.00	AC	7,937	1133.09	1,191	170.08	9,128	0.2%
50. 30. 20.160 TURFING, GENERAL	22.00	AC	19,402	881.91	2,910	132.29	22,312	0.4%
50. 30. 20 SITEWORK	1.00	EA	5,055,609	5055609	713,789	713789	5,769,398	49.9%

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** 2ND VIEW SUMMARY **

	QUANTITY	UOM	** CONTRACT ** TOTAL	UNIT	** CONTINGN ** TOTAL	UNIT	** PROJECT ** TOTAL	COL%
50. 30. 30 CONCRETE								
50. 30. 30. 10 FOOTINGS	10.00	CY	2,304	230.39	346	34.56	2,649	0.1%
50. 30. 30. 20 SLAB ON GRADE	2212.00	CY	525,447	235.42	78,817	35.31	604,264	28.1%
50. 30. 30. 30 WALLS	2240.00	CY	887,699	394.88	133,155	59.23	1,020,854	47.4%
50. 30. 30. 40 ELEVATED SLAB	806.00	CY	266,613	330.78	39,992	49.62	306,605	14.2%
50. 30. 30. 50 COLUMNS	100.00	CY	46,951	469.51	7,043	70.43	53,994	2.5%
50. 30. 30. 60 BEAMS	70.00	CY	46,881	669.72	7,032	100.46	53,913	2.5%
50. 30. 30. 70 STAIRS	9.00	CY	6,165	685.04	925	102.76	7,090	0.3%
50. 30. 30. 80 RETAINING WALLS	122.00	CY	41,128	337.12	6,169	50.57	47,297	2.2%
50. 30. 30. 90 WATERSTOP	475.00	LF	4,704	9.90	706	1.49	5,410	0.3%
50. 30. 30.100 WALL DRAINS	600.00	LF	43,682	72.80	6,552	10.92	50,234	2.3%
50. 30. 30 CONCRETE	5600.00	CY	1,871,573	334.21	280,736	50.13	2,152,309	18.6%
50. 30. 40 MASONRY								
50. 30. 40.000 <<< Not Identified >>>	1.00	EA	48,548	48548.11	7,282	7282.25	55,831	100%
50. 30. 40 MASONRY	7300.00	SF	48,548	6.65	7,282	1.00	55,831	0.5%
50. 30. 50 METALS								
50. 30. 50.000 <<< Not Identified >>>	1.00	EA	404,281	404281	60,642	60642.18	464,923	100%
50. 30. 50 METALS	1.00	EA	404,281	404281	60,642	60642.18	464,923	4.0%
50. 30. 60 WOOD/PLASTICS (Not Used)								
50. 30. 60.000 <<< Not Identified >>>	1.00	EA	0		0		0	%
50. 30. 60 WOOD/PLASTICS (Not Used)	1.00	EA	0		0		0	%
50. 30. 70 THERMAL/MOISTURE PROTECTION								
50. 30. 70. 10 ROOFING, 4 PLY	4200.00	SF	19,438	4.63	2,916	0.69	22,353	46.6%
50. 30. 70. 20 INSULATION, 1"	10520.00	SF	15,215	1.45	2,282	0.22	17,497	36.4%
50. 30. 70. 30 SEALANTS, CAULKING	1.00	JB	7,095	7094.97	1,064	1064.25	8,159	17.0%
50. 30. 70 THERMAL/MOISTURE PROTECTION	1.00	LS	41,747	41747.04	6,262	6262.06	48,009	0.4%
50. 30. 80 DOORS/WINDOWS/GLASS								
50. 30. 80.000 <<< Not Identified >>>	1.00	EA	9,966	9965.72	1,495	1494.86	11,461	100%
50. 30. 80 DOORS/WINDOWS/GLASS	1.00	EA	9,966	9965.72	1,495	1494.86	11,461	0.1%
50. 30. 85 FINISHES								
50. 30. 85.000 <<< Not Identified >>>	1.00	EA	52,820	52820.22	7,923	7923.03	60,743	100%
50. 30. 85 FINISHES	19500.00	SF	52,820	2.71	7,923	0.41	60,743	0.5%
50. 30.100 SPECIALTIES								
50. 30.100.000 <<< Not Identified >>>	1.00	EA	1,752	1751.78	263	262.77	2,015	100%
50. 30.100 SPECIALTIES	1.00	JB	1,752	1751.78	263	262.77	2,015	0.0%

** 2ND VIEW SUMMARY **

	QUANTITY	UOM	** CONTRACT ** TOTAL	UNIT	** CONTINGN ** TOTAL	UNIT	** PROJECT ** TOTAL	COL%
50. 30.110 EQUIPMENT (Not Used)								
50. 30.110.000 <<< Not Identified >>>	1.00	EA	0		0		0	%
50. 30.110 EQUIPMENT (Not Used)	1.00	JB	0		0		0	%
50. 30.120 FURNISHINGS								
50. 30.120. 10 BATH CABINET/COUNTERTOP	1.00	EA	1,096	1095.88	164	164.38	1,260	100%
50. 30.120 FURNISHINGS	1.00	15	1,096	1095.88	164	164.38	1,260	0.0%
50. 30.150 MECHANICAL								
50. 30.150. 10 STATION CRANE	1.00	JB	111,398	111398	16,710	16709.66	128,107	6.5%
50. 30.150. 20 DISCHARGE PIPES	1.00	JB	965,886	965886	144,883	144883	1,110,769	56.2%
50. 30.150. 30 ROLLER GATES	3.00	EA	283,084	94361.24	42,463	14154.19	325,546	16.5%
50. 30.150. 40 SUMP DEWATERING SYSTEM	1.00	JB	39,317	39317.09	5,898	5897.56	45,215	2.3%
50. 30.150. 50 WATER SUPPLY & PLUMBING SYSTEM	1.00	JB	52,424	52423.55	7,864	7863.53	60,287	3.0%
50. 30.150. 60 HEATING AND VENTILATION	1.00	JB	22,280	22280.30	3,342	3342.04	25,622	1.3%
50. 30.150. 90 TRASH RAKES	3.00	EA	245,340	81780.05	36,801	12267.01	282,141	14.3%
50. 30.150 MECHANICAL	1.00	JB	1,719,728	1719728	257,959	257959	1,977,688	17.1%
50. 30.160 ELECTRICAL								
50. 30.160. 10 TRANSFORMERS	1.00	JB	3,380	3379.59	507	506.94	3,887	0.4%
50. 30.160. 20 MOTOR CONTROL CENTER	1.00	JB	43,214	43213.05	6,482	6482.08	49,696	5.1%
50. 30.160. 30 SWITCHGEAR AND BUSWORK	1.00	JB	183,658	183658	27,549	27548.74	211,207	21.7%
50. 30.160. 40 MISCELLANEOUS WIRING	1.00	JB	126,239	126239	18,936	18935.82	145,175	14.9%
50. 30.160. 50 LIGHTING AND GROUNDING	1.00	JB	69,937	69937.02	10,491	10490.55	80,428	8.3%
50. 30.160. 60 SUBSTATION & TRANSMISSION LINE	1.00	JB	420,279	420279	63,042	63041.90	483,321	49.6%
50. 30.160 ELECTRICAL	1.00	JB	846,707	846707	127,006	127006	971,713	8.4%
50. 30 13 ST JOHNS PUMP STATION	1.00	JB	10089418	10089418	1,468,861	1468861	11,558,279	64.5%
50. 40 30 PLANNING, ENGINEERING & DES								
50. 40. 1 PLANNING, ENGINEERING & DESIGN								
50. 40. 1.000 <<< Not Identified >>>	1.00	EA	2,200,000	2200000	330,000	330000	2,530,000	100%
50. 40. 1 PLANNING, ENGINEERING & DESIGN	1.00	JB	2,200,000	2200000	330,000	330000	2,530,000	100%
50. 40 30 PLANNING, ENGINEERING & DES	1.00	JB	2,200,000	2200000	330,000	330000	2,530,000	14.1%
50. 50 31 SUPERVISION & ADMINISTRATION								
50. 50. 1 SUPERVISION & ADMINISTRATION								
50. 50. 1.000 <<< Not Identified >>>	1.00	EA	1,500,000	1500000	225,000	225000	1,725,000	100%
50. 50. 1 SUPERVISION & ADMINISTRATION	1.00	JB	1,500,000	1500000	225,000	225000	1,725,000	100%
50. 50 31 SUPERVISION & ADMINISTRATION	1.00	15	1,500,000	1500000	225,000	225000	1,725,000	9.6%

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** 2ND VIEW SUMMARY **

	QUANTITY	UOM	** CONTRACT ** TOTAL	UNIT	** CONTINGN ** TOTAL	UNIT	** PROJECT ** TOTAL	COL%
50 ITEM 5, ST. JOHNS BAYOU PUMP STA	1.00	JB	15628530	15628530	2,299,727	2299727	17,928,258	36.1%
60 ITEM 6, CHAN IMPROV ST JAMES DIT								
60. 10 01 LANDS AND DAMAGES								
60. 10. 1 01 LANDS/DAM ST JAMES MI 0-10.8								
60. 10. 1.000 <<< Not Identified >>>	1.00	EA	553,009	553009	82,951	82951.35	635,960	100%
60. 10. 1 01 LANDS/DAM ST JAMES MI 0 10.8	1.00	JB	553,009	553009	82,951	82951.35	635,960	76.5%
60. 10. 2 02 MITIGATION JAMES MI 0-10.8								
60. 10. 2.000 <<< Not Identified >>>	1.00	EA	169,600	169600	25,440	25440.00	195,040	100%
60. 10. 2 02 MITIGATION JAMES MI 0-10.8	1.00	JB	169,600	169600	25,440	25440.00	195,040	23.5%
60. 10 01 LANDS AND DAMAGES	1.00	JB	722,609	722609	108,191	108391	831,000	19.8%
60. 20 02 RELOCATIONS								
60. 20. 1 02 RELOCATIONS								
60. 20. 1.000 <<< Not Identified >>>	1.00	EA	1,860,000	1860000	279,000	279000	2,139,000	100%
60. 20. 1 02 RELOCATIONS	1.00	JB	1,860,000	1860000	279,000	279000	2,139,000	100%
60. 20 02 RELOCATIONS	1.00	JB	1,860,000	1860000	279,000	279000	2,139,000	51.0%
60. 30 09 CHAN IMPROV, ST JAMES DITCH								
60. 30. 10 MOBILIZATION AND DEMOBILIZATION								
60. 30. 10.000 <<< Not Identified >>>	1.00	EA	24,790	24790.41	3,719	3718.56	28,509	100%
60. 30. 10 MOBILIZATION AND DEMOBILIZATION	1.00	JB	24,790	24790.41	3,719	3718.56	28,509	3.0%
60. 30. 20 CLEARING								
60. 30. 20.000 <<< Not Identified >>>	1.00	EA	105,183	105183	15,777	15777.43	120,960	100%
60. 30. 20 CLEARING	570.24	STA	105,183	184.45	15,777	27.67	120,960	12.9%
60. 30. 30 EXCAVATION								
60. 30. 30.000 <<< Not Identified >>>	1.00	EA	419,624	419624	62,944	62943.59	482,568	100%
60. 30. 30 EXCAVATION	675600.00	BCY	419,624	0.62	62,944	0.09	482,568	51.4%
60. 30. 40 FINISH DRESS, FERT, SEED, & MULC								
60. 30. 40.000 <<< Not Identified >>>	1.00	EA	15,151	15151.47	2,273	2272.72	17,424	100%
60. 30. 40 FINISH DRESS, FERT, SEED, & MULC	14.00	AC	15,151	1082.25	2,273	162.34	17,424	1.9%
60. 30. 50 ROUGH DRESS, FERT, & SEEDING								
60. 30. 50.000 <<< Not Identified >>>	1.00	EA	55,315	55314.90	8,297	8297.24	63,612	100%

** 2ND VIEW SUMMARY **

	QUANTITY	UOM	** CONTRACT ** TOTAL	UNIT	** CONTINGN ** TOTAL	UNIT	** PROJECT ** TOTAL	COL%
60. 30. 50 ROUGH DRESS, FERT, & SEEDING	230.00	AC	55,315	240.50	8,297	36.07	63,612	6.8%
60. 30. 60 CORRUGATED METAL PIPE, 24-INCH								
60. 30. 60.000 <<< Not Identified >>>	1.00	EA	3,142	3141.89	471	471.28	3,613	100%
60. 30. 60 CORRUGATED METAL PIPE, 24-INCH	120.00	LF	3,142	26.18	471	3.93	3,613	0.4%
60. 30. 70 FLARED END SECTION, 24 INCH								
60. 30. 70.000 <<< Not Identified >>>	1.00	EA	1,691	1691.38	254	253.71	1,945	100%
60. 30. 70 FLARED END SECTION, 24-INCH	12.00	EA	1,691	140.95	254	21.14	1,945	0.2%
60. 30. 80 RIPRAP								
60. 30. 80.000 <<< Not Identified >>>	1.00	EA	1,015	1014.95	152	152.24	1,167	100%
60. 30. 80 RIPRAP	60.00	TN	1,015	16.92	152	2.54	1,167	0.1%
60. 30. 90 RIPRAP, BRIDGE PROTECTION								
60. 30. 90.000 <<< Not Identified >>>	1.00	EA	76,001	76000.70	11,400	11400.11	87,401	100%
60. 30. 90 RIPRAP, BRIDGE PROTECTION	4860.00	TN	76,001	15.64	11,400	2.35	87,401	9.3%
60. 30.100 FILTER MATERIAL								
60. 30.100.000 <<< Not Identified >>>	1.00	EA	507	507.47	76	76.12	584	100%
60. 30.100 FILTER MATERIAL	30.00	TN	507	16.92	76	2.54	584	0.1%
60. 30.105 FILTER MATERIAL, BRIDGE PROT								
60. 30.105.000 <<< Not Identified >>>	1.00	EA	31,902	31901.53	4,785	4785.23	36,687	100%
60. 30.105 FILTER MATERIAL, BRIDGE PROT	2040.00	TN	31,902	15.64	4,785	2.35	36,687	3.9%
60. 30.110 ENVIRONMENTAL PROTECTION								
60. 30.110.000 <<< Not Identified >>>	1.00	EA	81,296	81295.82	12,194	12194.17	93,490	100%
60. 30.110 ENVIRONMENTAL PROTECTION	57024.00	LF	81,296	1.43	12,194	0.21	93,490	10.0%
60. 30 09 CHAN IMPROV, ST JAMES DITCH	10.80	MI	815,617	75520.13	122,343	11328.02	937,960	22.4%
60. 40 30 PLANNING, ENGINEERING & DES								
60. 40. 1 30 PED ST. JAMES DITCH								
60. 40. 1.000 <<< Not Identified >>>	1.00	EA	150,000	150000	22,500	22500.00	172,500	100%
60. 40. 1 30 PED ST. JAMES DITCH	1.00	JB	150,000	150000	22,500	22500.00	172,500	100%
60. 40 30 PLANNING, ENGINEERING & DES	1.00	JB	150,000	150000	22,500	22500.00	172,500	4.1%

** 2ND VIEW SUMMARY **

	QUANTITY	UOM	** CONTRACT ** TOTAL	UNIT	** COFFTHGH ** TOTAL	UNIT	** PROJECT ** TOTAL	COLA
60. 50 31 SUPERVISION & ADMINISTRATION								
60. 50. 1 31 S&A ST. JAMES DITCH								
60. 50. 1.000 <<< Not Identified >>>	1.00	EA	100,000	100000	15,000	15000.00	115,000	100%
60. 50. 1 31 S&A ST. JAMES DITCH	1.00	JB	100,000	100000	15,000	15000.00	115,000	100%
60. 50 31 SUPERVISION & ADMINISTRATION	1.00	JB	100,000	100000	15,000	15000.00	115,000	2.7%
60 ITEM 6, CHAN IMPROV ST JAMES DIT	10.80	MI	3,648,226	337799	547,234	50669.01	4,195,460	8.4%
EAST PRAIRIE PHASE LRR	1.00	EA	43355731	43355731	6,372,997	6372997	49,728,728	100%

No errors detected...

* * * END OF ERROR REPORT * * *

Table B-1

New Madrid Gravity Outlet Cost Estimate

(October 1996 Price Level)

Item	Quantity	Unit	Unit Price $$	Federal Cost $$
Earthwork				
1 Excavation, Div Channel	253,000	BCY	1.20	302,811
2 Excavation, Structural	36,381	BCY	2.90	105,506
3 Excavation, Channel	520,000	BCY	0.60	312,000
4 Cofferdam, Chan Closure	170,553	ECY	2.00	341,105
5 Embank, Div Chan Refill	214,200	ECY	2.00	428,400
6 Dewatering	1	JB	2,221,435	2,221,435
7 Embankment, Pervious	14,250	TN	14.16	201,780
8 Embankment, Impervious	9,400	ECY	8.12	76,328
9 Embankment, Random	27,800	ECY	2.45	68,110
10 Drain Pipe, 8" Perforated	1,000	LF	26.00	26,000
11 Vibroflotation Densification	1	JB	270,000	270,000
Sub-Total Earthwork				**4,353,475**
Contingencies (15%)				**658,521**
Channel Protection				
12 Riprap 18" & 30" Thick	7,080	TN	13.40	94,872
13 Pervious Bedding Material	1,740	TN	13.40	23,316
14 Filter Fabric	6,778	SY	3.20	21,690
Sub-Total Channel Protection				**139,878**
Contingencies				**20,982**
Structural				
15 Concrete, Walls	1,600	CY	395.00	632,000
16 Concrete, Elev Slab/Beam	1,300	CY	331.00	430,300
17 Concrete, Slab on Grade	2,200	CY	235.00	517,000
18 Concrete, Columns	15	CY	470.00	7,050
19 Handrail	425	LF	42.00	17,850
20 Metals, Galv Structural Steel	9,500	LBS	3.00	28,500
21 Waterstop, 3-Bulb	1,800	LF	11.10	19,980
22 Perforated Pipe, 8"	250	LF	8.00	2,000
23 Check Valves, 8"	12	EA	400.00	4,800
24 Flap Valves, 8"	8	EA	415.00	3,320
25 Piling, Sheet PSA 23	1,600	SF	18.80	30,080
Sub-Total Structural				**1,692,880**
Contingencies (15%)				**253,932**
Mechanical				
26 Sluice Gates, 10'x10' Heavy	4	EA	94,100	376,400
Sub-Total Mechanical				**376,400**
Contingencies (15%)				**56,460**
Sub-Total Gravity Outlet				**7,513,000**
Planning/Engineering/Design				751,000
Construction Management				617,000
Lands and Damages				0
Grand Total - New Madrid Gravity Outlet Structure				**8,921,000**

Caldwell 03/28/97

ST. JOHNS BAYOU AND
NEW MADRID FLOODWAY MISSOURI
FIRST PHASE

APPENDIX C

ECONOMICS

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St Johns Bayou and New Madrid Floodway, Missouri, First Phase Limited Reevaluation Report

Appendix C – Economics

C-1. INTRODUCTION.

The purpose of this appendix is to verify or reaffirm the benefits and economic justification of the first phase of the recommended plan that was developed as part of the August 1986 General Design Memorandum (GDM) Phase II for St. Johns Bayou and New Madrid Floodway. This limited reevaluation report (LRR) is confined to first phase of the recommended plan presented in the GDM with no additional plan formulation or project sizing.

C-2. GENERAL.

Construction is assumed to begin in fiscal year 1997 and to be completed in fiscal year 2002. The period of analysis for this appendix is from the end of 2002 (beginning of 2003) through the end of 2102. For discounting purposes, costs are assumed to take place at the end of the year during which they are expended and benefits related to the physical construction from such costs are assumed to accrue one year after construction is completed. All benefits and costs accruing prior to the end of 2002 were compounded forward, and those occurring after the end of 2002 were discounted backward to determine the present value of project benefits and costs as of the end of 2002. The sum of the present values for each category was amortized over the period of analysis (100 years) to obtain an average annual uniform equivalent value using an interest rate of 7 3/8%.

This LRR uses current (1996) land use and price levels. Estimates of current land use were obtained from area farmers, the University of Missouri Office of Social and Economic Data Analysis, and USDA Census of Agriculture data. Data compiled for the study area revealed little change in its socioeconomic developments and activities from those addressed in the 1986 GDM. The area is still predominately rural and dependent on agriculture for its livelihood. Little urban development occurs in the area. However, there has been a significant change in agricultural practices since 1984 (the basis of data in the GDM).

C-3. PLAN TO VALIDATE BENEFITS.

Agricultural flood damage prevented accounted for more than 64% of the benefits for the first phase of the total project in the GDM. Agricultural intensification accounted for an additional 27%. Consequently, agricultural benefits account for a majority of the total inundation reduction benefits and require an in-depth reanalysis to provide assurance of a reasonable current benefit estimate. The

other benefit categories account for slightly more than 8% of total benefits. They do not require as detailed scrutiny to affirm current benefit estimates. Table C-1 presents the benefits as presented in the GDM, their percent of total benefits, their level of significance, and the plan for affirmation of the benefit estimates.

A complete reanalysis was undertaken for the agricultural benefits. The streets and roads benefits were deemed to be marginally significant and under most circumstances would not require detailed scrutiny. However, streets and roads comprised approximately 23% of the benefits for one of the construction items (St James Ditch) or one third of the total streets and roads benefits. Since streets and roads were considered marginally significant and St James Ditch accounted for such a large portion of total streets and roads benefits, a detailed analysis of St James Ditch was undertaken. All other appropriate benefit categories were indexed by the change in the ENR construction cost index as allowed by draft ER 1105-2-100. Those categories where indexing is not allowed, such as property benefits, were excluded from the LRR due to schedule, funding, and policy constraints.

An In Progress Review (IPR) was held in November 1996 to surface any issues or concerns associated with the above plan. Attendees were from Headquarters, Division, and District levels and included representatives capable of making decisions regarding all pertinent disciplines. A complete "buy-off" or agreement was reached during the IPR that the plan presented in Table C-1 was appropriate and an acceptable plan to verify the current benefit estimates.

C-4. COMPARISON OF CURRENT AND LATEST APPROVED ESTIMATE.

A comparison of the current and latest approved estimates is presented in Table C-2. The agricultural benefits increased significantly although prices received for agricultural commodities decreased. The main reason for the increase was a shift to more profitable crops and practices. The crop mix in the GDM was primarily soybeans while current practices are much more diversified between corn, soybeans, grain sorghum, double-cropped soybeans, and cotton. Also irrigation has become much more widespread in the study area which greatly increases the area's crop yields. Streets and roads also increased due somewhat to the change in price levels as measured by the ENR construction cost index (36% increase) and inclusion of upgraded roads and improvements along St James Ditch as a result of a complete field survey of this area. All benefit categories were affected by the lower Federal discount rate. The procedures used to obtain current benefit estimates by category is presented in the following sections.

Table C-1
Plan to Verify the Significant Annual Benefits from the Latest Approved Document
St Johns Bayou and New Madrid Floodway, First Phase
(October 1984 Price Levels, 8.375%)

Item	Annual Benefit	Percentage of Total Benefit	Significance	Verification Plan
Agricultural Flood Damage Prevented	2,556,054	64.3%	Significant	Detailed Reanalysis
Agricultural Intensification	1,084,196	27.3%	Significant	Detailed Reanalysis
Streets & Roads	279,319	7.0%	Marginally Significant	Detailed Reanalysis of St James Ditch. Index Remainder as Allowed by Draft ER 1105-2-100
Advanced Replacements	41,030	1.0%	Not Significant	Indexed as Allowed by Draft ER 1105-2-100
Betterments	3,421	0.1%	Not Significant	Indexed as Allowed by Draft ER 1105-2-100
Rural Property	10,153	0.3%	Not Significant	Omit
Evacuation	324	0.0%	Not Significant	Omit
Affluence	1,700	0.0%	Not Significant	None. Not a valid benefit category
Total	3,976,197			

Table C-2

Comparison of Current Annual Benefits with Latest Approved Benefits

St Johns Bayou and New Madrid Floodway, First Phase

Item	Latest Approved (1984 Price Levels @ 8.375%)	Current Estimate (1996 Price Levels @ 7.375%)	Difference	Reason for Difference
Agricultural Flood Damage Prevented	2,556,054	3,334,000	777,946	Change in land use to more profitable practices, increased yields due to irrigation, and decrease in interest rate
Agricultural Intensification	1,084,196	1,170,000	85,804	Change in land use to more profitable practices, increased yields due to irrigation, and decrease in interest rate
Streets & Roads	279,319	457,000	177,681	Increase in ENR index, inclusion of road improvements between 1984 and 1996, and decrease in interest rate
Advanced Replacements	41,030	51,000	9,970	Change in ENR index
Betterments	3,421	4,000	579	Change in ENR index
Rural Property	10,153		-10,153	Omitted due to schedule and policy constraints (indexing not permitted)
Evacuation	324		-324	Omitted due to schedule and policy constraints (indexing not permitted)
Affluence	1,700		-1,700	No longer considered a valid category
Total	3,976,197	5,016,000	1,039,803	

C-5. AFFIRMATION OF AGRICULTURAL BENEFITS.

The agricultural are classified into two categories: inundation reduction (flood damage reduction) and intensification. Inundation reduction benefits consist of damage reduction to development under present and projected future changes under without project conditions. Intensification benefits result from additional income that would be obtained as a result of changes in development caused by the project.

The agricultural benefits comprised approximately 92% of the benefits presented in the Phase II GDM (GDM). Since they comprised such a significant portion of the benefits of the project, current guidance necessitated their affirmation or validation to ensure that the project continues to be economically justified based on current conditions. This required the verification of the basic underlying data and assumptions used in the benefit computations of the GDM. Pertinent data for these benefits included current crop prices, costs of production, and the types of crops that are grown in the area. All three of these items have changed significantly from the data presented in the Phase II GDM which were based on October 1984 conditions.

a. Land Use. There has been very little, if any, change in land use in the area since the GDM was conducted. The area is characterized primarily by agricultural operations. Woodlands are virtually nonexistent. The only areas of woods are scattered and very small. The remaining trees are on spoil banks or channel side slopes of drainage channels or in other low-lying areas. The soils are generally poorly drained and fertile. Because of their favorable properties for agricultural use, these soils have significantly influenced development in the area. There is little urban development occurring in the first phase's project area. Only the town of East Prairie, Missouri is located in the benefited area. There is also scattered rural development in the form of farm residences and associated buildings, etc. throughout the area. The closest large population center is Sikeston, Missouri, which lies immediately north of the project area.

Future without- and with-project land use is expected to remain the same as current conditions. There are no large tracts of woodlands remaining in the area that can be cleared. The small isolated plots which are left are probably subject to the "Swampbuster" provision of the Food Security Act of 1985 which has effectively halted the clearing of woodlands in most wetland areas. No reversion of cleared lands to woodlands is expected since the cropland is very productive and should be profitable to farm under future without-project conditions. Conversion of croplands to urban uses is not expected since there are no urban areas located near the project area that have a shortage of non-flood prone lands. The only expected change under future with-project conditions is a change in cropping patterns with a shift from less to more profitable crops due to the decreased risk of flooding. This impact is not viewed as a change in land use but instead a change in cropping practices..

b. Crop Data. Flooding plays an important role in a farmer's decision making process. As the risk of flooding increases a farmer is less likely to plant higher value crops and use high management production techniques. The project area can be divided into flood zones where these

significant changes in cropping practices occur. Dividing the agricultural sector into flood zones helps to better evaluate impacts on the agricultural sector. The crop yields used in this analysis are also affected by flood risk and reflected by the differences between the flood zones. The yields in the lower zone are considered flood risk constrained while those in the upper zone are considered non-flood risk constrained crop management practices. Flood risk constrained management is a condition where flood risk/uncertainty causes inefficient crop management practices. But, with non-flood risk constrained management, there are no inefficiencies. The GDM identified the 3 year flood zone as the point where significant changes in farming practices occurs. The area above the 3 year frequency is where more intensive and profitable crops are grown while slightly lower value crops are grown below the 3 year flood zone. This reanalysis (LRR) also uses the 3 year flood zone as this dividing point.

(1). GDM Data. The cropping practices, budgets, yields used in the GDM are presented in Table C-3. It reflects single cropped soybeans as being the primary cash crop in the area accounting for 49 percent of the lower zone's acreage and 47 percent of the upper zone's. Soybean yields were 28.4 and 33.8 bushels per acre for the respective zones. Soybeans double cropped with wheat were the second largest crop followed by cotton, grain sorghum, and rice. The relative net profitability between the two zones was $52.85 and 69.98 per acre a $17.18 difference.

(2). LRR Data. The reanalysis revealed a substantial change in cropping practices, budgets, and yields from those used in the GDM. This data is presented in Table C-4 for present conditions. The primary changes are a general decline in prices received, increases in irrigation, and a general change from soybeans to higher value crops. Single cropped soybeans declined to approximately 30 percent of the area's acreage. Dryland soybean yields increased to 33.3 and 37.0 bushels per acre for the respective zones due to improved management practices and higher yielding varieties. Irrigated soybean yields were 40.5 and 45.0 bushels per acre. Corn was the second largest crop followed by grain sorghum, double cropped soybeans, and cotton. The relative net profitability for the two zones was $40.08 and $68.57 per acre a $28.49 difference.

The calculation of future crop budgets was accomplished by projecting both crop yields per acre and levels of corp production inputs per acre. The price levels for both crops and production costs were held constant at 1996 price levels. The methodology used to project crop yields and levels of production inputs is consistent with that used for other Memphis District flood control studies. A first degree polynomial function was fit to crop budget input and output indices published by the Economic Research Service of the U.S. Department of Agriculture The resulting regression equations were $y=0.0167348X-32.4349327$ for crop yields and $y=0.0051037X-9.1882495$ for production inputs. The correlation coefficients were 0.94873 and 0.37086 respectively. The output equation tested statistically significant at the 1 percent level of significance, while the input equation tested significant at the 2 percent level. Projected crop data is presented in Table C-5.

Table C-3
St Johns Bayou Basin Crop Information
Phase II GDM dated April 1987
October 1984 Price Levels

Item	Soybeans	Corn	Cotton			Wheat	Grain Sorghum	Rice	Double Cropped		Pasture	Total
			Seed	Lint	Total				Soybeans	Sorghum		
0-3 Year Floodplain												
Price	7.32	3.23	0.677	111.98	0.789	3.56	5.01	11.02	7.32	5.01	68.53	
Yield	28.42		574.65	0.575		39.13	45.00	47.10	28.27	27.00	3.60	
Gross Value	208.03		389.04	64.39	453.43	139.30	225.45	519.04	206.94	135.27	246.71	
Production Cost	163.43				367.71	133.96	208.46	403.71	144.70	186.81	96.97	
Net Return	44.60				85.72	5.34	16.99	115.33	62.24	-51.54	149.74	
Percent Distribution	0.49				0.07	0.30	0.04	0.02	0.24	0.01	0.04	
Weighted Net Return	21.85				6.00	1.60	0.68	2.31	14.94	-0.52	5.99	52.85
3 Year-SPF Floodplain												
Price	7.32	3.23	0.677	111.98	0.789	3.56	5.01	11.02	7.32	5.01	68.53	
Yield	33.84	95.00	574.65	0.575		39.13	45.00	47.10	28.27	27.00	4.20	
Gross Value	247.71	306.85	389.04	64.39	453.43	139.30	225.45	519.04	206.94	135.27	287.83	
Production Cost	170.93	231.78			367.71	133.96	208.46	403.71	144.70	186.81	96.97	
Net Return	76.78	75.07			85.72	5.34	16.99	115.33	62.24	-51.54	190.86	
Percent Distribution	0.47	0.03			0.04	0.26	0.03	0.02	0.21	0.01	0.06	
Weighted Net Return	36.09	2.25			3.43	1.39	0.51	2.31	13.07	-0.52	11.45	69.98

Table C-4
Current Crop Information
St Johns Bayou and New Madrid Floodway, First Phase
October 1996 Price Levels

Item	Corn		Rice	Dryland Cotton			Irrigated Cotton			Soybeans		Wheat	Double Crop Soybeans		Grain Sorghum		Total
	Dryland	Irrigated		Seed	Lint	Total	Seed	Lint	Total	Dryland	Irrigated		Dryland	Irrigated	Dryland	Irrigated	
0-3 Year Floodplain																	
Price	2.33	2.33	6.98	0.572	89.26		0.572	89.26		5.68	5.68	2.81	5.68	5.68	3.68	3.68	
Yield	124.9	143.0	56.25	677	0.596		794	0.699		33.3	40.5	50.0	26.6	32.3	41.33	58.52.	
Gross Value	291.02	333.19	392.63	387.24	53.20	440.44	454.17	62.39	516.56	189.14	230.04	140.50	151.09	183.46	152.09	215.35	
Production Cost	229.41	258.77	425.45			464.96			520.54	109.42	147.62	124.38	109.14	133.50	181.39	232.52	
Pre-Harvest	146.85	178.54	304.53			326.72			358.41	77.27	115.76	84.09	79.90	104.41	134.64	166.33	
Harvest	82.56	80.23	120.92			138.24			162.13	32.15	31.86	40.29	29.24	29.09	46.75	66.19	
Net Return	61.61	74.42	-32.82			-24.52			-3.98	79.72	82.42	16.12	41.95	49.96	-29.30	-17.17	
Percent Distribution	0.132	0.091	0.021			0.066			0.046	0.179	0.123	0.124	0.073	0.051	0.106	0.072	
Weighted Net Return	8.13	6.77	-0.69			-1.62			-0.18	14.27	10.14	2.00	3.06	2.55	-3.11	-1.24	40.08
3 Year-SPF Floodplain																	
Price	2.33	2.33	6.98	0.572	89.26		0.572	89.26		5.68	5.68	2.81	5.68	5.68	3.68	3.68	
Yield	138.8	180.0	56.25	752	0.662		836	0.736		37.0	45.0	50.0	29.6	36.0	45.92	61.60	
Gross Value	323.40	419.40	392.63	430.14	59.09	489.23	478.19	65.70	543.89	210.16	255.60	140.50	168.13	204.48	168.99	226.69	
Production Cost	238.60	279.53	425.45			480.27			529.12	112.99	151.16	124.38	112.44	136.83	186.58	236.01	
Pre-Harvest	146.85	178.54	304.53			326.72			358.41	77.27	115.76	84.09	79.90	104.41	134.64	166.33	
Harvest	91.75	100.99	120.92			153.55			170.71	35.72	35.40	40.29	32.54	32.42	51.94	69.68	
Net Return	84.80	139.87	-32.82			8.96			14.77	97.17	104.44	16.12	55.69	67.65	-17.59	-9.32	
Percent Distribution	0.171	0.114	0.021			0.066			0.046	0.182	0.118	0.124	0.073	0.051	0.084	0.054	
Weighted Net Return	14.50	15.95	-0.69			0.59			0.68	17.68	12.32	2.00	4.07	3.45	-1.48	-0.50	68.57

Table C-5
Projections of Crop Data to 2050
St Johns Bayou and New Madrid Floodway, First Phase
October 1996 Price Levels

Item	Corn		Rice	Dryland Cotton			Irrigated Cotton			Soybeans		Wheat	Double Crop Soybeans		Grain Sorghum		Total
	Dryland	Irrigated		Lint	Seed	Total	Seed	Lint	Total	Dryland	Irrigated		Dryland	Irrigated	Dryland	Irrigated	
0-3 Year Floodplain																	
Price	2.33	2.33	6.98	0.572	89.26		0.572	89.26		5.68	5.68	2.81	5.68	5.68	3.68	3.68	
Yield	199.8	228.8	90.00	1083	0.954		1270	1.118		53.3	64.8	80.0	42.6	51.7	66.12	93.63	
Gross Value	465.63	533.10	628.20	619.59	85.12	704.71	726.67	99.83	826.50	302.63	368.06	224.80	241.74	293.54	243.34	344.57	
Production Cost	278.94	306.91	498.00			547.90			617.82	128.71	166.74	148.55	126.69	150.95	209.44	272.24	
Pre-Harvest	146.85	178.54	304.53			326.72			358.41	77.27	115.76	84.09	79.90	104.41	134.64	166.33	
Harvest	132.09	128.37	193.47			221.18			259.41	51.44	50.98	64.46	46.79	46.54	74.80	105.91	
Risk Based	343.10	377.50	612.54			673.92			759.92	158.31	205.09	182.72	155.83	185.67	257.61	334.86	
Net Return	122.53	155.60	15.66			30.79			66.58	144.32	162.97	42.08	85.91	107.87	-14.27	9.71	
Percent Distribution	0.132	0.091	0.021			0.066			0.046	0.179	0.123	0.124	0.073	0.051	0.106	0.072	
Weighted Net Return	16.17	14.16	0.33			2.03			3.06	25.83	20.05	5.22	6.27	5.50	-1.51	0.70	97.81
3 Year-SPF Floodplain																	
Price	2.33	2.33	6.98	0.572	89.26		0.572	89.26		5.68	5.68	2.81	5.68	5.68	3.68	3.68	
Yield	222.1	288.0	90.00	1203	1.059		1338	1.178		59.2	72.0	80.0	47.4	57.6	73.47	98.56	
Gross Value	517.45	671.04	628.20	688.23	94.54	782.77	765.11	105.11	870.22	336.26	408.96	224.80	269.00	327.17	270.38	362.70	
Production Cost	293.64	340.12	498.00			572.41			631.54	134.42	172.40	148.55	131.96	156.28	217.75	277.81	
Pre-Harvest	146.85	178.54	304.53			326.72			358.41	77.27	115.76	84.09	79.90	104.41	134.64	166.33	
Harvest	146.79	161.58	193.47			245.69			273.13	57.15	56.64	64.46	52.06	51.87	83.11	111.48	
Net Return	156.27	252.69	15.66			78.71			93.43	170.92	196.91	42.08	106.69	134.95	2.55	20.99	
Percent Distribution	0.171	0.114	0.021			0.066			0.046	0.182	0.118	0.124	0.073	0.051	0.084	0.054	
Weighted Net Return	26.72	28.81	0.33			5.19			4.30	31.11	23.24	5.22	7.79	6.88	0.21	1.13	140.93

c. Agricultural Flood Damage Prevented. Flood damage reduction benefits to crops are based on the difference between average annual equivalent flood damages for without- and with-project conditions. Flood damages are calculated by applying crop damage rates per flooded acre to expected annual acre estimates. This procedure is described in the following paragraphs.

(1). Expected Annual Acres. The number of expected annual cleared acres flooded was calculated by the use of partial duration frequency curves and stage-area information. Results indicate there are approximately 21,631 expected annual cleared acres flooded by headwater in the project area under existing conditions. The project lowers this figure to 1,271 acres for a reduction of 20,360 or a 94% reduction (Table C-6). Backwater floods inundate approximately 35,739 cleared acres under existing conditions. With-project this figure is reduced 58% to 15, 115 acres.

Headwater and backwater flooding can and do occur concurrently. To avoid duplication of benefits, the overlapping effect had to be eliminated. From historical hydrologic data it was determined that when headwater and backwater floods occurred concurrently, the backwater influence was dominant. Therefore, only adjustment of headwater damages was necessary to avoid duplication in the estimation of total damage. Also, from this historical hydrologic data, an estimate was made of the proportion of time that headwater and backwater flooding occurred concurrently. Using this data, factors were developed to reduce the headwater benefits. These factors are presented in Table C-7. These factors are the same as those used in the GDM since a review of the hydrologic data used in the GDM concluded that no significant changes had taken place that would cause any changes.

(2). Crop Damage Rates. Agricultural crop damage rates in the GDM were calculated using a computer program entitled Computerized Agricultural Crop Flood Damage Assessment System (CACFDAS), developed by Mississippi State University for the Lower Mississippi Valley Division, Corps of Engineers. This program calculates crop flood damages by analysis of daily flood events. The program also has the capability to calculate damage from multiple flooding events in the same area during the same year. In addition, the program allows for specific crop replanting and/or crop substitution. The program is structured to compute flood damages based on the time of the flood event in relation to the sequence of agricultural operations that have occurred in the production process. Duration factors, expressed as the number of days required to cause damage, are developed for four stages of plant development. Normal, late planting, and last day of planting dates are also developed by crop. These dates are extremely important as they, in conjunction with the duration factors, are the base dates from which flood damages, crop replanting, crop substitution, and crop yield reductions are developed. Three cost vectors were developed for the crop budgets used in the program to assess flood damages. These include: (a) production costs and fixed harvesting equipment costs; (b) expected net returns to lands, management, and general farm overhead; and (c) operation revenues consisting of realized gross value of the harvested crop. Major data requirements include crop distribution, net and gross returns by crop, crop substitution data, daily flood duration data, and cleared acres flooded on a daily basis.

Table C-6
Expected Annual Acres
St Johns Bayou and New Madrid Floodway, First Phase

Item	Without-Project		Recommended Plan		Reduction	
	0-3 Year	3 Yr-SPF	0-3 Year	3 Yr-SPF	0-3 Year	3 Yr-SPF
Headwater						
St Johns Bayou	5,379	90	818	0	4,561	90
St James Ditch	7,365	342	246	0	7,119	342
Birds Point Levee Ditch	8,338	117	207	0	8,131	117
Total Headwater	21,082	549	1,271	0	19,811	549
Backwater						
St Johns Pump Station	14,963	3,062	10,952	1,031	4,011	2,031
New Madrid Pump Station						
Lower New Madrid	10,811	1,235	2,684	0	8,127	1,235
St James Bayou	3,488	2,180	448	0	3,041	2,180
Total Backwater	14,299	3,416	3,132	0	11,167	3,416

Table C-7
Backwater-Headwater Overlap Factors
St Johns Bayou and New Madrid Floodway, First Phase

Item	Backwater-Headwater Overlap Factors
St Johns Bayou, Reach 1	0.663
St James Ditch	0.973
BPLD Reach 1	0.854
St Johns Pump Station	N/A
New Madrid Pump Station	
Lower New Madrid	N/A
St James Bayou	N/A

A thorough review of the hydrologic inputs into the CACFDAS program concluded that there were no significant changes in durations, flood elevations, or elevation-area flooded relationships. The only changes to inputs into the CACFDAS program were crop mixes, production costs, crop yields, and crop prices. Current crop mixes, production costs, crop yields, and crop prices were incorporated into the CACFDAS runs to yield the current crop damage rates per acre presented in Table C-8. Also presented are the damage rates per acre used in the GDM based on 1984 price levels.

(3). Annual Benefit. The expected annual acres calculated in (1) are multiplied by the average damage per cleared acre flooded from (2) above to obtain crop damage estimates for with- and without-project conditions. These damage estimates are then adjusted by the appropriate backwater-headwater overlap factors presented in Table C-7. The results are presented in Table C-9 for various years. These damages and benefits are put on an annual basis using standard discounting procedures as outlined in the introduction. Total annual benefits for traditional methodologies are estimated at $3,327,000 at the current (7.375 percent) discount rate. These benefits are also estimated using risk based procedures as required by current guidance.

(4). Risk Analysis. This section provide an estimate of the risk inherent with the economic and hydrologic data used to evaluate the flood damage prevented benefits. It addresses the areas where risk and uncertainty are known to exist so that the economic performance of the project can be expressed in terms of probability distributions. This analysis was performed using a spreadsheet in conjunction with an add-on simulation model entitled @Risk. It incorporates the range (maximum and minimum) of possible values for an input variable in the flood damage calculation, and specifies the statistical distribution of likely outcomes over the chosen range. In the case where a normal distribution is assumed, 68% percent of the occurrences of a particular outcome would fall within (plus or minus) one standard deviation, on either side of the mean, and 95% percent within two standard deviations on either side of the mean. The initial step in constructing an @Risk simulation is to identify the sources of uncertainty. Some sources of risk and uncertainty arise from measurement errors, small sample sizes, estimation and forecasting errors, and modeling errors. The variables chosen and the amounts they are allowed to vary during the simulation are presented in Table C-10. All distribution functions are assumed to be normal.

The @Risk simulation was performed utilizing 3,000 iterations, or different combinations, of the chosen variables. The 68 and 95 percent confidence bands around the mean results are plus/minus one and two standard deviations, respectively. An additional step was taken to identify which variable(s) contributed the most to uncertainty. The simulation was run again, varying each variable individually while holding the remaining variables constant. The most important variable was the 1.5 foot variation in stage frequency followed by the 10 percent variation in the stage area relationship. The results of the individual simulations and their ranking are also presented in Table C-10.

Table C-8
Comparison of Crop Damage Rates
Phase II GDM versus Current Estimate
St Johns Bayou and New Madrid Floodway, First Phase
October 1996 Price Levels

Item	1984 Damage Rate/Acre				1996 Damage Rate/Acre			
	Without-Project		Recommended Plan		Without-Project		Recommended Plan	
	0-3 Year	3 Yr-SPF	0-3 Year	3 Yr-SPF	0-3 Year	3 Yr-SPF	0-3 Year	3 Yr-SPF
Headwater								
St Johns Bayou	47.39	76.64	0.00	0.00	50.42	93.58	0.00	0.00
St James Ditch	30.45	52.19	31.19	0.00	32.40	63.73	33.18	0.00
Birds Point Levee Ditch	53.43	53.67	13.55	0.00	56.85	65.53	14.42	0.00
	53.30	89.28	41.81	52.23	56.71	109.01	44.48	63.77
Backwater								
St Johns Pump Station								
New Madrid Pump Station								
Lower New Madrid	70.45	52.95	55.83	0.00	74.95	64.65	59.40	0.00
St James Bayou	37.56	96.52	33.45	19.15	39.96	117.85	35.59	23.38

Table C-9

Agricultural Crop Damages and Benefits

St Johns Bayou and New Madrid Floodway, First Phase

(October 1996 Price Levels, 7.375%)

Year	Without-Project	With-Project	Benefit
1998	3,380,997	3,239,944	141,053
1999	3,412,037	3,269,690	142,347
2000	3,443,077	3,158,364	284,713
2001	3,474,118	2,852,104	622,014
2002	3,505,158	1,444,946	2,060,212
2003	3,536,198	787,189	2,749,009
2012	3,815,561	849,374	2,966,187
2022	4,125,964	918,467	3,207,497
2032	4,436,367	987,561	3,448,806
2042	4,746,770	1,056,654	3,690,116
2052	5,057,174	1,125,749	3,931,425
2062	5,367,577	1,194,842	4,172,735
2072	5,677,980	1,263,937	4,414,043
2082	5,988,383	1,333,031	4,655,352
2092	6,298,786	1,402,126	4,896,660
2102	6,609,189	1,471,219	5,137,970
Average Annual Equivalent			
Traditional	5,093,404	1,766,708	3,326,696
Risk Based			
Mean	5,114,779	1,781,133	3,333,646
Standard Deviation	1,082,028	376,797	705,230

Table C-10
Agricultural Flood Damage Prevented
Results of Risk Analysis, Variables Ranked by Importance
St Johns Bayou and New Madrid Floodway, First Phase
(October 1996 Price Levels, 7.375%)

Item	Variation	Agricultural Flood Damage Prevented		Rank
		Mean Value	Standard Deviation	
All Variables		3,333,646	705,230	
Stage Frequency	1.5 Feet	3,334,525	674,059	1
Stage Area	10 Percent	3,319,570	167,194	2
Projection Factors	25 Percent	3,319,646	103,245	3
Crop Yields	10 Percent	3,319,673	85,479	4
Crop Prices	15 Percent	3,319,726	79,683	5
Production Costs	5 Percent	3,319,683	46,447	6
Interest Rate	7.125% to 7.625%	3,319,766	1,290	7

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d. Agricultural Intensification. Flood protection, full or partial, reduces the financial risks involved in farming operations. Such a reduction allows an intensification of farmlands which results in higher yields and, subsequently greater net returns to land. Intensification benefits result from an intensification of land that is presently being farmed as no conversion from non-farmed lands is expected to take place. These benefits result from a change to a more profitable crop distribution combination and from more intensive farm inputs that provide greater yields on the individual crops. Flood control improvements would permit better use of land protected from frequent flooding.

(1). Increased Net Returns per Acre. The intensification benefits are based on the increase in net returns between with- and without-project conditions and are adjusted to account for the increased residual damage to the intensified practices caused by any remaining flooding. The increase in net productive value per cleared acre after installation of the plan was determined as $28.49 and $43.12 (1996 and 2040 conditions respectively). These figures were derived from the data presented in Tables C-4 and C-5. These practices are based on those used by the area farmers under without-project conditions in the above 3-year flood zone less the below 3-year zone.

(2). Acres Intensified. These values were applied to the number of acres to be intensified to yield the basic benefit values. The acres to be intensified were identified as the cleared acres flooded by the 3-year without-project flood minus the cleared acres flooded by the 3-year with-project flood (Table C-11).

(3). Annual Benefit. The basic benefit values are adjusted downward to account for any increased damage caused by planting higher value crops on those acres flooded after project installation (Table C-12) and the backwater-headwater overlap factors presented in Table C-7 and discussed previously. The results are presented in Table C-13 for various years. These benefits are put on an annual basis using standard discounting procedures as outlined in the introduction. Total annual benefits for traditional methodologies are estimated at $1,223,000 at the current (7.375 percent) discount rate. These benefits are also estimated using risk based procedures as required by current guidance.

(4). Risk Analysis. This section provide an estimate of the risk inherent with the economic and hydrologic data used to evaluate the agricultural intensification benefits. It addresses the areas where risk and uncertainty are known to exist so that the economic performance of the project can be expressed in terms of probability distributions. This analysis was also performed using a spreadsheet in conjunction with an add-on simulation model entitled @Risk. It incorporates the range (maximum and minimum) of possible values for an input variable and specifies the statistical distribution of likely outcomes over the chosen range. In the case where a normal distribution is assumed, 68% percent of the occurrences of a particular outcome would fall within (plus or minus) one standard deviation, on either side of the mean, and 95% percent within two standard deviations on either side of the mean. The variables chosen and the amounts they are allowed to vary during the simulation are presented in Table C-14. All distribution functions are assumed to be normal.

Table C-11
Area Subject to Intensification
St Johns Bayou and New Madrid Floodway, First Phase

Item	Three-Year Flood Zone Without-Project	Three-Year Flood Zone With-Project	Area Intensified
Headwater			
St Johns Bayou	3,102	844	2,258
St James Ditch	6,634	0	6,634
Birds Point Levee Ditch	5,732	0	5,732
Backwater			
St Johns Pump Station	18,820	11,248	7,572
New Madrid Pump Station			
Lower New Madrid	4,739	86	4,653
St James Bayou	13,240	2,784	10,456
Total Project Area	52,267	14,962	37,305

Table C-12
Increased Residual Damage due to Intensified Practices
St Johns Bayou and New Madrid Floodway, First Phase
October 1996 Price Levels

Stream/Reach	1984 Increased Residual Damage	1996 Increased Residual Damage	2050 Increased Residual Damage
Headwater			
St Johns Bayou	0	0	0
St James Ditch	11,328	13,832	20,821
Birds Point Levee Ditch	0	0	0
Backwater			
St Johns Pump S	33,688	41,134	61,918
New Madr		0	0
		866	14,851

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Table C-13
Agricultural Intensification Benefits
St Johns Bayou and New Madrid Floodway, First Phase
(October 1996 Price Levels, 7.375%)

Year	Benefit
1998	48,128
1999	48,577
2000	81,489
2001	190,744
2002	816,765
2003	1,010,346
2012	1,091,551
2022	1,181,777
2032	1,272,003
2042	1,362,229
2052	1,452,455
2062	1,542,682
2072	1,632,907
2082	1,723,133
2092	1,813,361
2102	1,903,585
Average Annual Equivalent	
Traditional	1,223,457
Risk Based	
Mean	1,169,581
Standard Deviation	209,176

Table C-14
Agricultural Intensification Benefits
Results of Risk Analysis, Variables Ranked by Importance
St Johns Bayou and New Madrid Floodway, First Phase
(October 1996 Price Levels, 7.375%)

Item	Variation	Agricultural Flood Damage Prevented		Rank
		Mean Value	Standard Deviation	
All Variables		1,169,581	209,176	
Stage Frequency	1.5 Feet	1,170,203	140,777	1
Crop Prices	15 Percent	1,205,042	128,563	2
Crop Yields	10 Percent	1,205,066	64,528	3
Stage Area	10 Percent	1,205,278	60,186	4
Projection Factors	25 Percent	1,205,215	57,156	5
Production Costs	5 Percent	1,205,116	25,963	6
Interest Rate	7.125% to 7.625%	1,205,286	20,173	7

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The @Risk simulation was performed utilizing 3,000 iterations, or different combinations, of the chosen variables. The 68 and 95 percent confidence bands around the mean results are plus/minus one and two standard deviations, respectively. An additional step was taken to identify which variable(s) contributed the most to uncertainty. The simulation was run again, varying each variable individually while holding the remaining variables constant. The most important variable was the 1.5 foot variation in stage frequency followed by the 15 percent variation in crop prices. The results of the individual simulations and their ranking are also presented in Table C-14.

e. Streets and Roads.

(1). St James Ditch. These benefits were verified using flood outline maps and a field inspection of the East Prairie area to identify the current mileage of streets and roads inundated by the 1 year, 10 year, and 500 year floods. This yielded the mileage of different type road surfaces by floodplain. There are approximately 22.7 miles of primary and secondary paved roads in the 500 year flood zone. Perpendicular flooding damages 18.5 miles while the remaining 4.2 miles are flooded by parallel flows. Approximately 16.3 miles are also inundated by the 10 year flood. No roads were found at or below the 1 year zone. These data were combined with estimated per mile repair cost figures which were derived from prior Memphis District studies for comparable areas. These costs included values for perpendicular and parallel flooding of primary and secondary paved roads. The per mile values for perpendicular flooding were $66,100 and $33,000 for primary and secondary roads. The parallel values were $16,500 and $11,600 for primary and secondary roads. These data were utilized to develop stage damage relationships for without- and with-project. By integration of the stage-damage and stage-frequency curves, damage-frequency curves were developed. Measurement of the area under the damage-frequency curves yielded expected annual road damage estimates. The without- and with-project damages and benefits by flood event and expected annual values are presented in Table C-15.

The damages and benefits by year are also presented in Table C-15. No estimates for growth or improvements in the current road system are included since this benefit category is relatively small in comparison to the total annual benefits. To do so would probably yield a more probable or reasonable appraisal of the effects of the project but would not affect the viability of the project or any other aspect of the decision making process. This will tend to underestimate the annual damages and benefits and yield a conservative estimate of benefits to this category. These values are also put on an annual basis using standard discounting procedures. Total annual benefits are estimated to be $213,000 at the current (7.375 percent) discount rate.

(2). Other Areas. The streets and roads benefits for all other areas were changed to October 1996 price levels by multiplying the October 1984 values by the change in the ENR construction cost index from October 1996 to October 1984 (36% increase) as allowed in the draft ER 1105-2-100. It further was assumed that the change interest rate from the GDM would not change these benefits since they were found to be constant values not including projections of growth. Streets and roads benefits for the other areas are presented in Table C-16.

Table C-15
Annual Streets and Roads for St James Ditch
St Johns Bayou and New Madrid Floodway, First Phase
(October 1996 Price Levels, 7.375%)

Item	Damage		
	Without-Project	With-Project	Reduction
1. Calculation of Expected Annual Values			
Flood Event (Year)			
SPF	340,476	270,793	69,683
500	340,476	270,793	69,683
10	314,345	221,360	92,985
50	296,924	192,234	104,690
25	279,504	151,457	128,047
10	244,661	93,205	151,457
5	227,186	29,126	198,060
3	203,885	0	203,885
2	180,583	0	180,583
1.01	0	0	0
Expected Annual	223,804	25,838	197,966
2. Calculation of Average Annual Equivalent Values			
Year			
2002	224,000	26,000	198,000
2003	224,000	26,000	198,000
2012	224,000	26,000	198,000
2022	224,000	26,000	198,000
2032	224,000	26,000	198,000
2042	224,000	26,000	198,000
2052	224,000	26,000	198,000
2062	224,000	26,000	198,000
2072	224,000	26,000	198,000
2082	224,000	26,000	198,000
2092	224,000	26,000	198,000
2102	224,000	26,000	198,000
Annual	241,000	28,000	213,000

Table C-16

Annual Streets and Roads, Advanced Replacements, and Betterment Benefits
St Johns Bayou and New Madrid Floodway, First Phase
(October 1996 Price Levels, 7.375%)

Item	October 84$ @ 8.375%	Factor for Change in ENR Construction Cost Index	Change in Interest Rate and Construction Schedule	October 96$ @ 7.375%
Streets and Roads 1/				
Headwater	39,000	1.36	2/	53,000
Backwater				
St Johns Pump Station	94,400	1.36	2/	128,000
New Madrid Pump Station	46,400	1.36	2/	63,000
Total	179,800			244,000
Advanced Replacements	41,000	1.36	0.91	51,000
Betterments	3,400	1.36	0.87	4,000
Total	224,200			299,000

1/ Does not include benefits for St James Ditch for which detailed verification was conducted.

2/ Unaffected by change in discount rate since these benefit streams excluded growth.

f. Other Benefit Categories. There are also advanced replacement and betterment benefits presented in the GDM. These are infrastructure benefits dealing with the replacement of bridges. Draft ER 1105-2-100 also allows limited indexing of these benefits. They were also revised to October 1996 price levels with the change in ENR construction cost index (36% increase). The change in interest rate and construction schedule from the GDM tended to lower these benefits (91% and 87%, respectively). These benefits are also presented in Table C-16.

g. Summary of Annual Benefits. Total annual benefits accruing from construction of the project are estimated to be $5,016,000. Flood control benefits of $4,961,000 will result from flood damage reduction to agricultural crops and public streets and roads and from a general intensification of agricultural activities. The other benefits are comprised of advanced replacement and betterment benefits ($55,000). The annual benefits are based on a discount rate of 7.375 percent, and a 100 year period of analysis. A summary of the annual benefits is presented in Table C-17.

C-5. PROJECT COSTS.

The project costs, like the annual benefits, are based on current price levels (October 1996), estimated over a 100-year project life plus the installation period, and discounted to the end of the project installation period using the current Federal discount rate (7.375%). Economic costs associated with the project are initial investment charges, operation and maintenance charges, and replacement charges.

a. First Costs. Project costs total $40,811,000 and are presented in Table C-18 by year and by cost account. The largest part is for construction which includes the both pumping stations and all channel improvements. The second largest item is for engineering and design followed by relocations, construction management, and lands. All costs are based on October 1996 price levels and are assumed to be end of year expenditures for discounting purposes. A more detailed breakdown of the costs can be found in the main report and Appendix B. These figures exclude approximately $1,342,000 in sunk study costs.

b. Annual Interest and Sinking Fund Costs. The annual interest and sinking fund costs are summarized in Table C-19. They are based on a reference point at the beginning of year 2003 (end of year 2002), the current discount rate of 7.375 percent, and a 100 year period of analysis. Annual interest charges are approximately $3,551,000 and annual sinking fund charges are slightly less than $3,000..

Table C-17

Summary of Current Annual Benefits

St Johns Bayou and New Madrid Floodway, First Phase

(October 1996 Price Levels, 7.375%)

Item	Annual Benefit
Agricultural Flood Damage Prevented	3,334,000
Agricultural Intensification	1,170,000
Streets & Roads	457,000
Advanced Replacements	51,000
Betterments	4,000
Total	5,016,000

Table C-18
Cost Schedule of Project 1/
St Johns Bayou and New Madrid Floodway, First Phase
(October 1996 Price Levels)

Year	Lands	Relocations	Construction	E&D	Construction Management	Total
1997	217,000	8,000	65,000	627,000	21,000	938,000
1998	650,000		646,000	2,535,000	44,000	3,875,000
1999	990,000	1,142,000	7,966,000	630,000	636,000	11,364,000
2000	552,000	1,700,000	11,557,000	100,000	1,179,000	15,088,000
2001	381,000		7,356,000	73,000	925,000	8,735,000
2002		125,000	621,000		65,000	811,000
Total	2,790,000	2,975,000	28,211,000	3,965,000	2,870,000	40,811,000

1/ Excludes sunk costs for LRR, PCA, and prior years PED.

Table C-19
Annual Investment Cost
St Johns Bayou and New Madrid Floodway, First Phase
(October 1996 Price Levels, 7.375%)

Year	Investment Cost 1/	Present Value Factor	Present Value of Investment Cost
1997	938,000	1.42730	1,338,807
1998	3,875,000	1.32927	5,150,921
1999	11,364,000	1.23797	14,068,291
2000	15,088,000	1.15294	17,395,559
2001	8,735,000	1.07375	9,379,206
2002	811,000	1.00000	811,000
Total	40,811,000		48,143,785
Annual Interest		0.07375	3,551,000
Annual Sinking Fund		0.00006	3,000
Total Interest and Sinking Fund		0.07381	3,554,000

1/ Excludes sunk costs for LRR, PCA, and prior years PED.

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c. Annual Operation, Maintenance, and Replacement Costs.

(1). Channel Items. The estimated costs of channel maintenance and replacements are presented in Table C-20. These expenditures reflect previous experience with similar projects from this region. Brush-kill is required at 4 year intervals. Channel maintenance is required at 20 year intervals. Bridge replacements are required every 30 to 50 years as dictated by the life of the new bridges. Total maintenance and replacement cost is approximately $21,000.

(2). Pumping Stations. Operation, maintenance, and replacement costs associated with the pumping stations are estimated at $358,000 annually (Table C-21). They include electricity and labor costs, replacement of pump impellers every 40 years, gear reducers every 30 years, electric motor stators and motor control centers every 35 years, and roof replacement at 20 year intervals. Demand charges account for approximately $219,000 or 76% of the total $290,000 in energy charges. It should be noted at this point that the project sponsor is currently negotiating with a competing power provider that should be able to supply power to the pumping stations at a much lower cost, with most of the reduction coming from a reduced demand charge. The prospects of the sponsor reaching agreement with this provider are quite promising. Detailed costs are not yet available from the competing supplier. For this reason the estimated costs from the previously identified supplier are used in this analysis. Any reductions from these costs will only improve the economic viability of the project and lower the operating costs for the project sponsor.

d. Total Costs. Total annual costs are $3,933,000 and are presented in Table C-22. Annual interest and sinking fund charges account for the bulk of the annual costs at $3,551,000 (90%). The remaining 10 percent ($382,000) is comprised mostly of the cost of operating the pumping stations.

C-6. SUMMARY.

This update estimated the total annual benefits and costs to be $5,016,000 and $3,933,000, respectively. The project is justified with a benefit-cost ratio of 1.3 to 1. Table C-23 displays a summary of the project benefits and costs for this LRR. The project annually contributes excess benefits, or net benefits over costs, of $1,083,000 to the national economic development account.

Table C-20
Annual Operation, Maintenance, and Replacement Costs for Channel Items
St Johns Bayou and New Madrid Floodway, First Phase
(October 1996 Price Levels, 7.375%)

Item	Cost				Annual Cost			
	Brushkill	Cleanout	Replacements		Brushkill	Cleanout	Replacements	Total
St John's Bayou								
Total	4,500	24,750	221,000	275,000	1,248	717	4,231	6,000
Miles	4.50	4.50						
Per Mile	1,000	5,500						
Frequency	4 Years	20 Years	30 Years	50 Years				
St James Ditch								
Total	10,800	59,400	486,000	125,000	2,597	1,493	5,837	10,000
Miles	10.80	10.80						
Per Mile	1,000	5,500						
Frequency	4 Years	20 Years	30 Years	50 Years				
Birds Point Levee Ditch								
Total	12,400	68,200			3,202	1,841		5,000
Miles	12.40	12.40						
Per Mile	1,000	5,500						
Frequency	4 Years	20 Years						

Table C-21

Annual Operation, Maintenance, and Replacement Costs for Pump Stations

St Johns Bayou and New Madrid Floodway, First Phase

(October 1996 Price Levels, 7.375%)

Item	New Madrid Station			St Johns Station		
	Interval	Replacement Cost	Annual Cost	Interval	Replacement Cost	Annual Cost
Replacement Cost and Interval						
Pump Impellers	40	193,200	941	40	165,131	754
Gear Reducer	30	124,829	888	30	70,771	700
Electric Motor Stators	35	80,681	856	35	72,000	481
Motor Control Center	35	226,873	1,613	35	164,960	1,093
Roof	20	28,224	710	20	22,050	515
Maintenance Cost						
Roof	7	21,393	2,624	7	15,669	1,790
Estimated Maintenance	1	12,267	12,267	1	12,267	12,267
Operating Cost						
Labor		15,213	15,213	164787	15,213	15,213
Energy Charges		35,880	35,880		35,880	35,880
Demand Charges		109,296	109,296		109,296	109,296
Total Annual Costs			180,000			178,000

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Table C-22
Summary of Annual Costs
St Johns Bayou and New Madrid Floodway, First Phase
(October 1996 Price Levels, 7.375%)

Item	Value
Total Investment Cost 1/	40,811,000
Annual Costs	
Interest	3,551,000
Sinking Fund	3,000
Channel OM&R	21,000
Pump Station OM&R	358,000
Total Annual Cost	3,933,000

1/ Excludes sunk costs for LRR, PCA, and prior years PED.

Table C-23

Annual Benefits, Costs, Excess Benefits, and Benefit-to-Cost Ratio
St Johns Bayou and New Madrid Floodway, First Phase
(October 1996 Price Levels, 7.375%)

Item	Value
Total Investment Cost 1/	40,811,000
Annual Costs	
Interest	3,551,000
Sinking Fund	3,000
Channel OM&R	21,000
Pump Station OM&R	358,000
Total Annual Cost	3,933,000
Annual Benefits	
Agricultural Flood Damage Prevented	3,334,000
Agricultural Intensification	1,170,000
Streets & Roads	457,000
Advanced Replacements	51,000
Betterments	4,000
Total	5,016,000
Excess Benefits	1,083,000
Benefit-to-Cost Ratio	1.3

1/ Excludes sunk costs for LRR, PCA, and prior years PED.

ST. JOHNS BAYOU AND
NEW MADRID FLOODWAY MISSOURI
FIRST PHASE

APPENDIX D

REAL ESTATE REPORT
AND COST ESTIMATE

REAL ESTATE REPORT
& COST ESTIMATE

FOR

ST. JOHN'S BAYOU
AND NEW MADRID FLOODWAY, MISSOURI

MISSISSIPPI AND NEW MADRID COUNTIES
MISSOURI

PROJECT

GENERAL DESIGN MEMORANDUM) NO. 101
APPROVED JULY 21, 1987

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APPENDIX D

REAL ESTATE REQUIREMENTS

The subject of this report is the St. John's Bayou and New Madrid Floodway, Missouri Project. The project area is located in the southeast portion of Missouri and is situated in Mississippi and New Madrid Counties. This area of Missouri is commonly referred to as the "Bootheel."

HISTORY: Reference is made to the St. John's Bayou and New Madrid Floodway, Missouri Phase II, General Design Memorandum No. 101, Volumes 1-4, dated August, 1986, Rev. Apr 87. In 1986, real estate costs were prepared for the subject project. A summary of the real estate costs are included in the above referenced report.

This report was approved by HQUSACE on 15 Dec 1986, subject to resolution of comments. A revised report (dated Apr 87) was prepared and sent to Division on 20 May 87 addressing comments made by both Division and HQUSACE. Division approved resolution of these comments by correspondence contained in 5th end. dated 21 Jul 87.

PURPOSE OF REPORT

The purpose of this report is to provide current real estate information and the costs for right-of-way needed for the St. John's Project. The alternatives being considered in this report are:

1. St. John's Bayou (Mile 0 - 3.0)
2. St. John's Bayou (Mile 3.0 - 4.5)
3. St. James Ditch (Mile 0 - 10.8)
4. Setback Levee Ditch (Mile 0 - 8.1)
5. Setback Levee Ditch (Mile 8.1 - 12.4)
6. St. John's Pumping Station
7. New Madrid Pumping Station
8. Mitigation Requirements

Estimates of the right-of-way cost are included for each of the alternatives identified above. A composite estimate referred to as the East Prairie Element is also provided. This estimate is a composite of all project costs included in the alternatives 1 through 8. The attached estimates update real estate cost previously shown and approved in General Design Memorandum No. 101.

Per information provided by Planning Division, 413 acres will be acquired in conjunction with the St. John's Project for mitigation purposes. The mitigation requirements reportedly will include 399 acres of woodland and 14 acres of cropland. Although the exact location of mitigation lands has not been resolved between the Missouri Department of Conservation and the U. S. Fish and Wildlife Service, a cost estimate is included in this report which estimates the current value for both woodland and cropland in the area. The mitigation estimate is provided only for planning purposes and does not

include the market value for any commercially merchantable timber that may be located on the respective wooded tracts. Once the exact number of acres and the location of the mitigation lands are known, Planning Division has indicated this information will be provided to the Real Estate Division so the Appraisal Branch can prepare a cost estimate applicable to the selected tracts.

DESCRIPTION OF PROJECT

The St. John's and New Madrid Floodway project involves work which will be completed both inside and outside of the existing floodway. The Floodway project consists of two major levees, one being the main-line levee along the Mississippi River (MR&T), and the second being a levee referred to as the "Birds Point - New Madrid Floodway Levee," hereafter referred to as the Setback Levee. The land located between these two levees is property that is situated in the Floodway. The MR&T levee located on the east side of the Floodway does not tie into or close at the levee's lower end. Any water which accumulates inside the Floodway drains back into the Mississippi River as the River stages fall.

The work that is the subject of this report includes three major real estate elements. These are:

(1). a combination of widening, deepening and cleaning out three existing drainage ditches.
(2). construction of the proposed St. John's Pumping Station which will pump water from the enlarged canals through the existing "Setback Levee" levee.
(3). construction of the proposed St. John's - New Madrid Pumping Station in conjunction with closing the MR&T levee at the lower end of the floodway.

Some lands in the MR&T Federal Project will be included in the right-of-way for the St. John's Project. These lands are not owned by the Federal Government, but are under control of the St. John's Levee District. This right-of-way is located in the southwest portion of the project near where the St. John's Pumping Station will be constructed. The existing easement is recognized in the land cost estimates and its impact on land values is considered in this report.

NOTE: The Navigational Servitude is not applicable to any element of this project.

LEGAL DESCRIPTION

Legal descriptions of the lands located within the project area have not yet been prepared. This will be accomplished after plans and specifications are complete and the right-of-way requirements are available. A review of maps indicates that approximately 109 ownerships are situated within the project features being considered.

DESCRIPTION OF ESTATES

Right-of-way for this project will be acquired through use of four estates. The estates are: Fee Simple, Restrictive Channel Improvement Easement, Transmission Line Easement, and Flowage Easement (Seasonal). Three of the estates, Fee Simple, Transmission Line, and Flowage Easement can be found in Engineering Regulation 405-1-12.

The description for the Restrictive Channel Improvement Easement will be the same wording as previously approved for use in the Memphis District. A description of these four estates can be found on pages 18 and 19 of this report.

NOTE: Any estates required for the closure of the Mississippi River levee will be acquired as part of the MR&T Project.

DESCRIPTION OF GENERAL AREA

There are two cities located near the project area. These are the towns of New Madrid and East Prairie, Missouri. Both are small communities having populations of approximately 3,500 each. The economy of the area is centered primarily around agricultural production. A majority of land in this area is unimproved cropland used for agricultural purposes such as growing cotton. Other land uses include commercial and residential development near the cities, some farmsteads and farm businesses in the agricultural areas, and levees, ditches and road rights-of-way.

No mineral exploration or drilling activity was observed in the project area. One abandoned building is situated near the proposed right-of-way along the St. James Ditch. Since the appraiser was not able to determine if this structure was located within the project limits, the contributory value for this improvement is included in the real estate costs. No other improvements such as residences, farm buildings, churches, cemeteries or schools are located in the project area.

No personal property was observed in the project area. Public sewers are available in the towns of East Prairie and New Madrid. Otherwise, public sewers are not available in the rural areas and waste disposal is by private septic system. Electric and telephone service is generally available throughout the area. Access to the project area is available via county roads and existing levees.

HAZARDOUS, TOXIC AND RADIOLOGICAL WASTE

A limited inspection of the project area did not reveal the presence of any material or conditions which indicate the presence of hazardous, toxic or radiological waste materials (HTRW). Some old debris such as a discarded appliance and furniture was observed in one location. Since the appraiser is not qualified to made determinations concerning HTRW, the reader should refer to Appendix E for more detailed information involving this project.

PROJECT SPONSOR'S ABILITY TO ACQUIRE REAL ESTATE

The sponsor for this project will be the St. John's Levee and Drainage District. This sponsor has both the ability to acquire the necessary rights-of-way and the financial capability to do so. The St. John's Levee and Drainage District is a political subdivision of the State of Missouri.

Per information provided Real Estate Division, the cost sharing proposal for this project is reported to be Government (Corps) 75 %, and the St. John's Levee and Drainage District 25 %.

PUBLIC LAW (PL) 91-646

The St. John's Levee and Drainage District is aware of their responsibilities under PL 91-646. The Corps will be working in partnership with the project sponsor concerning the acquisition of right-of-way for this project. This will enable the Corps and sponsor to resolve and issues concerning PL 91-646 that may arise.

UTILITIES AND FACILITIES RELOCATIONS

Construction of the subject project will involve the following type relocations: utilities, roads and bridges. No railroads are located in the limits of this project. All relocations will be the responsibility of the project sponsor. An Attorney's Report of Compensable Interests has not been prepared. The Attorney's Report will be prepared prior to signing of the Project Cooperation Agreement. No residential, farm or business relocations are indicated as a result of this project

REAL ESTATE ACQUISITION SCHEDULE

A real estate acquisition schedule will be jointly developed by the Corps and the project sponsor once details of the project are finalized. No problems with acquisition are anticipated at this time. The sponsor has condemnation "quick-take" authority.

VALUATION INFORMATION

An estimate of the cost of right-of-way for subject project is presented in the following pages. The Highest and Best Use (HBU) of land in the project area is generally for agricultural use. The HBU of the remainder is for growing timber, due primarily to the lands topography, elevation and susceptibility to periodic flooding.

After project construction is completed, (excluding land in the fee and perpetual right-of-way), the HBU of the remaining land will be for agricultural use. No uneconomic remnants or severance damages are indicated as a result of project design or construction. With the possible exception of one improvement, the proposed right-of-way is all unimproved land. Subject's current land value has been estimated using the market approach to value.

Assumptions and limiting conditions under which these updated real estate costs have been prepared are included to inform the user of this report of the factors influencing value. The real estate costs for this study have been submitted to the Chief Appraiser Mississippi Valley Division for approval.

The real estate cost shown herein are based on recent comparable sales information of agricultural lands that are located near the proposed project area. Woodland sales in this area are almost non-existent. The values for woodland are estimated based on a combination of (1) a property which is currently being offered for sale, (2) two sales of wooded tracts and (3) the value of agricultural land less the cost of clearing and preparing the land for agricultural production.

The real estate cost estimates for the various alternatives considered in this project are included as pages 7 through 15 of this report.

OTHER CONSIDERATIONS

Based on information provided for this project, the general attitude of the landowners toward this project appears to be favorable since the project is designed to reduce flooding throughout the area. However, as with most controversial issues, there may be some local landowners who are opposed to this project since their lands will be subject to imposition of easements, or may be purchased in fee.

Induced flooding reportedly will not occur outside of lands included in the project right-of-way. A flowage easement (seasonal) will be acquired over lands where ponding will occur near the pumping stations.

The project sponsor has been advised in writing of the risks associated with acquisition of lands prior to signing of the Project Cooperation Agreement.

A map showing the project area is included as page 6 of this report.

Insert Map

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St. John's Bayou and New Madrid Floodway, Missouri Project
Mississippi and New Madrid Counties, Missouri

Item 3

St. John's Bayou (Mile 0 - 3.0)

ESTIMATE OF COSTS (Date of Value - November 1996)

	Acres	Unit Value ($)	Total Value ($)
(a) Lands & Damages			
Restrictive Channel Improvement Easement			
Within Existing Channel	60	50 x .50	1,500
Woodland	100	700 x .95	66,500
Cropland	140	1,400 x .95	186,200
Improvements			0
Severance Damages			0
Total (R)			$254,000
(b) Contingencies 25% (R)			64,000
(c) Acquisition Costs (Estimates 15 Tracts)			
Non-Federal 15 @ $4,000 per tract			60,000
Federal 15 @ $1,000 per tract			15,000
(d) PL-91-646			
Title II, (Move Personal Property)			0
Title III, (Legal, Sale and Purchase, etc.)			1,000
(e) Total Estimated Real Estate Cost			$394,000

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St. John's Bayou (Mile 3.0 - 4.5)

ESTIMATE OF COSTS (Date of Value - November 1996)

	Acres	Unit Value ($)	Total Value ($)
(a) Lands & Damages			
Restrictive Channel Improvement Easement			
Within Existing Channel	30	50 x .50	750
Woodland	50	700 x .95	33,250
Cropland	70	1,400 x .95	93,100
Improvements			0
Severance Damages			0
Total (R)			127,000
(b) Contingencies 25% (R)			32,000
(c) Acquisition Costs (Estimates 3 Tracts)			
Non-Federal	3 @ $4,000 per tract		12,000
Federal	3 @ $1,000 per tract		3,000
(d) PL-91-646			
Title II. (Move Personal Property)			0
Title III. (Legal, Sale and Purchase, etc.)			1,000
(e) Total Estimated Real Estate Cost			$175,000

St. James Ditch (Mile 0 - 10.8)

ESTIMATE OF COSTS (Date of Value - November 1996)

	Acres	Unit Value ($)	Total Value ($)
(a) Lands & Damages			
Restrictive Channel Improvement Easement			
Within Existing Channel	100	50 x .50	7,500
Cropland	215	1,400 x .95	287,280
Improvements			5,000
Severance Damages			0
Total (R)			$295,000
(b) Contingencies 25% (R)			74,000
(c) Acquisition Costs (Estimates 60 Tracts)			
Non-Federal	60 @ $4,000 per tract		240,000
Federal	60 @ $1,000 per tract		60,000
(d) PL-91-646			
Title II, (Move Personal Property)			0
Title III, (Legal, Sale and Purchase, etc.)			6,000
(e) Total Estimated Real Estate Cost			$675,000

Setback Levee Ditch (Mile 0 - 8.1)

ESTIMATE OF COSTS (Date of Value - November 1996)

(a) Lands & Damages	Acres	Unit Value ($)	Total Value ($)
Restrictive Channel Improvement Easement			
Within Existing Channel	73	50 x .50	1,825
Woodland	82	700 x .95	54,530
Cropland	111	1,400 x .95	147,630
Improvements			0
Severance Damages			0
Total (R)			$204,000
(b) Contingencies 25% (R)			51,000
(c) Acquisition Costs (Estimates 11 Tracts)			
Non-Federal	11 @ $4,000 per tract		44,000
Federal	11 @ $1,000 per tract		11,000
(d) PL-91-646			
Title II, (Move Personal Property)			0
Title III, (Legal, Sale and Purchase, etc.)			1,000
(e) Total Estimated Real Estate Cost			$311,000

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Setback Levee Ditch (Mile 8.1 - 12.4)

ESTIMATE OF COSTS (Date of Value - November 1996)

	Acres	Unit Value ($)	Total Value ($)
(a) Lands & Damages			
Restrictive Channel Improvement Easement			
Within Existing Channel	38	50 x .50	950
Woodland	42	700 x .95	27,930
Cropland	57	1,400 x .95	75,810
Improvements			0
Severance Damages			0
Total (R)			$105,000
(b) Contingencies 25% (R)			26,000
(c) Acquisition Costs (Estimates 9 Tracts)			
Non-Federal	9 @ $4,000 per tract		36,000
Federal	9 @ $1,000 per tract		9,000
(d) PL-91-646			
Title II, (Move Personal Property)			0
Title III, (Legal, Sale and Purchase, etc.)			1,000
(e) Total Estimated Real Estate Cost			$177,000

St. John's Pumping Station

ESTIMATED COSTS (Date of Value - November 1995)

(a) Lands & Damages	Acres	Unit Value ($)	Total Value ($)
Fee Simple			
Within Existing Levee R/W	14	50	700
Within Existing Channel	2	50	100
Woodland	18	700	12,600
Cropland	4	1,400	5,600
Cropland	1	2,000	2,000
Transmission Line Easement (Perpetual)			
Within Existing Levee R/W	2	50 x .50	50
Flowage Easement (Seasonal)			
Woodland	600	700 x .10	42,000
Cropland	1,900	1,400 x .10	266,000
Improvements			0
Severance Damages			0
Total (R)			$329,000
(b) Contingencies 25% (R)			82,000
(c) Acquisition Costs (Estimates 3 Tracts)			
Non-Federal	3 @ $4,000 per tract		12,000
Federal	3 @ $1,000 per tract		3,000
(d) PL-91-646			
Title II, (Move Personal Property)			0
Title III, (Legal, Sale and Purchase)			1,000
(e) Total Estimated Real Estate Cost			$427,000

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ESTIMATE OF COSTS (Date of Value - November 1996)

(a) Lands & Damages	Acres	Unit Value($)	Total Value($)
Fee Simple			
Closure of New Madrid Floodway Levee	15*	0	MR&T Cost*
Within Existing Channel	8	50	400
Woodland	11	700	7,700
Cropland	11	1,400	15,400
Transmission Line Easement (Perpetual)			
Within Existing Levee R/W	.34	50 x .50	9
Woodland	.34	700 x .25	60
Flowage Easement (Seasonal)			
Woodland	2,225	700 x .10	155,750
Cropland	175	1,400 x .10	24,500
Improvements			0
Severance Damages			0
Total (R)			$204,000

(b) Contingencies 25% (R)		51,000
(c) Acquisition Costs (Estimates 3 Tracts)		
Non-Federal	3 @ $4,000 per tract	12,000
Federal	3 @ $1,000 per tract	3,000
(d) PL-91-646		
Title II, (Move Personal Property)		0
Title III, (Legal, Sale and Purchase, etc.)		1,000
(e) Total Estimated Real Estate Cost		$271,000

*Cost of right-of-way for the closure levee reportedly will be paid from MR&T funds.

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ESTIMATE OF COSTS (Date of Value - November 1996)

(a) Lands & Damages	Acres	Unit Value ($)	Total Value ($)
Fee Simple			
Woodland	399	700	279,300
Cropland	14	1,400	19,600
Improvements			0
Severance Damages			0
Total (R)			$299,000
(b) Contingencies 25% (R)			75,000
(c) Acquisition Costs (Estimates 5 Tracts)			
Non-Federal	5 @ $4,000 per tract		20,000
Federal	5 @ $1,000 per tract		5,000
(d) PL-91-646			
Title II, (Move Personal Property)			0
Title III, (Legal, Sale and Purchase, etc.)			1,000
(e) Total Estimated Real Estate Cost			$400,000

East Prairie Element (Composite of All Estimates)

ESTIMATE OF COSTS (Date of Value - November 1996)

(a) Lands & Damages	Acres	Unit Value ($)	Total Value ($)
Fee Simple			
Closure of New Madrid Floodway Levee	15*	0	MR&T Cost*
Within Existing Levee R/W	14	50	700
Within Existing Channel	10	50	500
Woodland	428	700	299,600
Cropland	29	1,400	40,600
Cropland	1	2,000	2,000
Restrictive Channel Improvement Easement			
Within Existing Channel	301	50 x .50	7,525
Woodland	274	700 x .95	182,210
Cropland	594	1,400 x .95	790,020
Transmission Line Easement (Perpetual)			
Within Existing Levee R/W	2.34	50 x .50	59
Woodland	.34	700 x .25	60
Flowage Easement (Seasonal)			
Woodland	2,825	700 x .10	197,750
Cropland	2,075	1,400 x .10	290,500
Improvements			5,000
Severance Damages			0
Total (R)			$1,817,000
(b) Contingencies 25% (R) **			455,000
(c) Acquisition Costs (Estimates 109 Tracts)			
Non-Federal	109 @ $4,000 per tract		436,000
Federal	109 @ $1,000 per tract		109,000
(d) PL-91-646			
Title II, (Move Personal Property)			0
Title III, (Legal, Sale and Purchase, etc.)			13,000
(e) Total Estimated Real Estate Cost			$2,830,000

*Cost of right-of-way for the closure levee reportedly will be paid from MR&T funds.
**Rounded to next higher $1,000 to agree with individual cost estimates.

ASSUMPTIONS & LIMITING CONDITIONS

St. John's Bayou and New Madrid Floodway, Missouri

1. These estimates are based on maps, acreage calculations and information provided by Engineering and Project Management Divisions.

2. No estimate is made for the market value of crops which may be growing when the right-of-way is acquired. If crops are destroyed due to project construction, the property owners or tenant farmers will be entitled to additional compensation not included in this report. No estimate is included in this report for the future crop values.

3. No mineral deposits or materials of commercial value are located within the proposed right-of-way.

4. The seasonal flowage easement will allow annual flooding of lands for wildlife restoration. The flooding will take place from November 15 to February 15 of the following year and will occur outside of the agricultural growing season.

5. Information, estimates, and opinions furnished to the appraiser and contained in this report were obtained from sources considered reliable and are believed to be true and correct. However, no responsibility for accuracy of such items furnished the appraiser can be assumed by the appraiser.

6. The appraiser assumes that there are no hidden or unapparent conditions of the property or subsoil, which would render it more or less valuable. The appraiser assumes no responsibility for conditions or for engineering which might be required to discover such factors.

7. The existence of potentially hazardous material such as the presence of urea formaldehyde, foam insulation, asbestos materials, and/or existence of toxic waste, which may or may not be present on the property, has not been considered. The appraiser is not qualified to detect such substances.

8. At the time of the appraiser's inspection of the proposed new right-of-way, no Corps survey stakes could be found marking the exact location of the proposed right-of-way. Therefore, since the appraiser was unable to precisely determine the exact location of the property lines, these estimates have been prepared under less than desirable conditions even though every effort has been made to avoid errors.

9. Severance damages will be avoided by leaving adjacent owners sufficient rights allowing access (in perpetuity) to their remaining property after acquisition. Thus, all ownerships will have access equal to before project conditions. The "highest and best use" of the remainder(s) does not change. No uneconomic remnants will occur due to project design or construction.

ASSUMPTIONS & LIMITING CONDITIONS
St. John's Bayou and New Madrid Floodway, Missouri (continued).

10. These estimates are made contingent that any privately owned drain pipes, culverts, roads, etc. that are situated within the right-of-way (and affected by project construction) will be removed and replaced by the Corps contractor. Thus, all property owners and/or tenant farmers will be equal under the "before and after" appraisal scenario. If the contractor does not comply with removal and replacement of these items, the Corps Real Estate Division will need to revise this report to estimate compensation due for additional takings applicable to the respective ownership(s).

11. The land value for agricultural land in the project area varies from approximately $1,300 to $1,500, with some tracts selling for over $2,000 per acre depending on location and whether or not a property is irrigated. Since the appraiser was unable to determine how much of the project land is irrigated, a blended land value of $1,400 per acre is used in this report.

12. Memphis District payments for Public Law (PL) 91-646 have averaged about $100 per tract made on the estimated number of ownerships. This project expense is included in the total project costs under PL 91-646 payments.

Barnie L. McDonald
Appraiser
April 4, 1997

Reviewed and Approved

Otis R. Gore, ARA
Division Appraiser
Real Estate Division
MVD/MRC
April 4, 1997

DESCRIPTION OF ESTATES

FEE SIMPLE

The fee simple title to the land described in Schedule A, Tract(s) No(s)._____, subject, however, to existing easements for public roads and highways, public utilities, railroads and pipelines.

RESTRICTIVE CHANNEL IMPROVEMENT EASEMENT

A perpetual and assignable right and easement to construct, operate and maintain channel improvement works on, over and across the land, and to construct and maintain weirs at selected locations, together with all right, title and interest in and to the timber, growing crops, buildings, improvements and/or other obstructions situated thereon; to excavate, dredge, cut away, and remove any and all of said land, to place thereon dredged or excavated material; including the further right to seed and revegetate the embankment, to maintain the embankment with such vegetation, to prohibit the mowing, cutting, burning, and use of the land for growing crops or grazing, to prohibit the reshaping or removal of earth or other material from said land, and to prohibit public access to the land, and for such other purposes as may be required in connection with said work of improvement; reserving, however, to the owners, their heirs and assigns, all such rights and privileges as may be used without interfering with or abridging the rights and easement hereby acquired; subject, however, to existing easements for public roads and highways, public utilities, railroads and pipelines.

TRANSMISSION LINE EASEMENT

A perpetual and assignable easement and right-of-way in, on, over and across the land, for the location, construction, operation, maintenance, alteration, repair and patrol of overhead transmission lines and towers; together with the right to trim, cut, fell and remove therefrom all trees, underbrush, obstructions and other vegetation, structures, or obstacles within the limits of the right-of-way; reserving, however, to the landowners, their heirs and assigns, all such rights and privileges as may be used without interfering with or abridging the rights and easement hereby acquired; subject, however, to existing easements for public roads and highways, public utilities, railroads and pipelines.

FLOWAGE EASEMENT

The perpetual right, power, privilege and easement occasionally to overflow, flood and submerge the land described in Schedule A, Tract(s) No(s). _____ in connection with the operation and maintenance of the project as authorized by the Act of Congress, as approved, together with all right, title and interest in and to the structures and improvements now situate on the land, except fencing; provided that no structures for human habitation shall be constructed or maintained on the land, that no other structures shall be constructed or maintained on the land except as may be approved in writing by the representative of the United States in charge of the project, and that no excavation shall be conducted and no landfill placed on the land without such approval as to the location and method of excavation and/or placement of landfill; the above estate is taken subject to existing easements for public roads and highways, public utilities, railroads and pipelines; reserving, however, to the landowners, their heirs and assigns, all such rights and privileges as may be used and enjoyed without interfering with the use of the project for the purposes authorized by Congress or abridging the rights and easement hereby acquired; provided further that any use of the land shall be subject to Federal and State laws with respect to pollution.

ST. JOHNS BAYOU AND
NEW MADRID FLOODWAY MISSOURI
FIRST PHASE

APPENDIX E

HTRW PHASE I ASSESSMENT

Hazardous, Toxic, and Radioactive Waste
Phase 1 Assessment

St. Johns Bayou - New Madrid Floodway
Limited Reevaluation Report
East Prairie Phase

Summary

The Corps of Engineers, Memphis District (MD) has examined the study area of the St. Johns Bayou New Madrid Floodway for the potential presence of hazardous, toxic, and radioactive wastes (HTRW). The assessment relies on site inspections, personal interviews with local officials, and document research. Based on these evaluations, it is reasonable to conclude that no hazardous, toxic or radioactive wastes would be encountered during construction of this project. No additional HTRW work is recommended, unless new information or HTRW is discovered during construction.

Introduction

The purpose of this initial assessment is to gather and evaluate data regarding the existence or potential for encountering HTRW at or near Corps civil works projects. Documentation is based on historical records search and site inspections. The assessment is intended to minimize liability of the Federal government, protect the health and safety of field personnel from undocumented HTRW sources during field investigations, and document the existence of sites that are in need of remediation.

This assessment was prepared under guidance of the Corps of Engineers Regulation, ER 1165-2-132, Water Resources Policies and Authorities for Hazardous, Toxic, and Radioactive Waste (HTRW) for Civil Works Projects, June 22, 1992.

Project Description

Purpose and Need

The purpose of this project is to provide flood control and drainage within the study area . This project provides a solution to the problems caused by headwater and backwater flooding and reduces the damages caused by the current inadequate drainage in the region.

Project Authority

This project was authorized by the Water Resources Development Act of 1986 (PL 99-662), Section 401(a).

Prior Project Documentation

The St. Johns Bayou New Madrid Floodway Final Environmental Impact Statement was released in May of 1975. The Phase I General Design Memorandum and Final Supplement to the Final Environmental Impact Statement was completed in December, 1981. The St. Johns Bayou and New Madrid Floodway, Missouri, Phase II General Design Memorandum 101 was revised in April, 1987.

Project Action

The plan consists of channel enlargement and improvement along 4.5 miles of St. Johns Bayou, beginning at New Madrid, Missouri, then continuing 8.1 miles along Birds Point New Madrid Setback Levee Ditch, and ending with 10.8 miles along St. James Ditch. An additional 4.3 miles along the Setback Levee Ditch will have selective clearing starting at the confluence with St. James Ditch (See Figure 1of the Environmental Assessment). A 1,000 cfs pumping station will also be constructed at the lower end of St. Johns Bayou, several hundred feet east of the existing gravity outlet structure.

General Environmental Setting

Geologic Features

The area is covered to depths of 200 feet by recent alluvial deposits of sandy loams, clays, sands, and gravels underlain by Tertiary sediments. The New Madrid Fault is the most notable geologic structure associated with the study area. This fault became prominent to the general public following a major earthquake in December of 1811. This quake was followed by two others in early 1812, all of which registered 12 on the Richter Scale and which researchers say were the most violent earth tremors on the North American continent. One of the most notable results of the tremor was the lowering of a thirty square mile area in West Tennessee forming Reelfoot Lake.

Climate

The growing season for this area is approximately seven months long. The average monthly temperature in the area varies from 30 degrees Fahrenheit in January to 81 degrees Fahrenheit in July. Annual precipitation varies from 27 to 80 inches with a normal over the area of about 50 inches. The heaviest rainfall generally occurs between January and May. Killing frost generally occurs during the months of November to early April.

Hydrological Elements

The St. Johns Bayou Basin is covered by nearly 200 feet of recent alluvial deposits of sandy loams, clays, sands, and gravels underlain by Tertiary sediments. All soils were formed in alluvium that was sorted by the Mississippi - Ohio River complexes as they overflowed their main channels or entered the deltaic plain. Sand was deposited first, then finer sediments on top as flood water continued. Several layers of fine, clayey sediments are interspersed among the sandy layers. Wells are the principal supply of water for domestic use within the project area. The associated aquifers

lie several hundred feet deep and are overlain with several clay layers.

Vegetation and Wildlife

Due to the richness of the soil, rainfall distribution, and seasonal weather conditions, this area is primarily used for the production of row crops. The region is possibly the most productive area in the United States that does not require extensive irrigation. The principal crops consist of cotton, soybeans, wheat, hay, and pasture lands. Several rare or endangered species of wildlife may exist in the project area, but due to the mitigation plan none are expected to be adversly affected.

Environmental Concerns

The objective of this investigation is to determine the existence or probability of locating historical waste disposal sites or other sites containing substances that could be injurious to workers or detrimental to wildlife. Many toxic chemicals possess half-lives that enable particular chemical forms to persist in the soil, creating a potential long term risk. The formation of a chemical metabolite over time can aid in the identification of the original organic contaminant. Several factors, such as soil characteristics (clay, mineral, or organic types), chemical concentration of the contaminant, residence time of the chemical within the soil, surface and groundwater interactions, and site-specific meteorological conditions determine whether a particular metabolite is ultimately released to the environment to cause potential containment problems.

Exposure to contaminated soil may pose both direct and indirect hazards to humans. The degree of exposure to toxic substances is primarily a function of concentration in the top several inches of soil; exposure is induced by skin adsorption, ingestion, or inhalation of the contaminant. Within the soil's surface layer, such routes of exposure are facilitated because sunlight and air allow many chemicals to volatize rapidly or become metabolized to different forms by soil microorganisms. Chemicals can also leech into groundwater and enter streams in surface runoff, where they present a threat to fish, birds, and terrestrial wildlife species.

Undocumented underground storage tanks for petroleum products represent an additional source of concern. If undocumented waste sites are uncovered during the course of the proposed action, work delays, increased coordination with regulatory agencies, and escalating project costs could result, with the risk of potential worker exposure to HTRW.

Assessment Methodology

HTRW Objective

The objective of this assessment is to minimize, through early detection, exposure from any waste site or contaminated material during the construction of the project. The intent is to provide a reasonable assessment of the potential problem areas, so that project managers and local sponsors can make decisions on property transfers or future testing requirements. This preliminary assessment

focuses on information that would identify known sites adjacent to or near the project area and determine the probabilities for potential contaminant release.

Agency Coordination/ Historical Records Search

The U. S. Environmental Protection Agency (EPA), several divisions of the Missouri Department of Conservation (MDOC), the Missouri Department of Natural Resources (MDNR), the National Response Center (NRC) in Washington, D.C., and various local officials were contacted regarding information about any known HTRW problems in the project area. Contacts are listed in Appendix (A).

Site Visits

Memphis District personnel have made numerous site visits to the study area to become familiar with the wildlife habitats and the overall land use. During the past several years, numerous field investigations have been conducted by Corps biologists and engineers.

Assessment Results and Findings

The results of the records search and site inspections are discussed below. Details of these analyses are contained in files at Memphis District.

Agency Coordination/Historical Records Search

A records search of potential sources of contamination within the project area was performed through contacts with personnel from the EPA, NRC, and the MDOC. Records listing Federal National Priorities List and Superfund sites were examined by the Kansas City EPA, and no sites are located within or bordering the project area. A list of occurrences (spills) for Mississippi and New Madrid counties was obtained from the NRC, and no releases have been reported in the project area within the time frame covered by their records (since 1990). A list of state RCRA sites has been examined, and none occur near the project area. Contact with MDOC personnel indicated that due to the rural nature of the project site, the possibility of any documented HTRW sites was unlikely.

Site Visits

The land use for the study area is rural agricultural with low density residential areas. A visual inspection of the project rights-of-way was conducted from 7 October 1996 through 11 October 1996. Two illegal dumps were located during this inspection. Site #1 was located approximately 1.25 miles west of the intersection of MO Hwy 102 and the Birds Point New Madrid Levee. It consisted of general trash and an old water heater. The second and larger dump (Site #2) was located

approximately two thirds of a mile upstream of the first site where MO Hwy 525 crosses St. James Ditch. The canal appeared to be completely blocked on both sides of the bridge by the contents of a residence (furniture, carpeting, clothing, several appliances, a swing set), thirty or so tires, construction materials, propane fuel tanks, two deer carcasses, and general household wastes. All materials should be removed and deposited in an approved sanitary landfill either prior to or during construction.

Local Interviews

The East Prairie Fire Department was contacted to determine the possibility of hazardous waste contamination due to pesticide, herbicide, or chemical fires. None have occurred within the time frame covered by their records (the last seven years). The St. Louis-Southwestern Railroad has a line that runs through the project area; contact with railroad personnel revealed no indication of contamination due to a hazardous substance release or train accident.

Assessment Discovery

Site investigations indicate the absence of apparent site-specific HTRW problems within the project rights-of-way. In addition, agency coordination has provided no substantial cause for further consideration of potential HTRW in the area.

Relative Risk Assessment

Based on document verifications that no HTRW indications or existing support facilities exist within project rights-of-way and present land use, the potential for encountering hazardous or toxic wastes in the project area is unlikely.

Conclusion and Recommendation

This Phase 1 Assessment did not encounter information relating to the potential presence of hazardous wastes sites within the project area. It also does not guarantee the non-existence of HTRW within or affecting the project area. The analysis, conslusions and recommendations in this report are based solely upon information obtained from the record searches and visual site survey. This report does not constitute a guarantee or certificate of the non-existence of HTRW contamination at any location. Based upon information gathered during the preliminary assessment for the study area, it is reasonable to assume that no hazardous, toxic, or radioactive wastes would be encountered during the construction of this project. No additional HTRW investigations are recommended. No other analysis is required, unless new information is developed or HTRW is discovered. This assessment indicates no apparent risk of encountering hazardous wastes sites within the project area.

Appendix (A)
List of Contacts

FEDERAL

National Response Center

1. Freedom of Information Office (202) 267-2655
Chief Petty Officer C. J. Bright, FOIA Officer (21 December 1996)

Federal Environmental Protection Agency

1.Region VII, Kansas City, Kansas

Superfund Division (913) 551-7742
Bryant Burnett, (12 December, 1996)

RCRA Division (913) 551-7883
Lynn Slugantz, (3 January 15 1997)

STATE

Missouri Department of Conservation

1. Solid Waste Division (573) 683-6735
Randy McDonna

Missouri Department of Natural Resources

1. Hazardous Waste Division (573) 634-2436 (18 December 1996)

LOCAL

East Prairie Fire Department

1. Chief's Office (573) 649-3511
Chief Danny Laferty (17 December 1996)

St. Louis-Southwestern Railroad

1. Engineering Department (501) 541-1784
David Cockrell, Mechanic Supervisor, Roundhouse (18 December 1996)

2.Engineering Group (501) 541-1621
Mike Coball (18 December 1996)

ST. JOHNS BAYOU AND
NEW MADRID FLOODWAY MISSOURI
FIRST PHASE

APPENDIX F

BPNM LEVEE DITCH ENVIRONMENTAL ASSESSMENT

ENVIRONMENTAL ASSESSMENT

St. Johns Bayou - New Madrid Floodway
First Phase - Item One - Selective Vegetation Removal
Birds Point New Madrid Setback Levee Ditch - Miles 8.1 to 12.4

U.S. Army Corps of Engineers
Memphis District

April 1997

St. Johns Bayou - New Madrid Floodway
First Phase - Item One - Selective Vegetation Removal
Birds Point New Madrid Setback Levee Ditch - Miles 8.1 to 12.4

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St. Johns Bayou - New Madrid Floodway
First Phase - Item One - Selective Vegetation Removal
Birds Point New Madrid Setback Levee Ditch - Miles 8.1 to 12.4

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ENVIRONMENTAL ASSESSMENT

St. Johns Bayou - New Madrid Floodway
First Phase - Item One - Selective Vegetation Removal
Birds Point New Madrid Setback Levee Ditch - Miles 8.1 to 12.4

INTRODUCTION

The Corps of Engineers, Memphis District, has prepared this Environmental Assessment (EA) to evaluate potential impacts associated with constructing a limited portion of the St. Johns Bayou and New Madrid Floodway, Missouri flood control project. The St. Johns Bayou and New Madrid Floodway project is part of a comprehensive plan that provides flood protection from Mississippi River floods to a large area of southeast Missouri.

The St. Johns Bayou and New Madrid Floodway basins are located in southeast Missouri and include all or portions of New Madrid, Scott, and Mississippi counties. The basins are adjacent to the Mississippi River, extending from the vicinity of Commerce, Missouri, to New Madrid, Missouri. The area is divided by the Birds Point New Madrid Setback Levee into two distinct drainage basins. The St. Johns Bayou Basin lies west of the New Madrid Floodway.

The St. Johns drainage basin is approximately 450 square miles, is fan shaped with a length of about 40 miles, and a maximum width of 25 miles. Runoff from the St. Johns Bayou Basin drains through an existing gravity outlet consisting of six 10-foot by 10-foot box culverts completed in 1953. During high Mississippi River stages (about 29 feet on the New Madrid gage), the floodgates on this structure are closed to prevent Mississippi River backwater flooding in the St. Johns Bayou watershed. When the floodgates are closed, interior headwater drainage flow is impounded until the Mississippi River recedes to an elevation lower than the impounded landside water.

The original recommended plan of improvement for the overall project included 137 miles of rural channel improvement, 6.7 miles of urban channel improvement, a 1,000 cfs pumping station for the St. Johns Bayou area, and a 1,500 cfs pumping station for the New Madrid Floodway area. The project also included 2,500 acres of land acquisition and development for fish and wildlife habitat in the Tenmile Pond area to mitigate for woodland and wetland losses. About 4,900 acres of ponding easements on farmland and some wooded acres would be acquired during the waterfowl season to mitigate for this loss due to the levee closure. The overall plan also included restrictive easements for fish and wildlife habitat on 2,450 acres of the new excavated material embankments along the channels. Greentree reservoirs and construction of two fish pool weirs were also part of the total mitigation plan.

Channels in the rural portion of the St. Johns Bayou Basin would provide a minimum of a 2-year level of protection. The urban channel improvements in Sikeston and East Prairie would provide a minimum of a 5-year level of protection from urban property damage. The urban

improvements provide the highest level of protection feasible. In the New Madrid Floodway a 1.1-year level of protection would be provided.

Due to economic constraints, the overall St. Johns Bayou and New Madrid Floodway project cannot be completed at this time. The project sponsor has elected to begin a limited portion (Item One) of the overall project along 4.3 miles of the Birds Point New Madrid Setback Levee Ditch in the vicinity of East Prairie, Missouri. This first construction item of the East Prairie Phase of the overall project will be referred to hereafter as Item One. It consists of selectively removing trees less than 6 inches in diameter and shrubby vegetation from the top of the channel bank to the waterline, and clearing excess vegetation and blockages from within the channel that may be hindering flow. This work item is addressed in the Phase II General Design Memorandum (GDM) (U.S. Army Corps of Engineers 1986). Item One is not dependent on the remainder of the overall project for benefits.

This EA will only address work associated with the Item One phase. The remaining channel work in St. Johns Bayou Basin, and the New Madrid Floodway, as well as the levee closure and its associated pumping station will be addressed in a supplemental Environmental Impact Statement (EIS). This EA also serves to update the Supplement to the EIS that was submitted with the August 1986 Phase II General Design Memorandum 101 and subsequently approved for construction by Congress. It is prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, as interpreted by the U.S. Amy Corps of Engineers Regulation ER-200-2-2, and employs a systematic, interdisciplinary approach. The following sections include discussions of the need, authority, and impacts of this limited phase of the overall St. Johns Bayou project on natural, cultural and social resources.

NEED FOR ACTION

PURPOSE

Land use in the area is 90 percent agricultural with urban and built-up areas accounting for only 1.9 percent. Damaging winter and spring floods in the St. Johns Bayou area result from both impounded runoff in the lower reaches of St. Johns Bayou and headwater flooding in the upper reaches of St. Johns Bayou and tributaries because of inadequate channel capacities. Flooding occurs almost on a yearly basis. Flood waters occasionally last into late June, resulting in major crop losses. The 100-year backwater flood occurrence in the St. Johns Bayou area would flood over 125 structures and inundate about 50,000 acres of agricultural land and over 2,700 acres of forested land. Flood damages to agricultural lands and to urban property in Sikeston, and East Prairie are major problems. The 100-year headwater flood would inundate approximately 99,000 acres of prime farmland and flood over 520 farm structures.

PUBLIC CONCERNS

Over the past few years, heavy rains and high Mississippi River water levels have increased the urgency for some form of flood control. Agriculture has been impacted the most severely with

other damages occurring to electric, water, and sewer utilities, plus businesses, schools, and private homes. Flooded roads prevent the normal traffic flow of goods and services throughout the business communities within the floodway. Widespread public support exists not only for a project which will provide flood control, but also one for benefitting environmental resources within the St. Johns Bayou area.

PROJECT AUTHORITY

The St. Johns Bayou and New Madrid Floodway project was authorized for construction by the Water Resources Development Act of 1986 (PL 99-662), Section 401(a). The authorized project is based on the Report of the Chief of Engineers, dated January 4, 1983, which is part of the Phase I General Design Memorandum (GDM) documents prepared in response to Section 101(a) of the Water Resources Development Act of 1976 (PL 94-587). The Phase II GDM is based on the Phase I GDM project recommendations, and it was prepared under the Chief's authority for continuing planning and engineering studies on a viable project while awaiting project authorization. Revisions were made in the Phase II GDM to indicate the non-Federal cost sharing requirements reflected in the authorizing Act, PL 99-662. The recent designation of East Prairie, Missouri, as an Enterprise Community by the President has provided the momentum to move the initial, or East Prairie Phase of the overall project towards implementation. In late FY 96, funds were reprogrammed to the project to initiate Preconstruction, Engineering and Design (PED) activities associated with this phase. In FY 97, Congress urged completion of preconstruction activities within six months and provided new start construction funds.

PROJECT DESCRIPTION
ALTERNATIVES

The original project report evaluated several alternatives. These are addressed in the Phase I and Phase II GDM reports. Since Item One is a portion of the original project, only one construction alternative exists which would provide some form of flood protection at an affordable cost. The no-action alternative is defined as termination of the project.

ALTERNATIVE 1

The first alternative consists of selective clearing and snagging a 4.3-mile reach of the Birds Point New Madrid Setback Levee Ditch beginning at the confluence with St. James Ditch at Mile 8.1 (Figure 1). This channel work would be performed from the left descending bank. All brush and small trees less than 6 inches in diameter within this reach will be removed. Any material not able to be burned will be hauled to an approved disposal site. Approximately 21 acres of this predominately pasture with shrubby patches of berm habitat will be cleared. No other woodlands will be cleared with this project. The average channel width in this selective clearing reach is 80 feet. Vegetative clearing with Iem One, when coupled with future downstream channel enlargement, would provide flood protection for up to a 10-year storm event; the same design level of flood protection for which it was planned in the original GDM. No channel excavation will be done here.

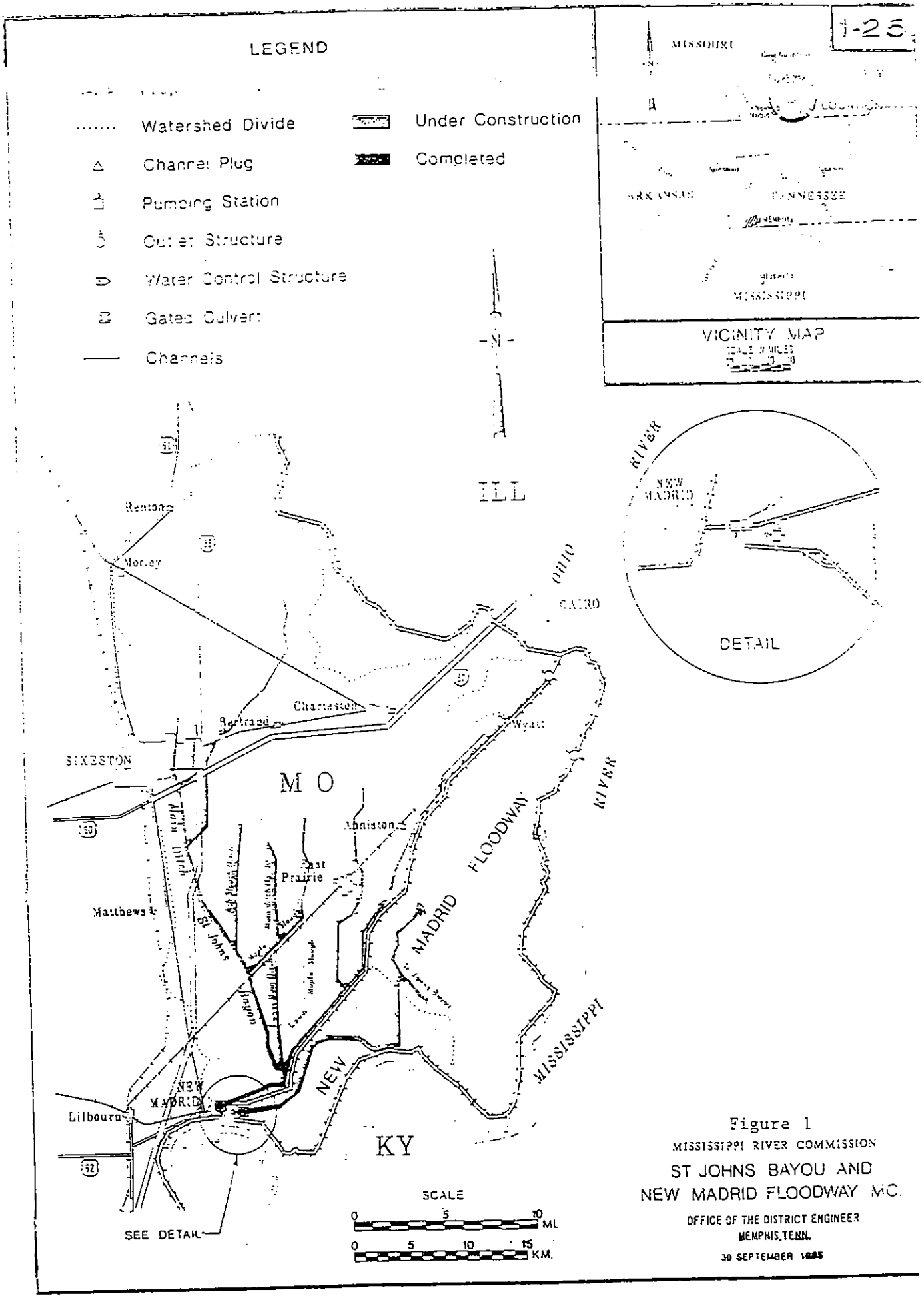

Figure 1
MISSISSIPPI RIVER COMMISSION
ST JOHNS BAYOU AND
NEW MADRID FLOODWAY MO.
OFFICE OF THE DISTRICT ENGINEER
MEMPHIS, TENN.
30 SEPTEMBER 1985

ALTERNATIVE 2

With the second or no-action alternative, the project would terminate and the area would continue to experience flooding with the associated economic losses.

ENVIRONMENTAL SETTING

LOCATION

The St. Johns Bayou Basin is located in southeast Missouri on the west bank floodplain of the Mississippi River delta. It drains approximately 450 square miles. All streams and ditches flow south or southwest to eventually empty into St. Johns Bayou and then the Mississippi River at New Madrid. The New Madrid Floodway lies immediately east of the St. Johns Bayou Basin; separated from it by the Birds Point New Madrid Setback Levee. Item One of the First Phase of the overall project lies within Mississippi County and covers 4.3 miles of the Birds Point New Madrid Setback Levee Ditch (hereafter called Setback Levee Ditch), starting at the confluence with St. James Ditch at Mile 8.1, and ending upstream at Hwy 102.

GEOLOGY

The New Madrid Fault is the most notable geologic structure associated with the study area. It is an ancient rift fault that did not fully separate. It is generally believed that the fault extends from about Cairo, Illinois, to the vicinity of Helena, Arkansas.

MINERALS

There are no mineral resources found in the immediate project area.

TOPOGRAPHY

The Item One project is situated in the braided-relict alluvium deposited by the post-glacial Mississippi - Ohio River complex. The topography is characteristic of a large river delta. The area is substantially devoid of relief with elevations ranging from 280 to 325 feet above mean sea level.

SOILS

The St. Johns Bayou Basin is covered by nearly 200 feet of recent alluvial deposits of sandy loams, clays, sands, and gravels underlain by Tertiary sediments. All soils were formed in alluvium that was sorted by post glacial Mississippi and Ohio Rivers as they overflowed their main channels or entered the deltaic plain. The two basic soil associations (Sharkey - Alligator and Dundee - Forestdale) when wet, are sticky and plastic; and when dry, they become hard and crack. Wetness is a major management problem on these soils as runoff is slow. Both associations are poorly

drained and are subject to wind and surface water erosion.

CLIMATE

The climatic conditions range from comparatively mild winters to warm summers. The average monthly temperatures range from 30 degrees Fahrenheit in January to 81 degrees Fahrenheit in July. The average relative humidity in the mid afternoon is about 60 percent. Humidity occasionally reaches 90 percent during summer months. Annual precipitation varies from 27 to 80 inches with an average of about 50 inches. Average precipitation is greater from late fall through early spring than throughout the rest of the year. Due to the large amount of precipitation in fall and winter, ditches are necessary to maintain extensive surface drainage. Summer precipitation is usually not sufficient for optimum plant growth and irrigation is necessary. Average snowfall is between 6 and 11 inches annually, but varies greatly from year to year. The prevailing winds are from the southwest with the highest wind speeds occurring from mid February through March.

AIR QUALITY

The original GDM stated that air quality in the New Madrid area is less than desirable. At that time, the total suspended particulates (TSP) exceeded the secondary standards for both annual and 24-hour air quality of 60 ug/cubic meter (See the Air Quality part in Section A, Natural Resources in Volume II of the Revised December 1981 Technical Appendix.). These suspended particulates are primarily due to fugitive dust from intensive farming, smoke from burning wheat stubble, commercial development, and from point source emissions of the Associated Electric Cooperative's New Madrid power plant and the Noranda Aluminum, Inc. primary aluminum reduction plant (Federal Register 1980). Recent data from the DNR revealed that there are no sources in Mississippi County where annual emissions for particulate matter, nitrous oxide, carbon monoxide, and sulphur dioxide exceed 50 tons per year.

WATER QUALITY

A water quality study of the total St. Johns - New Madrid Floodway project area was performed by the Corps of Engineers in 1978. Sediment analyses were also performed in December 1978, February 1979, and August 1979. These studies are discussed and cited in the Water Quality section of the September 1980 Technical Appendix of the GDM (U.S. Army Corps of Engineers 1980). Additional water quality data for the same general area are available from a study conducted by Environmental Science and Engineering, Inc. (ESEI) in 1977 and 1978 (ESEI 1978).

ESEI, in October 1977, tested for pesticide levels in fish flesh and found all to be below the maximum limits set by the EPA for pesticides. However, a few samples contained mercury concentrations in excess of the maximum safe level for human consumption. EPA expressed concern and requested further testing be conducted on fish flesh. Analyses of these samples revealed mercury levels within the EPA limits which satisfied EPA concerns.

LAND USE & ECONOMIC DEVELOPMENT

Land use in the study area is heavily oriented toward agricultural. These lands account for 90 percent of land use. The major commercial crops, in order of value, are soybeans, corn, grain sorghum, double crop of wheat/soybeans, cotton, pasture and rice. Livestock production has not been emphasized. Optimum production from field crops has not been realized because of inadequate drainage.

There are no large bottomland hardwood sections within the Item One project area. The wooded land is confined to the narrow strip along a small portion of the channel top bank.

The project area is totally rural. When the 1986 Phase II GDM was published, urban and built-up areas accounted for only 1.9 percent of the land area. Manufacturing is limited to relatively small plants found in the nearby larger towns. However, there is a potential for development.

SIGNIFICANT RESOURCES AND IMPACTS

The resources described in this section are those recognized by laws, executive orders (E.O.), regulations, and other standards of Federal, state, or regional agencies and organizations.

WOODED LAND

Existing Conditions

Originally, the southeastern lowlands of Missouri were extensively forested with a climax lowlands - swamp hardwood forest, which was removed, for the most part, in the early 20th century. Over 96% of the original forest has been cleared for agriculture and municipalities. Nearly all the Setback Levee Ditch is grazed pasture up to the channel top bank. A small downstream portion near St. James ditch contains brush and small trees.

Impacts

All brush and small trees less than 6 inches in diameter (dbh) which are hindering stream water conveyance will be removed and burned near the ROW. Any material not able to be burned will be hauled to an approved disposal site. No other woodlands will be cleared with the Item One project. Approximately 21 acres of this predominately pasture with shrubby patches of berm habitat will be cleared. This project is not expected to induce any woodland clearing outside the project ROW. Losses are considered minimal.

AGRICULTURAL LAND

Existing Conditions

The St. Johns Bayou Basin is heavily oriented toward agricultural with 261,376 acres of cleared land. Soybeans, which comprise approximately 30% of the total planted acres, is the major crop within the floodplain and is expected to remain so. Corn, at about 25%, is the second crop, then grain sorghum at 15%, followed by wheat double cropped with soybeans at 12%. Other major crops include cotton, rice and hay. Correspondence with the Natural Resources Conservation Service revealed that all the agricultural land within the ROW is considered prime farmland.

The floodgate and gravity outlet structure at the lower end of St. Johns Bayou prevents Mississippi River backwater flooding in the St. Johns Bayou Basin. During high river stages, the gates of the gravity outlet are manually closed at an elevation of 279 feet NGVD or when the Mississippi River reaches a stage of 29 feet on the New Madrid gage. They remain closed until the Mississippi River recedes to an elevation lower than the impounded landside water. Then they are opened and gravity drainage through the structure is permitted. The gates remain open at all times when the Mississippi River water elevation is lower than the impounded water. The Item One ROW is inundated annually with headwater flooding.

Impacts

The flood gates at the St. Johns Bayou Control Structure will continue operating as normal. Backwater flooding will continue to inundate portions of the St. Johns Bayou Basin as it presently does. There will be a slight reduction in headwater flooding with increased channel conveyance after selective vegetative clearing is completed.

WETLAND

Existing Conditions

A wetland survey was conducted in the entire St. Johns Bayou - New Madrid Floodway in July 1979 (Keller 1979). A total of 10 wetlands (approximately 1,731 acres) were located in the St. Johns Bayou Basin. A ground survey of the Item One ROW was performed in October 1996. No wetlands were found within or adjacent to the ROW.

Impacts

No wetlands will be impacted with this project.

WILDLIFE

Existing Conditions

In southeastern Missouri, the conversion of woodlands and swamps to cropland has eliminated, or severely reduced the abundance of those wildlife species dependent upon extensive forest or swamp ecosystems. Animals that now use the riparian ditchbank corridors include white-tailed deer, gray and fox squirrels, cottontail rabbit, and mourning dove, voles, mice, beaver, mink, raccoon, skunk, opossum, and red fox. The coyote is the top mammal predator in the area. Several species of turtles, frogs, skinks, snakes and salamanders plus various songbirds and hawks are also found within the project area.

Impacts

Backwater flooding will continue to take place as it presently does, while headwater flooding will be slightly reduced. Resident animals are adapted to this seasonal flooding and respond accordingly. Constructing the project will alter the habitat types within the ROW with removal of the smaller trees and brushy vegetation along the ditchbank. Every few years, periodic maintenance will require the ROW be cleared of excess vegetation. Wildlife impacts will be minimal. There will be no restrictive easements acquired on the ROW since no excavation will be required.

WATERFOWL

Existing Conditions

The project area is located within the Mississippi River Flyway, the major migratory corridor for waterfowl in central North America. Lands that are inundated with backwater floods provide necessary resting and feeding areas for waterfowl that stop over for a few days to rest and feed in the bottomland hardwoods and on residual soybeans, corn and rice. This backwater flooding will continue to occur as usual with the project.

Impacts

No significant adverse impacts are expected with this project.

AQUATIC RESOURCES

Existing Conditions

Southeastern Missouri lowlands originally were covered with climax bottomland hardwood forests through which many meandering streams provided diverse aquatic habitat. Nearly 96 percent of the land is now farmland. Channelization and present agricultural practices restrict the aquatic habitat and fisheries to man-made channels. In this reach of the Setback Levee Ditch, species diversity and productivity are limited because of the lack of instream habitat, shallow water depth, wide temperature fluctuations, sedimentation, and homogeneity of the unstable stream bed substrate. The dominant macroinvertebrate groups are chironomid larvae and oligochaetes which are adapted to soft silt and clay sediments. These species are also tolerant of poor water quality.

Impacts

The stream channel in the study area has limited the aquatic resources due to sparse instream and ditchbank cover, low summer flow, and unstable substrate. Selective clearing and snagging will only take place on this stream reach; no excavation. The new water depths should not change from existing conditions. Fish will be able to move out of the project area during channel work. They are expected to repopulate the work reach shortly after project completion. What little vegetative cover that is presently found on the ditchbanks will also shortly grow back. There is concern that reduction of in-stream cover, could raise summer time water temperatures. This would adversely impact the fishery. However, this raise would be considered minimal due to the present lack of canopy and instream cover on this part of the Setback Levee Ditch.

This project will not affect the operation of the flood gates at the St. John Bayou Control Structure. Thus there will not be any impacts on existing fish species movement or composition between the Mississippi River and the St. Johns Bayou Basin, especially during the spawning season.

ENDANGERED SPECIES

Existing Conditions

The Phase I GDM (Revised December 1981) contains a comprehensive list and extensive discussion of the plant and animals that have been determined by various groups to be rare, threatened, or of special concern at the time the GDM was prepared. During preparation of the GDM, the U.S. Fish and Wildlife Service in accordance with Section 7(c) of the Endangered Species Act Amendments of 1978 determined that the bald eagle (Haliaeetus leucocephalus) and the fat pocketbook pearly mussel (Potamilus capax) may occur in the study area (USFWS 1979b and 1979c). Three other species were determined to be endangered since the August 1986 Phase II GDM (Revised in 1987) was written and approved: the interior least tern (Sterna antillarum athalassos), Higgins eye mussel (Lampsilis higginsi), and pallid sturgeon (Scaphirhynchus albus).

Impacts

Bald Eagle: Field surveys and biological assessments (BA) for both the eagle and the mussel indicated that the overall project as presented in the GDM would not jeopardize the continued existence of these species. The U.S. Fish and Wildlife Service concurred with these findings.

Fat Pocketbook Pearly Mussel: At the time the original GDM was prepared, the BA concluded that P. capax did not occur in the St. Johns Bayou Basin, and that the overall project would not affect this species. The U.S. Fish and Wildlife Service concurred with this finding. Recent review of the BA, upheld the earlier conclusion. However, to satisfy additional USFWS concerns that P. capax may occur near the project area, a mussel survey at Mississippi River mile 926, was conducted by Waterways Experiment Station (Miller 1996). This report concluded that existing river habitat is unsuitable and the site is approximately 500 river miles from the nearest viable population. Additionally, a mussel survey in the Setback Levee Ditch will be done prior to selective vegetative clearing. This survey will be coordinated with the USFWS and any endangered mussels relocated.

Interior Least Tern: The least tern is found only on large, bare sand bar habitats within the Mississippi River (Rumancik 1985 to 1995). No least tern habitat exists within the Item One project area. Least terns are opportunistic feeders and prey on any small, silvery fish. The predominant fish of this type is the gizzard shad, which will not be impacted by this project. Hence, it is reasonable to conclude that this project will not adversely impact the interior least tern.

Higgins Eye Mussel: The original GDM concluded that the Higgins eye mussel was not in the overall project area. Considering the distance of the Item One project site from known collection sites and since it has never been reported from the project area, it is reasonable to conclude that this limited project will not threaten the continued existence of the species.

Pallid Sturgeon: The pallid sturgeon prefers deep river runs, strong currents and gravel spawning bars, and is unlikely to use small streams, shallow backwater areas, or flooded fields for spawning. Preferred habitat type is not found in the St. Johns Bayou Basin. No pallid sturgeon were collected during fishery surveys of the St. Johns Bayou area from 1977 through 1991 (Christoff 1997). Present sturgeon populations are found in the upper Mississippi and Missouri Rivers, and then far south at the Old River Control Structure in Louisiana (USFWS 1992). Possible occurrence in this section of the Mississippi River is extremely remote. From this information, it is concluded that this project will not adversely impact the sturgeon.

The impacts related to this project are being coordinated with the U.S. Fish and Wildlife Service by copy of this EA. The work is unlikely to adversely affect the continued existence of any federally endangered or threatened species, nor would any critical habitat be adversely impacted or destroyed. No adverse impacts are expected to occur to any state listed species.

WATER QUALITY

Existing Conditions

A detailed water quality analysis is contained in Volume II of the Phase I GDM & EIS Technical Appendixes (Revised December 1981). That analysis revealed the water quality of the streams and channels within the St. Johns Bayou Basin was characteristic of an intensively farmed river delta. Surface waters contain elevated levels of agrichemicals, turbidity, suspended solids and nutrients. However, no water quality parameter was found at an unacceptable level to fish and wildlife or people. The conditions found in the early 1980's are considered to be applicable at this later time since land use patterns have not changed substantially.

Impacts

There will be no additional or other water quality impacts associated with this project which will differ from those evaluated in the original GDM and supplemental EIS. The water quality is expected to return to the existing levels soon after construction is completed, and no serious release of toxic materials is expected during excavation (Fulk 1975). No excavation will be done with this project, thus no Section 404(b)(1) report will be required. The work will fall under a general permit between the Corps and the State of Missouri. The long term effects of the project are estimated to be negligible. This EA will be coordinated with the Missouri Department of Natural Resources, Water Pollution Control Program to determine if a Water Pollution Control Permit is required for this Item One project.

RECREATION

Existing Conditions

Recreation resources for the overall project were discussed in Volume II, Section C of the Phase I GDM & EIS Technical Appendixes (Revised December 1981). That section stated that hunting and fishing, and other outdoor recreational opportunities are very limited in the study area. This limitation is a direct result of the conversion of woodlands to farm fields and channelized streams. Other types of alternative recreation area available in several towns in the study area.

Impacts

The recreational impacts associated with this project would be the same as those addressed in the original GDM, but only limited to the project area of this project. Man-day usage rate values for different types of recreation have not changed significantly since the GDM was written, even though the population has increased.

CULTURAL RESOURCES

Existing Conditions

An intensive cultural resource survey was performed and a report prepared, which was included in the Technical Appendixes (Revised December 1981) of the GDM. All surveys were coordinated with the Missouri State Historic Preservation Officer. No cultural resources sites were found within the project ROW.

Impacts

No adverse impacts will occur.

LOCAL ECONOMY

Existing Conditions

The economy of the area is heavily oriented toward agriculture. At the time the GDM was prepared, agricultural production had already shifted from a labor-intensive to a capital-intensive process. The cities in the area were experiencing growth while the rural and farm populations were declining in population. An analysis of the resources and economy of the study area was included in Volume II. Section D, Economic Base Data, Resources and Economy of the Study Area of the Phase 1 GDM & EIS (Revised December 1981). The economics section discussed population characteristics. labor skill and employment, agriculture, educational levels, transportation; and how the overall project would affect these factors and the development of the economy.

Impacts

Flood waters inundate the project area mostly in the late winter and early spring, and may last well into summer months during wetter years. Flooding frequency will not change with this project completion. There may be a slight reduction in frequency locally around this section of the Setback Levee Ditch. However, the vast majority of the area will not change over existing conditions, and continue to receive damages to farmlands, roads, utilities, municipalities, and private structures.

FLOODPLAIN MANAGEMENT

Under Executive Order 11988 (floodplain management), Federal agencies are to "...provide leadership and shall take action to reduce the risk of flood loss, to minimize the impacts of floods on human safety, health, and welfare, and to restore and preserve the natural and beneficial values served by floodplains...."

Based on the extent of flood damage and economic loss (homes, businesses, road, utilities,

transportation, and crops) that currently exist, it is prudent to initiate flood protection reduction by constructing Item One of the First Phase of the overall St. Johns Bayou and New Madrid Floodway, Missouri project. By reducing the future risk of flood loss and minimizing structural development in the floodplain, this proposed project is in full compliance with Executive Order 11988.

OTHER STUDY ASPECTS

SOCIOECONOMIC ENVIRONMENT

Existing Conditions

Section D, Economic Base Data, Resources and Economy of the Study Area, contained in Appendix II of the Phase 1 GDM & EIS (Revised 1981) provided an overview of the various factors that were expected to affect the future development of the St. Johns Bayou - New Madrid Floodway Basins. Some of the topics addressed were: general development policies; growth inducing factors such as the project location in relation to surrounding metropolitan areas, major highways and their influences on municipal, commercial and industrial development; land use trends regarding airports, railroads, a Mississippi River port, and the power plant at Sikeston; parks and recreation; area water supply; housing. Additional topics discussed population characteristics, education levels of the population, and personal income.

Impacts

Any segments of the overall project that are constructed as separate elements, such as this project, are not expected to change the initial analyses. Impacts and effects will be in proportion to the particular segment of the overall project. There will be no significant adverse impacts to air quality, water quality, noise levels, transportation patterns or municipality operations during construction. Normal farming practices impact these items more than what would be expected to occur with vegetative clearing for this project section.

HAZARDOUS, TOXIC AND RADIOACTIVE WASTES

Existing Conditions

No HTRW survey was conducted nor a report prepared when the St. Johns Bayou and New Madrid Floodway, Missouri GDM was prepared in the early 1980's. At that time, an HTRW survey was not required.

A visual inspection of the project rights-of-way was conducted from 7 October 1996 through 11 October 1996. No HTRW sites were found. A Phase 1 Assessment for this project was prepared under the guidance of the Corps of Engineers Regulation, ER 1165-2-132, Water Resources Polices and Authorities for Hazardous, Toxic, and Radioactive Waste (HTRW) for Civil Works

Projects, June 22, 1992. This assessment is on file with the Memphis District Environmental Analysis Branch.

Impacts

Thie Phase 1 Assessment did not encounter information relating to the potential presence of hazardous wastes within the project area. It does not constitute a guarantee or certificate of the non-existence of HTRW contamination at any location. Based upon information gathered during the preliminary assissment for the study area, it is reasonable to assume that no hazardous, toxic, or radioactive wastes would be encountered during the construction of this phase of the overall project.

MITIGATION

The adverse impacts associated with selective vegetative clearing along 4.3 miles of the Birds Point New Madrid Setback Levee Ditch are considered minimal. A maintenance easement will be obtained on the ROW to allow for future access when channel maintenance is required. However, since no excavation is planned which would require land for excavated material deposition, there is no justification to acquire a restrictive easement on the ROW. Fishery impacts are also considered minimal, not warranting any mitigation within this channel section.

COMPLIANCE WITH REGULATIONS

Project compliance with applicable Federal and state regulations is shown in Table 1. The circulation of a Public Notice regarding the Section 404(b)(1) requirements, review of the EA by appropriate agencies, and the signing of a Finding of No Significant Impact (FONSI) will bring this First Phase - Item One project into full compliance with the above laws and regulations.

COORDINATION

The proposed action is being coordinated with the U.S. Fish and Wildlife Service and the Missouri Department of Conservation. All other Federal, and state agencies and the public will be coordinated with by the Public Notice review.

CONCLUSION

The U.S. Army Corps of Engineers, Memphis District, plans to selectively clear the vegetation below the top bank on 4.3 miles of the Birds Point New Madrid Setback Levee Ditch, working upstream from the intersection of St. James Ditch at Mile 8.1. This project is a portion of the previously approved St. Johns Bayou and New Madrid Floodway, Missouri General Design Memorandum. The cleaned channel would provide improved flow conveyance during large rain events. This office has assessed the proposed action and has determined that adverse project impacts would be minimal, and any adverse impacts which may occur, would be mitigated when other phases of the overall project are completed. All Executive Orders, endangered species, Section 404 (b)(1),

and cultural resources requirements have been met, and the appropriate agencies coordinated with. The quality of human life would increase with flood reduction on farmland.

PREPARERS

This document was prepared by John P. Rumancik Jr., fishery and wildlife biologist. Gloria A. Markovci, environmental engineer, prepared the hazardous, toxic and radioactive waste Phase I Assessment. Both documents are on file with the Memphis District Environmental Analysis Branch.

Table 1

ENVIRONMENTAL COMPLIANCE

St. Johns Bayou - New Madrid Floodway
First Phase - Item One - Selective Vegetation Removal
Birds Point New Madrid Setback Levee Ditch - Miles 8.1 to 12.4

Legislation	Compliance Document	Status of Compliance
Archaeological Resources Protection Act of 1979	EA	Partial
Bald Eagle Act	EA	Partial
Clean Air Act of 1977, as amended	EA	Partial
Clean Water Act of 1977, as amended	EA	Partial
Endangered Species Act of 1973, as amended	EA	Partial
Farmland Protection Policy Act of 1984	EA	Partial
Federal Water Project Recreation Act	N/A	N/A
Fish and Wildlife Coordination Act of 1958	EA	Partial
Food Security Act of 1985	N/A	N/A
Land and Water Conservation Fund Act	N/A	N/A
National Environmental Policy Act of 1969	EA	Partial
National Historic Preservation Act of 1965, as amended	EA	Partial
Prime and Unique Farmlands (CEQ Memo, 1976)	EA	Partial
River and Harbor and Flood Control Act of 1970	N/A	N/A
Water Resources Development Act of 1986	EA	Partial
Water Resources Planning Act of 1965	EA	Partial
Wild and Scenic Rivers Act	N/A	N/A
Executive Order 11593 (Protection & Enhancement of the Cultural Environment	EA	Partial *
Executive Order 11990 (Protection of Wetlands)	EA	Partial
Executive Order 11998 (Floodplain Management)	EA	Partial

Review of this Environmental Assessment by appropriate agencies will bring the project into full compliance with the above laws and regulations.

* Full compliance achieved subsequent to cultural resources investigations, mitigation if required, and acceptance by the State Historic Preservation Officer (and Advisory Council on Historic Preservation, should mitigation be required).

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ST. JOLAS BAYOU AND
NEW MADRID FLOODWAY MISSOURI
FIRST PHASE

APPENDIX G

FINANCIAL CAPABILITY

St. John Levee and Drainage District

of Missouri

Established 1912

Board of Supervisors
John Joe Bryant
F. S. Hunter
William D. LaVaile
James H. Bogle
William D. Dill

Lynn N. Bock
Secretary-Treasurer
565 Virginia P.O. Box 40
New Madrid, MO 63869
Telephone (573) 748-9232
Fax (573) 748-2565

April 4, 1997

Colonel G. Gregory Bean, District Engineer
US Army Corps of Engineers
Memphis District
167 North Main, Room B202
Memphis Tennessee 38103-1894

Dear Colonel Bean:

The St John Levee and Drainage District of Missouri, non-Federal sponsor of the St Johns Bayou and New Madrid Floodway, First Phase Project, is capable of meeting the cost sharing obligations required under the terms of the draft Project Cooperation Agreement (PCA). We understand the total non-Federal construction requirements are $11,360,000 which consists of $2,881,000 for rights-of-way, $3,197,000 for bridge and utility relocations, and a required $5,282,000 cash contribution to provide the minimum non-Federal requirement of 25 percent. We also understand that we will be responsible for all operation, maintenance, and replacement activities associated with the pumping stations and channel improvements.

We are working closely with the East Prairie Enterprise Community to implement this project. The city of East Prairie was designated an Enterprise Community (EC) by the President in December 1994. They identified the implementation of this project in their EC strategic plan as a critical element for allowing this area to improve its economic infratructure and move toward sustainable economic development. This is important to us because the area served by this project is characterized by pervasive poverty, unemployment, and general distress. The St. John Levee and Drainage District serves as a primary EC partner and local sponsor for the project beacuse a key principle for successful EC programs is community-based partnerships and collaborative initiatives. As further evidence of our ability and desire to support the EC concept and sponsor the project,in 1996 we increased our annual tax rate approximately 150%
to begin collecting the additional money required to build up cash reserves and provide for project operation and maintenance activities.

The primary source of funding for project construction is through East Prairie EC Funds administered through the US Department of Agriculture (USDA), which will provide 20% of the total project cost or 80% of the non-Federal share. This $9,088,000 of funding will be used to satisfy all of the project's $5,282,000 cash requirements.

We are currently identifying the ownerships necessary for the project rights-of-way. We and other improvement districts in the project area own a portion of the necessary rights of way. The lands owned by other districts will be furnished for project construction through third party sub-agreements. Some of the private landowners receiving direct benefits from the project will donate the necessary rights-of-way for project construction and maintenance. We are actively working to identify these owners and secure the necessary letters of intent to donate. The remaining lands not donated will be purchased.

The $3,197,000 in relocations is comprised of $2,927,000 for bridges and $270,000 for utilities. We expect all utilities to be relocated at the expense of their owners and are pursuing sub-agreements with their owners. The bridge figure includes $366,000 for relocation of Missouri Route OO and $143,000 for Missouri Route WW, which we expect to be provided by the State of Missouri. The remaining $2,418,000 in bridge relocations are owned by New Madrid ($727,000) and Mississippi ($1,691,000) Counties. We are currently negotiating with these two counties to share in a portion of the cost of relocating these facilities. New Madrid County has already informally agreed to share in the cost of relocating their bridges by providing labor, materials, and possibly cash.

The remaining $3,806,000 in EC funds will be used to acquire any remaining lands and perform any remaining relocations. If these funds are not adequate to cover all remaining requirements, additional funds will be provided from our current operating budget which had a cash carryover of approimately $623,000 in 1996 as a result of prior planning to place us in a position to sponsor this project.

OPERATION, MAINTENANCE, AND REPLACEMENT COSTS

Pump Stations. The annual costs for the two pumping stations is expected to be approximately $345,300 for an average year's operation. These costs are comprised of $30,400 for labor, $24,500 for maintenance, $71,800 energy, and $218,600 for demand charges. The labor required to operate and maintain the stations will be provided by existing personnel included in our annual operating budget. The remaining $314,900 will be included in our annual operating budget and funded by existing tax revenues and third party agreements with other benefiting drainage districts. All future maintenance and replacement costs will be provided from a

contingency fund established with cash surpluses from the annual operating budget.

At this point it should be noted that we are currently negotiating with a competing power provider that will be able to supply power to the pumping stations at a demand charge much lower than the estimated $218,600. We will have an agreement with this provider in place by the execution of the PCA. New cost estimates are not yet available but will be provided in time to be included in the PCA. Since the new costs are not yet available we elected to reference the old costs in our financing plan and show the capability the to meet these obligations. Any cost reductions we can secure will only strengthen our financial capability of sponsoring this project.

Channels and Canals. We and other area drainage districts currently maintain an extensive network of ditches and canals within the project area. All of the channel and canal improvements associated with the project take place on ditches currently being maintained. It is our intent that when the project is completed, the districts currently providing maintenance will continue to do so. Also at the completion of project construction all bridges will be turned over to their current owners who will provide all future bridge maintenance and replacement costs.

SUMMARY

Enclosed is a schedule of non-Federal funds for the construction, operation, and maintenance of the project. This schedule also includes the source of funding to meet these requirements. An escrow account will be established and maintained to receive the funds from the various sources mentioned above to disperse as needed for construction purposes.

Sincerely,

William D. LaValle

William D. LaValle,
President

ATTEST:

Lynn N. Bock

LYNN N. BOCK
Secretary/Treasurer

Non-Federal Obligations and Sources of Funds During Project Construction
Fully Funded
St Johns Bayou and New Madrid Floodway, First Phase

	Obligations				Sources			
					Donations		Cash	
Fiscal Year	Lands 1/	Relocations	Cash	Total	Lands 2/	Relocations	Enterprise Community Funds 3/	Annual Operating Budget 4/
1997	208,000	8,000	354,000	570,000		0	456,000	114,000
1998	684,000	0	321,000	1,005,000		0	804,000	201,000
1999	1,005,000	1,205,000	797,000	3,007,000		97,000	2,406,000	504,000
2000	576,000	1,841,000	1,683,000	4,100,000		539,000	3,280,000	281,000
2001	408,000	0	2,037,000	2,445,000		0	1,956,000	489,000
2002	0	143,000	90,000	233,000		143,000	186,000	(96,000) 5/
Total	2,881,000	3,197,000	5,282,000	11,360,000		779,000	9,088,000	1,493,000

1/ Includes mitigation lands.
2/ Currently being identified, individual impovement districts currently own portions of construction rights-of-way.
3/ Assumes 20% of total project cost.
4/ Includes income from tax revenues and contributions from other improvement districts.
5/ Excess of Enterprise Community Funds and donated relocations over non-Federal requirements.

Non-Federal Operation, Maintenance, and Replacement Costs
(October 1996 Price Levels)
St Johns Bayou and New Madrid Floodway, First Phase

Item	Interval in Years	Cost
Scheduled Expenditures		
Pump Station Replacements		
New Madrid Station		
Pump Impellers	40	193,200
Gear Reducer	30	124,800
Electric Motor Stators	35	80,700
Motor Control Center	35	226,900
Roof	20	28,200
Roof Maintenance	7	21,400
St Johns Station		
Pump Impellers	40	165,100
Gear Reducer	30	70,800
Electric Motor Stators	35	72,000
Motor Control Center	35	165,000
Roof	20	22,100
Roof Maintenance	7	15,700
Channels and Canals		
Brushkill		
St Johns Bayou	4	4,500
St James Ditch	4	10,800
Birds Point Levee Ditch	4	12,400
Channel Cleanout		
St Johns Bayou	20	24,800
St James Ditch	20	59,400
Birds Point Levee Ditch	20	68,200
Bridge Replacements		
St Johns Bayou	30	221,000
St Johns Bayou	50	275,000
St James Ditch	30	486,000
St James Ditch	50	125,000
Birds Point Levee Ditch		0
Annual Expenditures		
New Madrid Station		
Maintenance		12,300
Labor		15,200
Energy		35,900
Demand Charge		109,300
St Johns Station		
Maintenance		12,300
Labor		15,200
Energy		35,900
Demand Charge		109,300

ST. JOHNS BAYOU AND
NEW MADRID FLOODWAY MISSOURI
FIRST PHASE

APPENDIX H

QUALITY CONTROL

QUALITY CONTROL

ST. JOHNS BAYOU AND NEW MADRID FLOODWAY MISSOURI
EAST PRAIRIE PHASE

LIMITED REEVALUATION STUDY

1. REFERENCES:

   a. ER 1110-1-12, Engineering and Design QUALITY MANAGEMENT, 1 June 1993.
   b. ER-1110-2-1150, Engineering and Design ENGINEERING AND DESIGN FOR CIVIL WORKS PROJECTS, 20 August 1993.
   c. CECW-P/CECW-E Joint Memorandum dated 1 November 1993, Subject: Level of Engineering Effort Required in the Feasibility Phase.
   d. Report on the Task Force on Technical Review, dated December 1994.
   e. CECG/ASA(CW) Joint Memorandum dated 31 March 1995, Subject: Technical Review Process.
   f. CECW-A Memorandum of 1 April 1995, Subject: Implementation of New Technical and Policy Review Procedures.
   g. CECW-A Policy Memorandum No. 2 dated April 1995, Subject: Civil Works Decision Document Review - Policy Compliance.
   h. CECW-EP Memorandum of 31 May 1995, Subject: Engineering, Design and Dam Safety Guidance.
   i. LMVD Memorandum for Record dated 27 July 1995, Subject: QA/QC Meeting, 26-27 July 1995.
   j. CELMV-ET Memorandum of 23 September 1995, Subject: Lower Mississippi Valley Division, Directorate of Engineering and Technical Services, Quality Control and Quality Assurance Guidance.

2. DEFINITIONS:

   a. Quality Control. The evaluation of technical products and processes to ensure their compliance with applicable laws, regulations, and sound technical practices.

   b. Quality Assurance. The oversight of the quality control processes to insure their effectiveness in the production of quality products.

   c. Functional Chief. The chiefs of Plan Formulation, Economic and Social Analysis, and Environmental Analysis Branches in Planning Division. The chiefs of Design, Geotechnical & Survey, and Hydraulics & Hydrology Branches in Engineering Division. The chiefs of Acquisition and Appraisal Branches in Real Estate Division.

d. Interdisciplinary Planning Team (IPT). The group assigned to accomplish the Limited Reevaluation Study and produce a quality technical product.

e. Technical Review Team (TRT). The group organized to perform an independent technical review.

f. Technical Review Manager (TRM). The individual in each of the District's technical Divisions assigned with the responsibility of overseeing the entire technical review process for that Division.

g. Technical Review/Verification Process. The interactions between the reviewer and production person and/or IPT and TRT to insure a quality product.

3. PROJECT/STUDY INFORMATION:

Project/Study Name: St. Johns Bayou and New Madrid Floodway Missouri, First Phase
Project Manager/Study Manager: Eddie Belk/Timothy J. Caldwell
Study/Purpose: Limited Reevaluation Study - Flood Control
Estimated Study Cost: $400.000
Date for Submittal of Draft Limited Reevaluation Report: March 1997

4. PROJECT PURPOSE:

The primary emphasis of the study is flood control.

5. PROJECT DESCRIPTION:

The project area is located in southeast Missouri in New Madrid, Scott, and Mississippi Counties. The project contains two distinct drainage basins adjacent to the Mississippi River. The St. Johns Basin is 450 square miles in area and is approximately 40 miles long and 25 miles wide. The New Madrid Floodway is 180 square miles in area and is approximately 33 miles long and 10 miles wide. The project includes 137 miles of rural channel improvement, 6.7 miles of urban channel improvement, a 1,000 cfs pumping station for the St. Johns Bayou area, and a 1,500 cfs pumping station for the New Madrid Floodway area. The project includes 2,500 acres of land acquisition and development for fish and wildlife (mitigation) and 2,450 acres of restrictive easement along the channels. There will also be a total of 4,900 acres of seasonal ponding easements (mitigation).

The First Phase of the project consists of the downstream components of the St. Johns Bayou and New Madrid Floodway Missouri project presented in the Phase II GDM dated August 1986,

revised in April 1987. This phase includes 27.6 miles of rural channel improvements, the 1,000 cfs pumping station for the St. Johns Bayou area, and the 1,500 cfs pumping station for the New Madrid Floodway area. This phase will also include a portion of the 2,500 acres of land acquisition and development for fish and wildlife (mitigation) and restrictive easements along the channels as determined based upon the work to be performed. The 4,900 acres of seasonal ponding easements (mitigation) will also be included in this phase.

6. PURPOSE:

All planning, engineering, and design studies were conducted consistent with Corps guidance and regulations and the final output is a high quality product. The policies, procedures, and organizational responsibilities for providing quality control of activities, for completion of the Limited Reevaluation Report, Environmental Assessment, ongoing Supplemental Environmental Impact Statement (SEIS), and/or Engineering Appendix for the St. Johns Bayou and New Madrid, Missouri, First Phase were established immediately following the initiation of the study.

7. RESPONSIBILITY:

a. Functional Chief. Functional chiefs are responsible for insuring that all work has received the necessary internal checks prior to furnishing the work to the TRT. Each functional chief provided a list of reviewers to the TRM and IPT leader. The designation of persons to the TRT was the responsibility of each functional chief in consultation with the TRM. The functional chief assigned reviewers independent of the study process.

b. Technical Review Manager (TRM). The TRM was a section chief or senior employee with extensive knowledge of Division functions. The TRM was responsible for periodically meeting with reviewers to insure that the review and verification process is consistent and an effective comprehensive technical review was being accomplished. The TRM will disseminate lessons learned and facilitate technology transfer among technical review teams. The TRM insured that all comments and their resolution were documented and status reports were provided after each technical review milestone.

c. Division Chief. The Division Chief is responsible for the quality of the products produced. The Division Chief was responsible for resolving issues and rendering decisions that could not have been made at a lower level.

d. Interdisciplinary Planning Team (IPT). The St. Johns Bayou and New Madrid, Missouri, Limited Reevaluation Study was conducted utilizing an IPT with responsibility for completion of the Report. This effort was led by a Planning Division Study Manager. Technical representatives from Engineering Division, Planning Division, and Real Estate coordinated and led sub-product efforts as the study moved through their areas. The IPT held meetings approximately bi-monthly as the study progressed.

The IPT was composed of members from all functional areas that had input into the planning and development of the project. The IPT was responsible for performing all the planning and engineering necessary for producing the Limited Reevaluation Report and for assuring that study and design checks were performed by peers as the work progressed. The IPT leader coordinated the activities of the IPT and served as point of contact for the TRMs. The IPT leader assured that the schedule contained sufficient time to perform product reviews. The TRMs coordinated all technical reviews with the IPT who forwarded all unresolved issues to the appropriate functional chief for resolution. The areas represented on the IPT with the selected team member annotated are as follows:

IPT Leader - Timothy J. Caldwell
Economics - Bobby Learned
Environmental - John Rumancik
Hydraulics and Hydrology - Barry Bruchman
Geotech & Survey - Billy Selvo/Darian Chasteen
Mechanical/Electrical - Wayne Quarles/Don Badowski
Structural - David Berretta
Cost Engineering - Jerry Welch
General Engineering - Donnie Crawford
Real Estate - Barney McDonald
Project Sponsor Representative(s) -Bill David Lavalle
Project Management - Eddie Belk

Other members were added as appropriate for specific work. Each individual represented on the IPT maintained close coordination with their MRC counterpart throughout the course of the study.

e. Technical Review Team (TRT). The TRT was responsible for performing an independent technical review of the Limited Reevaluation Study products. Technical review included verification of:

1. Assumptions.
2. Methods, procedures, and material used in analyses based on the level of analyses.
3. Alternatives evaluated are reasonable.
4. Appropriateness of data used and level of data obtained.
5. Reasonableness of results.
6. Products meet customer needs and are consistent with law and existing policy.

The TRT for the St. Johns Bayou and New Madrid, Missouri, East Prairie Phase Study is composed of members having technical expertise in the planning and engineering areas of the work being reviewed. The TRT members were selected from the technical areas where experience and training as well as practice have qualified the member to be considered a senior technical expert in the particular field that the TRT member represents. Designated experts were independent of and have no ownership in the study and design activities.

9. QUALITY CONTROL PROCESS (QC Process)

The objective for quality planning and engineering for the St. Johns Bayou and New Madrid, Missouri, Limited Reevaluation Study was to produce a product free of errors, in compliance with all technical and policy requirements, utilizing design standards and criteria appropriate for the work being proposed, and adapting agreed upon features as requested by our external customer, the project sponsor, with detail sufficient for easy understanding. This desired quality product was produced so that rework should not be required thus saving time and cost.

The role of the Memphis District and the Mississippi River Commission staff in relationship to the QCP was established following study initiation. The scope of the engineering appendix to be included in the Limited Reevaluation Report was determined considering factors such as seamless planning, design, and construction; desires and capability of the project sponsor; and the level of detail needed to develop a reliable time, quantity, and cost estimate.

There were points within the study process where the review was conducted by the entire technical review team (TRT) and there were points where only one or more key members conducted the review. The flexibility to optimize the review process within the functional area while maintaining the team approach was utilized throughout the study process. Technical review was conducted throughout the study process.

Key points within the study process were established for review and verification of the data and analyses. A review activity for each of these points was incorporated into the study schedule as a milestone within the project network schedule. All reviews were scheduled and held concurrently with continued study execution in order to avoid delays to the study schedule to the extent possible. The entire product was not revisited at each technical review or verification point. Review and verification occured prior to release of data to other offices whether within the division or other district elements. These reviews were conducted in conjunction with regularly scheduled In-Progress Reviews (IPRs) when appropriate. A total of five (approximately one per month) IPRs were conducted during the course of the study. All but one of the IPRs included representatives from MRC, two of those and a teleconference included HQUSACE representatives. The only IPR excluding representative of MRC or HQUSACE was conducted with the U.S. Fish and Wildlife Service and the Missouri Department of Conservation. Memorandums of the conferences can be made available upon request.

The first IPR was conducted to establish the roles and responsibilities of the various participants in the review process. Input from the reviewers was used to ascertain the direction of further planning and engineering activities.

The Memphis District generic technical review checklist was utilized to facilitate the review and verification process.

10. QUALITY CONTROL DOCUMENTATION

Documentation of Report Preparation and Review Process. The District has retained in its files, available for verification, all working papers and other documentation of study management and technical analyses (such as MFR's, PGM's, MOU's, etc.), and all working papers associated with the independent technical review by all disciplines involved in the study.

CERTIFICATION SHEET

ST. JOHNS BAYOU AND NEW MADRID FLOODWAY, MISSOURI PROJECT
PHASE I
LIMITED REEVALUATION

I certify that the St. Johns Bayou and New Madrid Floodway, Missouri Phase I Limited Reevaluation has been reviewed and that sound technical practices and procedures have been followed. The document conforms to pertinent regulations, guidance, and sound professional practices.

ANALYST	REVIEWER	FUNCTIONAL AREA
Hubert Logan	Ronald O. Smith	General Engr
Jerry Welch	Richard Hunt	Cost Engineering
Don Badowski	Daphne Koester	Structures
Billy Selvo	Ronald O. Smith	GEOTECH
Barry Bruchman	[illegible]	HYDRAULICS
Tim Caldwell	Jacqueline Whitlock	PLAN FORMULATION
John Rumancik	[illegible]	Environmental
Bobby Leamed	Douglas Young	ECONOMICS
Don Crawford	Ronald O. Smith	GEN ENG
Barnie McDonald	[illegible]	REAL ESTATE

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CERTIFICATION:

RONALD DUNN _____, P.E.
Chief, Design and Cost Engineering Branch

JOHN MONROE _____, P.E.
Chief, Geotechnical Design and Survey Branch

DEWEY JONES _____ P.E.
Chief, Hydraulics and Hydrology Branch

KENNETH BRIGHT _____
Chief, Plan Formulation Branch

DAVE REECE _____
Chief, Environmental Analysis Branch

LARRY SHARPE _____
Chief, Economic and Social Analysis Branch

JOSEPH KEITHLEY _____
Chief, Engineering Division

DONALD M. DUNN _____
Chief, Planning Division

HARRIS VANDERGRIFF _____
Chief, Real Estate Division

GREGORY G. BEAN _____
District Engineer

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CERTIFICATE OF LEGAL REVIEW

I have reviewed the St. John's Bayou and New Madrid Floodway, Missouri, First Phase, Draft Limited Reevaluation Report (the Report) for the construction of that project near the East Prairie community in southeastern Missouri.

I conclude that the Report is legally sufficient and that it complies fully with the requirements set forth by law, regulation, and guidance provided by HQUSACE.

Dated 6 May 1997.

David E. Sirmans
District Counsel

By: Michael J. Parks
Assistant District Counsel

ST. JOHNS BAYOU AND
NEW MADRID FLOODWAY MISSOURI
FIRST PHASE

APPENDIX I

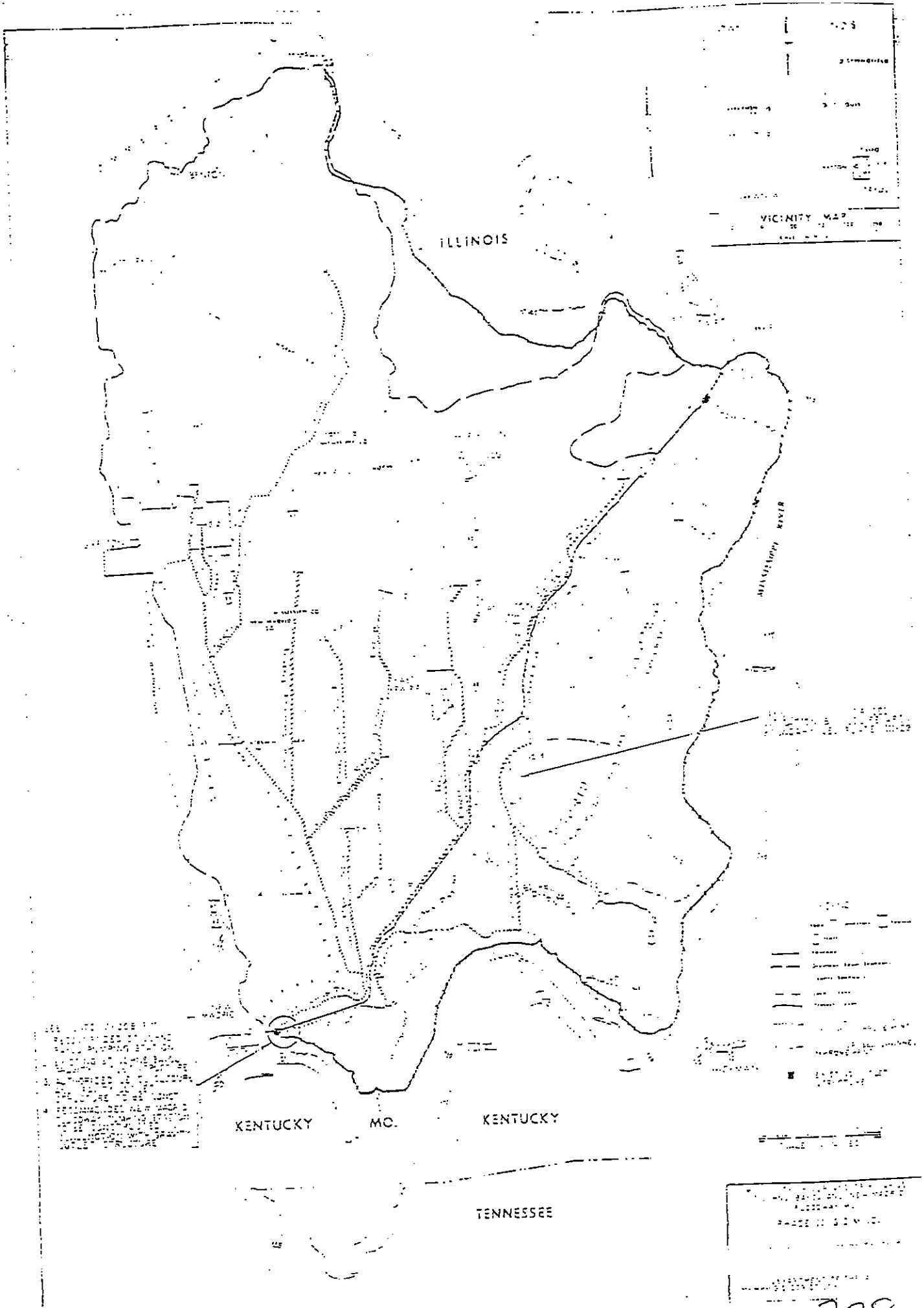
PLATES

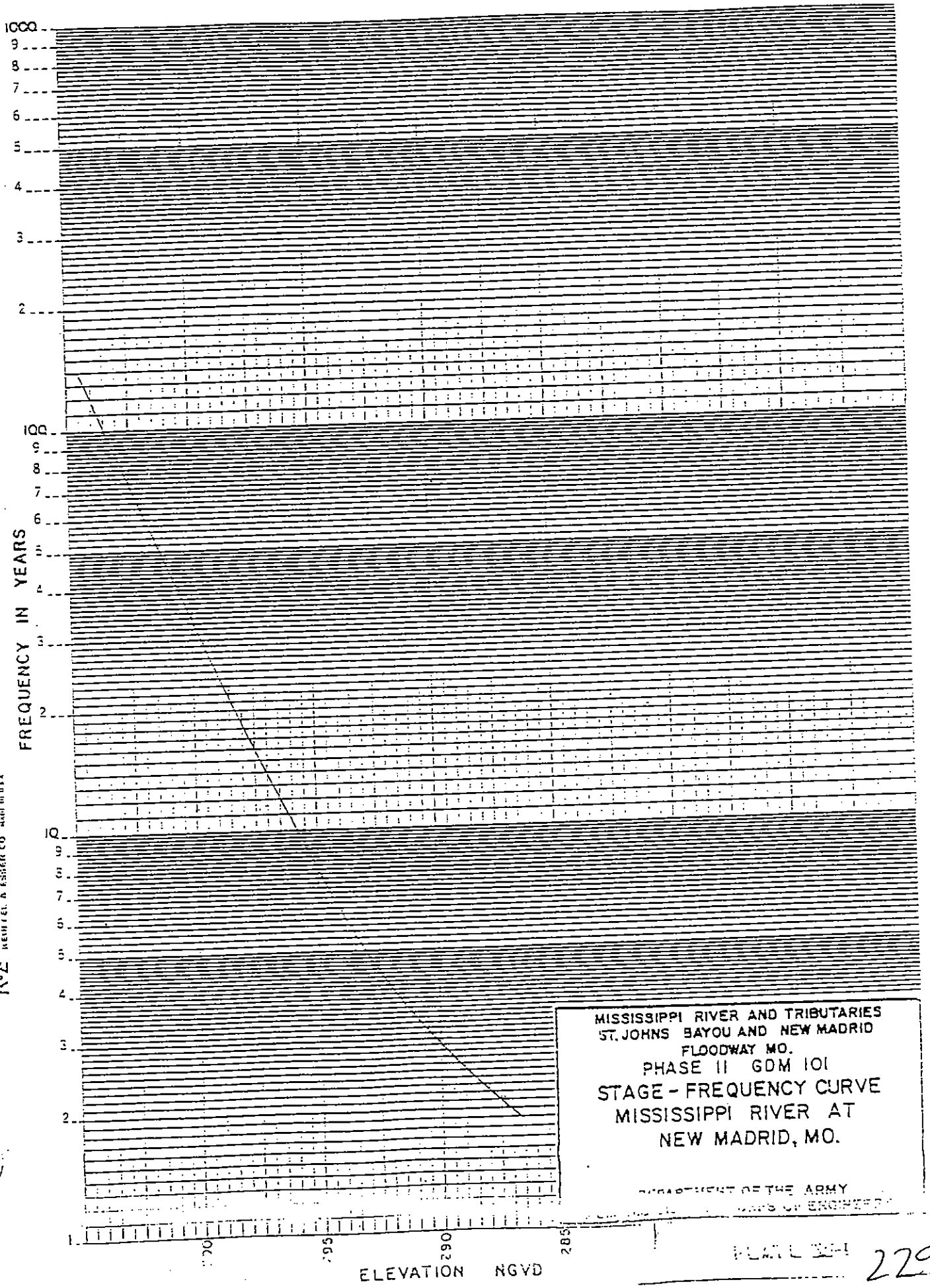
APPENDIX I - PLATES AND MAPS

Number	Title
II-1	Plan of Improvement
V-1	Stage Frequency Curve Mississippi River at New Madrid, Missouri
V-2	St. Johns Bayou 2-Year Frequency Hydrographs
V-3	East Bayou Ditch 1.1-Year Frequency Hydrographs
V-4	St. Johns Bayou Flow Frequency Curve Mile 0.00
V-5	East Bayou Ditch Flow Frequency Curve Mile 0.00
V-6	Synthetic Gage and Discharge Measurement Locations
V-7	Rainfall Frequency
V-8	Snyders C_t Relationship, Memphis District
V-9	St. Johns Bayou Discharge Frequency Curve Peak Flows
V-10	East Bayou Ditch Discharge Frequency Curve Peak Flows
V-11	Drainage Area vs. 1.1 Year Frequency Flow
V-12	Drainage Area vs. 2-Year Frequency Flow
V-13	Drainage Area vs. 10-Year Frequency Flow
V-14	Drainage Area vs. 100-Year Frequency Flow
V-15	Sikeston, Missouri 1-7 Day Rainfall vs. Observed Data
V-16	St. Johns Bayou Stage Discharge Curve Existing Conditions Highway 80, Mile 16.07
V-17	St. Johns Bayou Stage Discharge Curve Existing Conditions Kathleen Avenue, Mile 24.85
V-18	North Cut Ditch Stage Discharge Existing Conditions Highway AA, Mile 2.19
V-19	North Cut Ditch Stage Discharge Curve Existing Conditions Missouri Pacific Railroad, Mile 6.81
V-20	North Cut Ditch Stage Discharge Curve Existing Conditions Highway O, Mile 9.95
V-21	Ash Slough Ditch Stage Discharge Curve Existing Conditions Highway 80, Mile 2.80
V-22	St. Johns Bayou Plan and Profile Mile 0.00-6.50
V-25B	Control Structure and Closure Levee Area
V-36	Birds Point-New Madrid Levee Ditch Plan and Profile Mile 0.00-6.40
V-37	Birds Point-New Madrid Levee Ditch Plan and Profile Mile 6.40-12.69
V-40	St. James Ditch Plan and Profile Mile 0.00-5.50
V-41	St. James Ditch Plan and Profile Mile 5.50-10.80
V-42	Typical Sections, Channel Excavation
V-42A	Typical Sections, Vegetative Clearing
V-48	Partial-Duration Stage Frequency Curve Location
V-49	St. Johns Bayou Partial-Duration Stage Frequency Curve (Reach 1 - Mile 5.60)

APPENDIX I - PLATES AND MAPS CONTINUED

Number	Title
V-52	Birds Point-New Madrid Levee Ditch Partial-Duration Stage Frequency Curve (Reach 1 - Mile 4.00)
V-53	Birds Point-New Madrid Levee Ditch Partial-Duration Stage Frequency Curve (Reach 2 - Mile 10.20)
V-56	St. James Ditch Partial-Duration Stage Frequency Curve (Reach 1 - Mile 5.55)
V-72	St. Johns Bayou Stage Hydrograph at Outlet (2-Year Design) Year 1945
V-73	St. Johns Bayou Stage Hydrograph at Outlet (2-Year Design) Year 1957
V-74	St. Johns Bayou Stage Hydrograph at Outlet (2-Year Design) Year 1964
V-75	St. Johns Bayou Stage Hydrograph at Outlet (2-Year Design) Year 1969
V-76	St. Johns Bayou Pump Analysis at Outlet (2-Year Design)
V-77	St. Johns Bayou Pumping Station Outlet Works
V-78	East Bayou Ditch Stage Hydrograph at Outlet (1.1-Year Design) Year 1945
V-79	East Bayou Ditch Stage Hydrograph at Outlet (1.1-Year Design) Year 1957
V-80	East Bayou Ditch Stage Hydrograph at Outlet (1.1-Year Design) Year 1964
V-81	East Bayou Ditch Stage Hydrograph at Outlet (1.1-Year Design) Year 1969
V-82	East Bayou Ditch Pump Analysis at Outlet (1.1-Year Design)
V-83	New Madrid Floodway Pumping Station Outlet Works
VIII-1	Pumping Stations, General Plan
VIII-2	New Madrid Pumping Station, Pumphouse, Pumping Station Plan
VIII-3	New Madrid Pumping Station, Centerline Section
VIII-4	St. Johns Pumping Station, Centerline Section
VIII-29	Tenmile Pond Mitigation Area
XIILRR-1	Index of Facilities and Pertinent Data
XII-3	Location Map
XII-4	Location Map
XII-5	Plan and Elevation Views, Facilities on St. Johns Bayou
XII-45--54	Plan and Elevation Views, Facilities on St. James Ditch
XII-63--64	Plan and Elevation Views, Facilities on BPNM Levee Ditch


VICINITY MAP
ILLINOIS
KENTUCKY
MO.
KENTUCKY
TENNESSEE



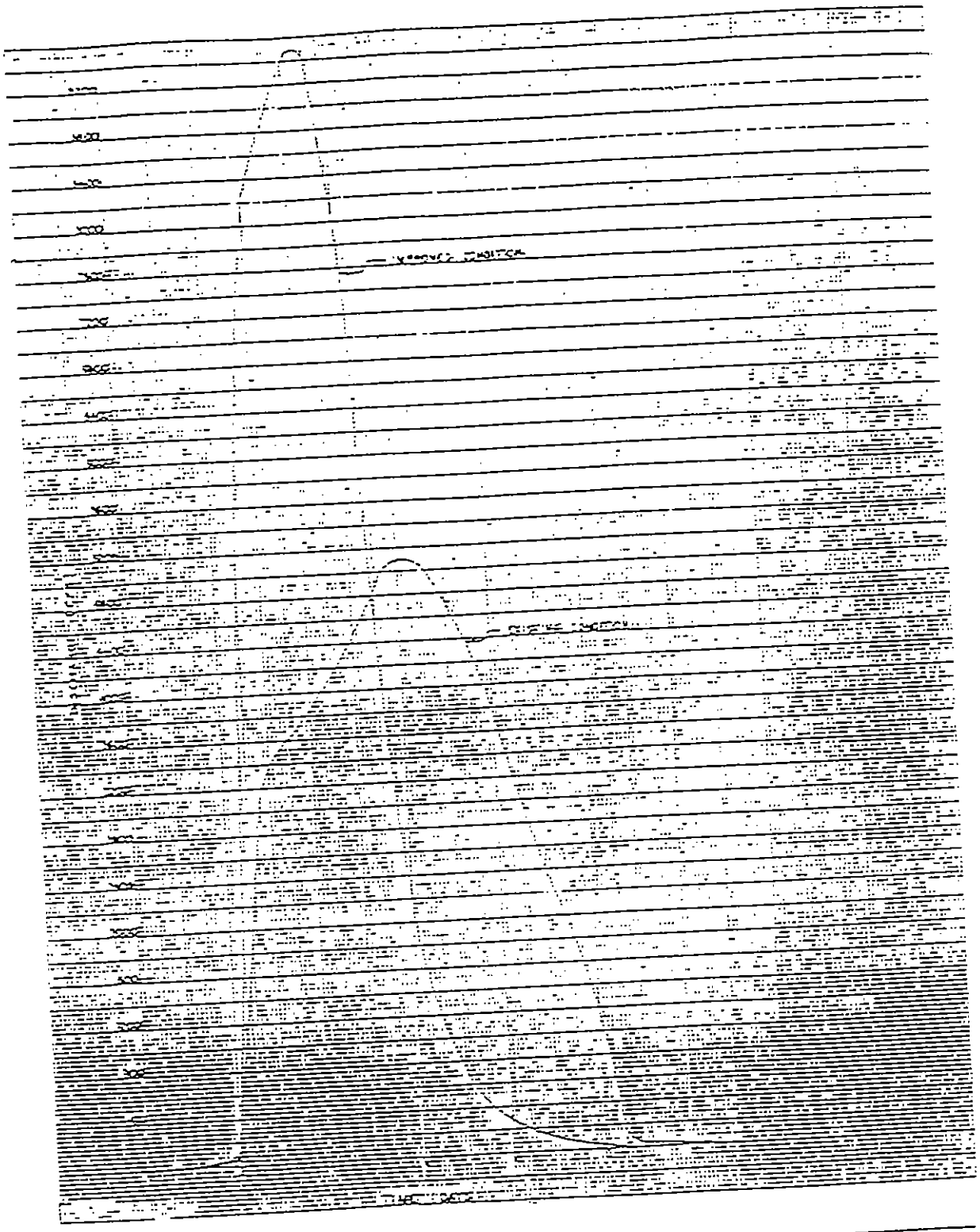
MISSISSIPPI RIVER AND TRIBUTARIES
ST. JOHNS BAYOU AND NEW MADRID
FLOODWAY MO.
PHASE II GDM 101
STAGE - FREQUENCY CURVE
MISSISSIPPI RIVER AT
NEW MADRID, MO.

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS

PLATE 229

46 5493

K+E SEMI-LOGARITHMIC 3 CYCLES X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.



MISSISSIPPI RIVER AND TRIBUTARIES
ST. JOHNS BAYOU AND NEW MADRID
FLOODWAY, MO.
PHASE II GDM 101
ST. JOHNS BAYOU
2-YEAR FREQUENCY
HYDROGRAPHS

DEPARTMENT OF THE ARMY
MEMPHIS DISTRICT, CORPS OF ENGINEERS

PLATE V-2

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DISCHARGE (CFS)
TIME
EXISTING CONDITIONS
WITHOUT CHANNEL PLUGS
EXISTING CONDITIONS
WITH CHANNEL PLUGS
MISSISSIPPI RIVER AND TRIBUTARIES
ST. JOHNS BAYOU AND NEW MADRID
FLOODWAY MO.
PHASE II GDM 101
EAST BAYOU DITCH
1.1 - YEAR FREQUENCY
HYDROGRAPHS
MEMPHIS DISTRICT CORPS OF ENGINEERS

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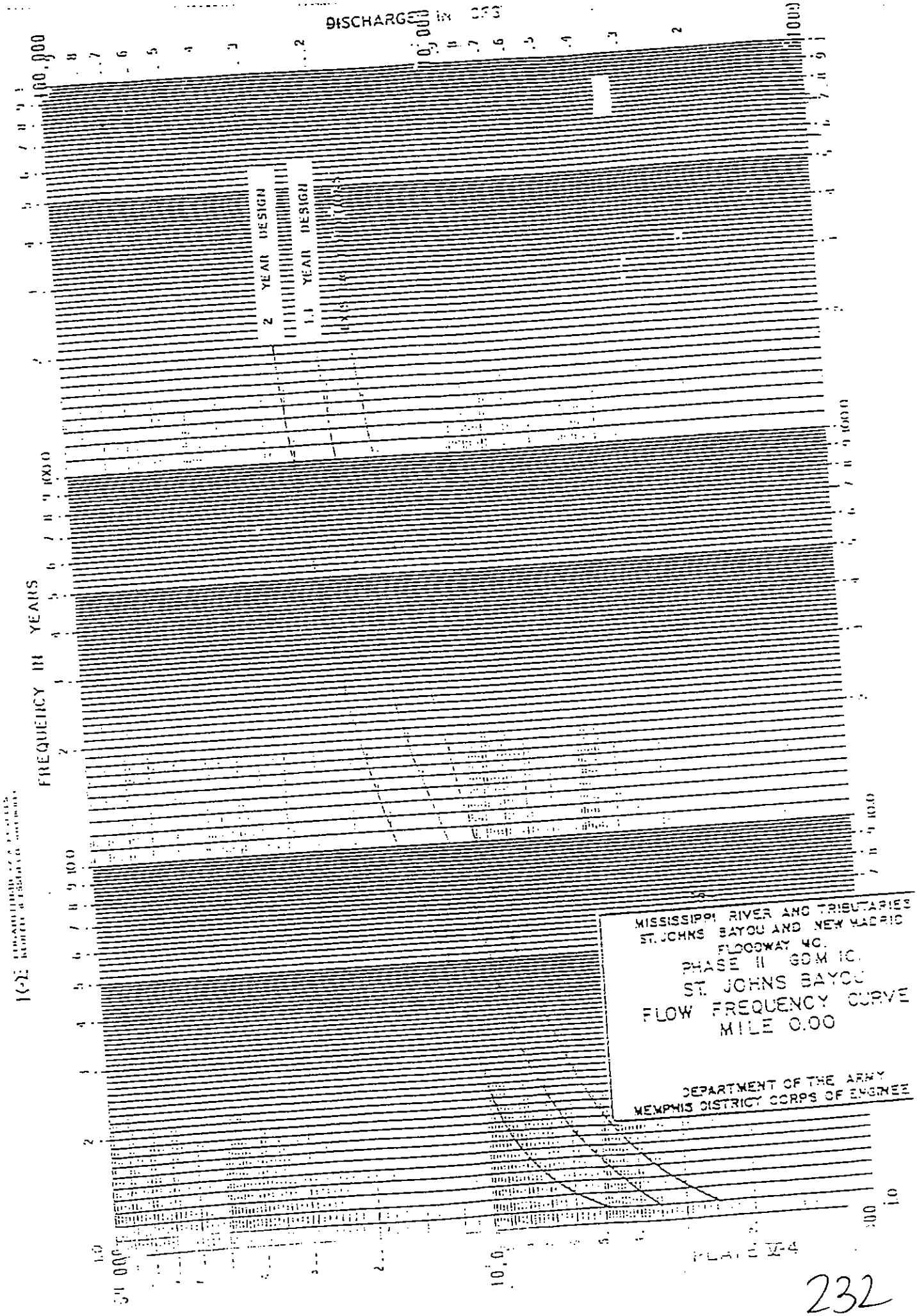
DISCHARGE IN CFS
FREQUENCY IN YEARS
2 YEAR DESIGN
1.1 YEAR DESIGN
MISSISSIPPI RIVER AND TRIBUTARIES
ST. JOHNS BAYOU AND NEW MADRID
FLOODWAY MO.
PHASE II GDM IC
ST. JOHNS BAYOU
FLOW FREQUENCY CURVE
MILE 0.00
DEPARTMENT OF THE ARMY
MEMPHIS DISTRICT CORPS OF ENGINEE
PLATE V-4

232

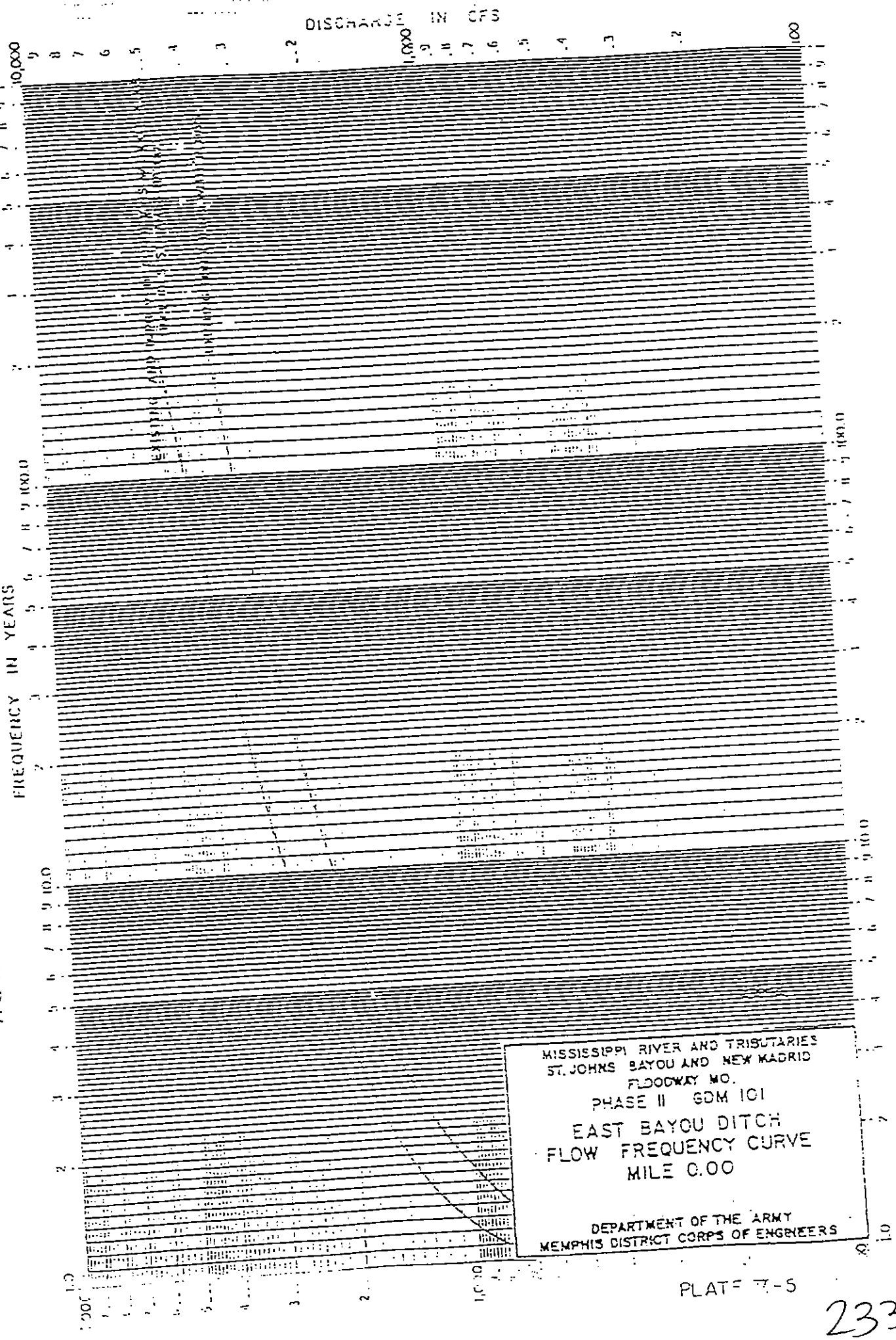
DISCHARGE IN CFS
FREQUENCY IN YEARS
MISSISSIPPI RIVER AND TRIBUTARIES
ST. JOHNS BAYOU AND NEW MADRID
FLOODWAY MO.
PHASE II GDM 101
EAST BAYOU DITCH
FLOW FREQUENCY CURVE
MILE 0.00
DEPARTMENT OF THE ARMY
MEMPHIS DISTRICT CORPS OF ENGINEERS

PLATE [illegible]-5

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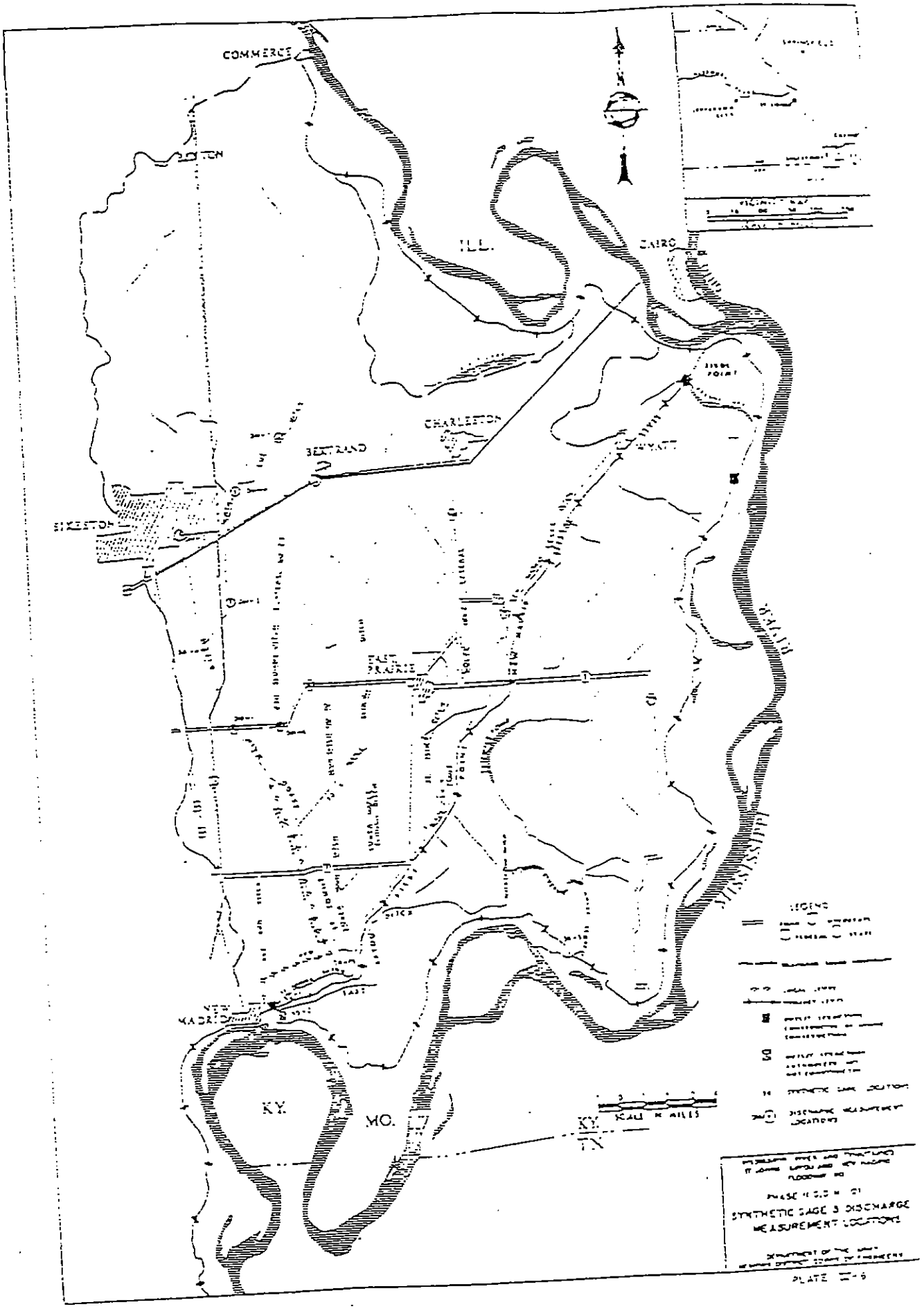
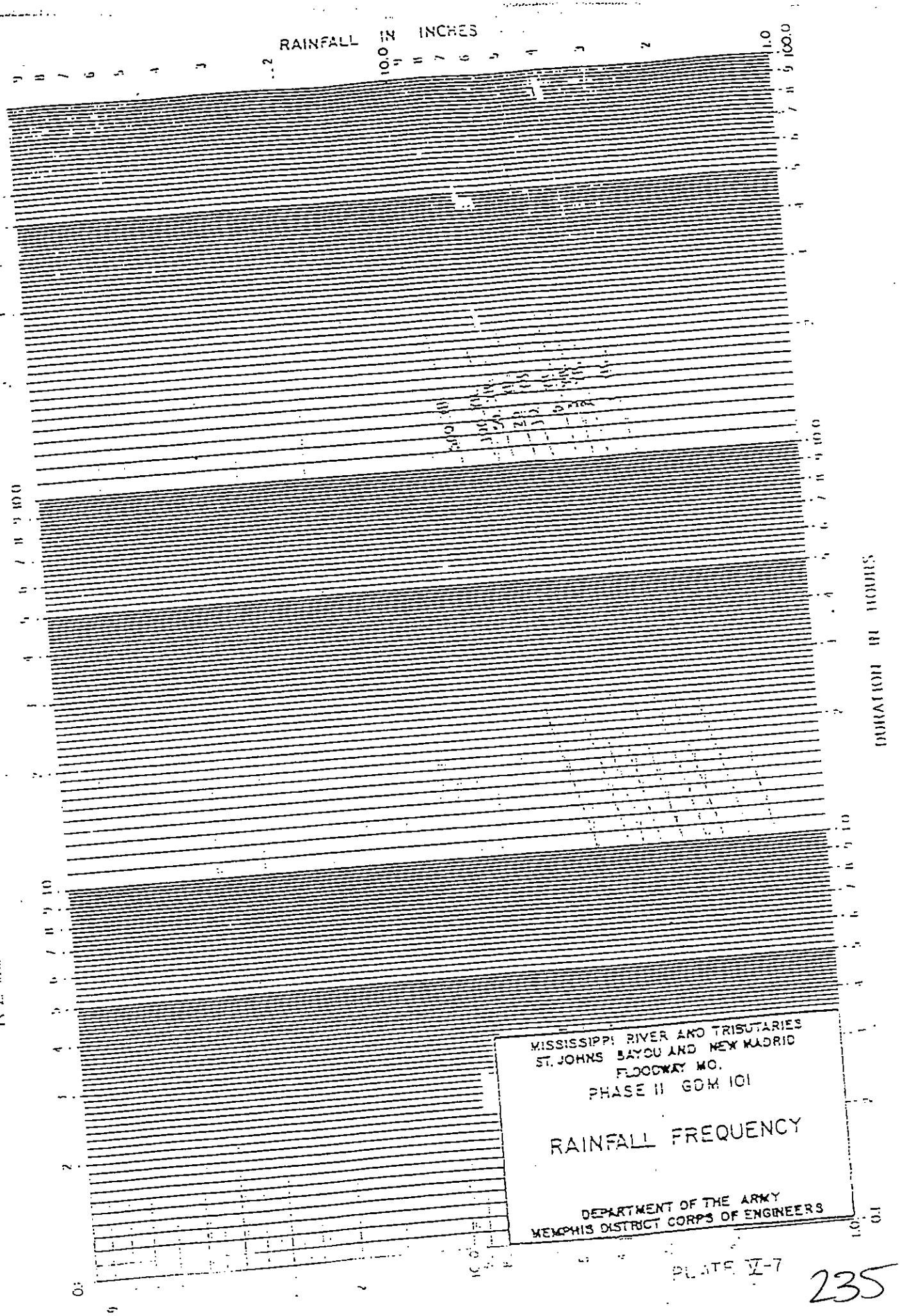

COMMERCE
ILL.
CAIRO
CHARLESTON
BERTRAND
SIKESTON
EAST PRAIRIE
NEW MADRID
KY.
MO.
LEGEND
SYNTHETIC SAGE 3 DISCHARGE MEASUREMENT LOCATIONS
PLATE

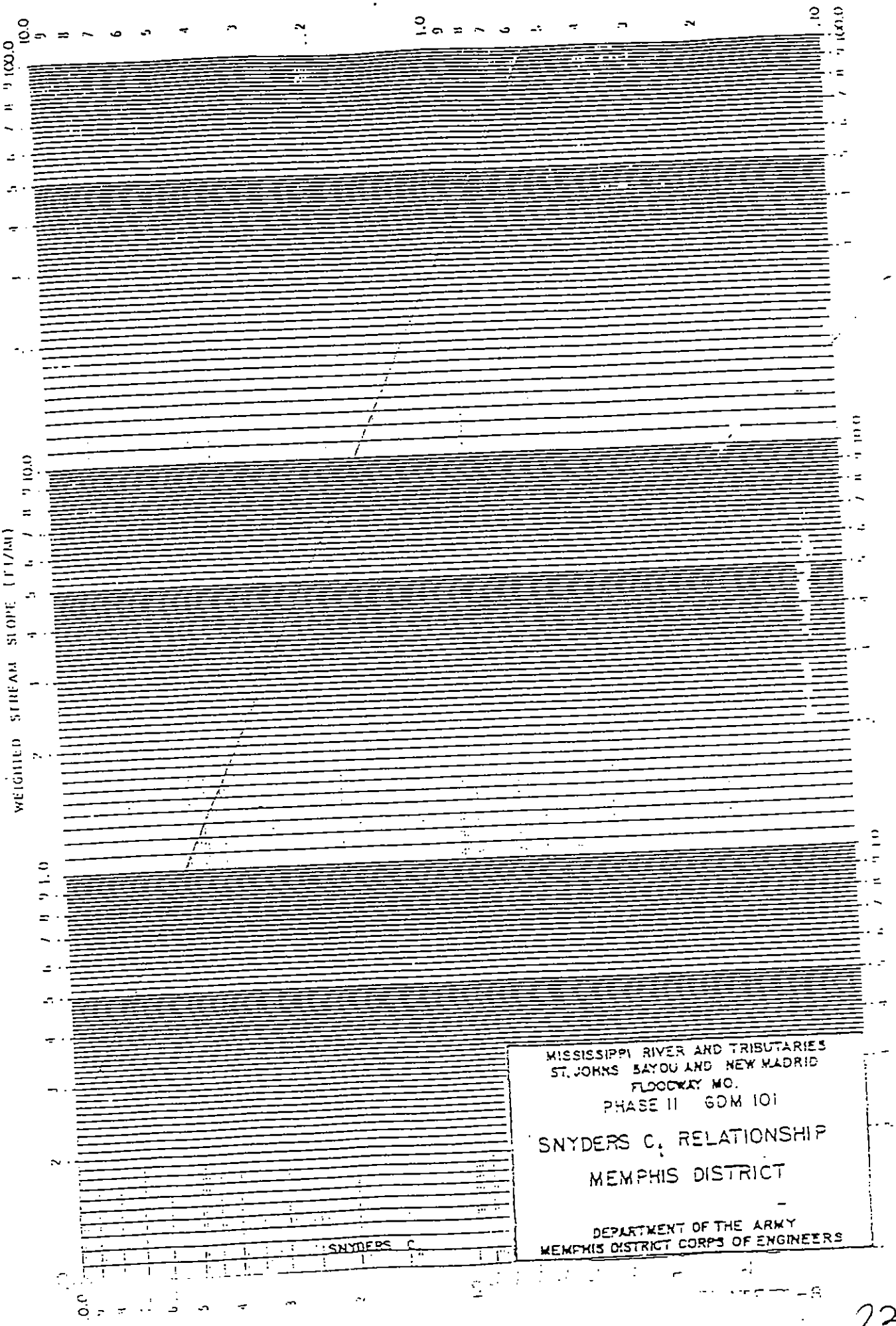


MISSISSIPPI RIVER AND TRIBUTARIES
ST. JOHNS BAYOU AND NEW MADRID
FLOODWAY MO.
PHASE II GDM 101

RAINFALL FREQUENCY

DEPARTMENT OF THE ARMY
MEMPHIS DISTRICT CORPS OF ENGINEERS

PLATE V-7



MISSISSIPPI RIVER AND TRIBUTARIES
ST. JOHNS BAYOU AND NEW MADRID
FLOODWAY MO.
PHASE II GDM 101

SNYDERS C. RELATIONSHIP

MEMPHIS DISTRICT

DEPARTMENT OF THE ARMY
MEMPHIS DISTRICT CORPS OF ENGINEERS

236

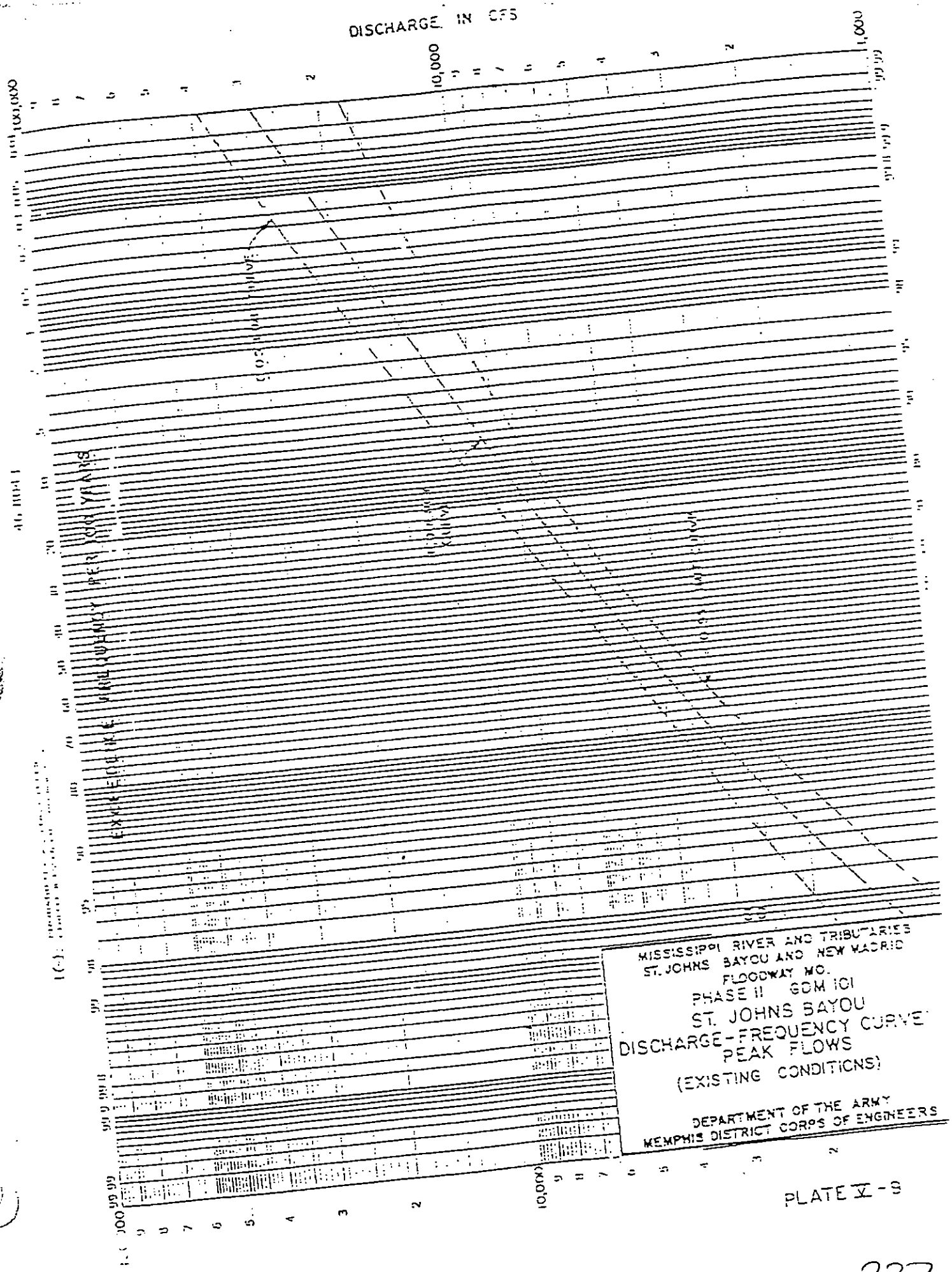

DISCHARGE IN CFS
EXCEEDENCE FREQUENCY PER 100 YEARS
MISSISSIPPI RIVER AND TRIBUTARIES
ST. JOHNS BAYOU AND NEW MADRID
FLOODWAY MO.
PHASE II GDM 101
ST. JOHNS BAYOU
DISCHARGE-FREQUENCY CURVE
PEAK FLOWS
(EXISTING CONDITIONS)
DEPARTMENT OF THE ARMY
MEMPHIS DISTRICT CORPS OF ENGINEERS

PLATE V-9

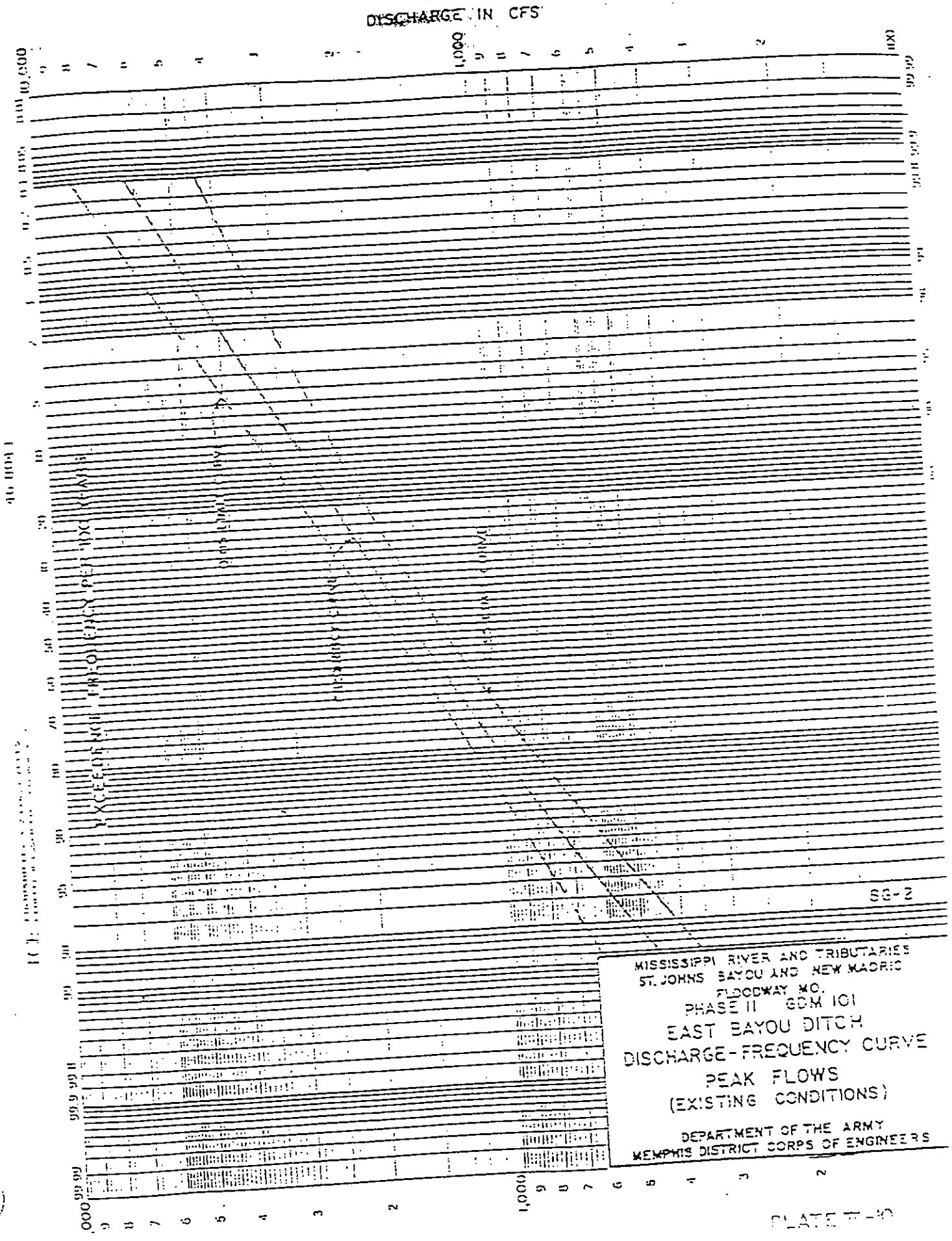
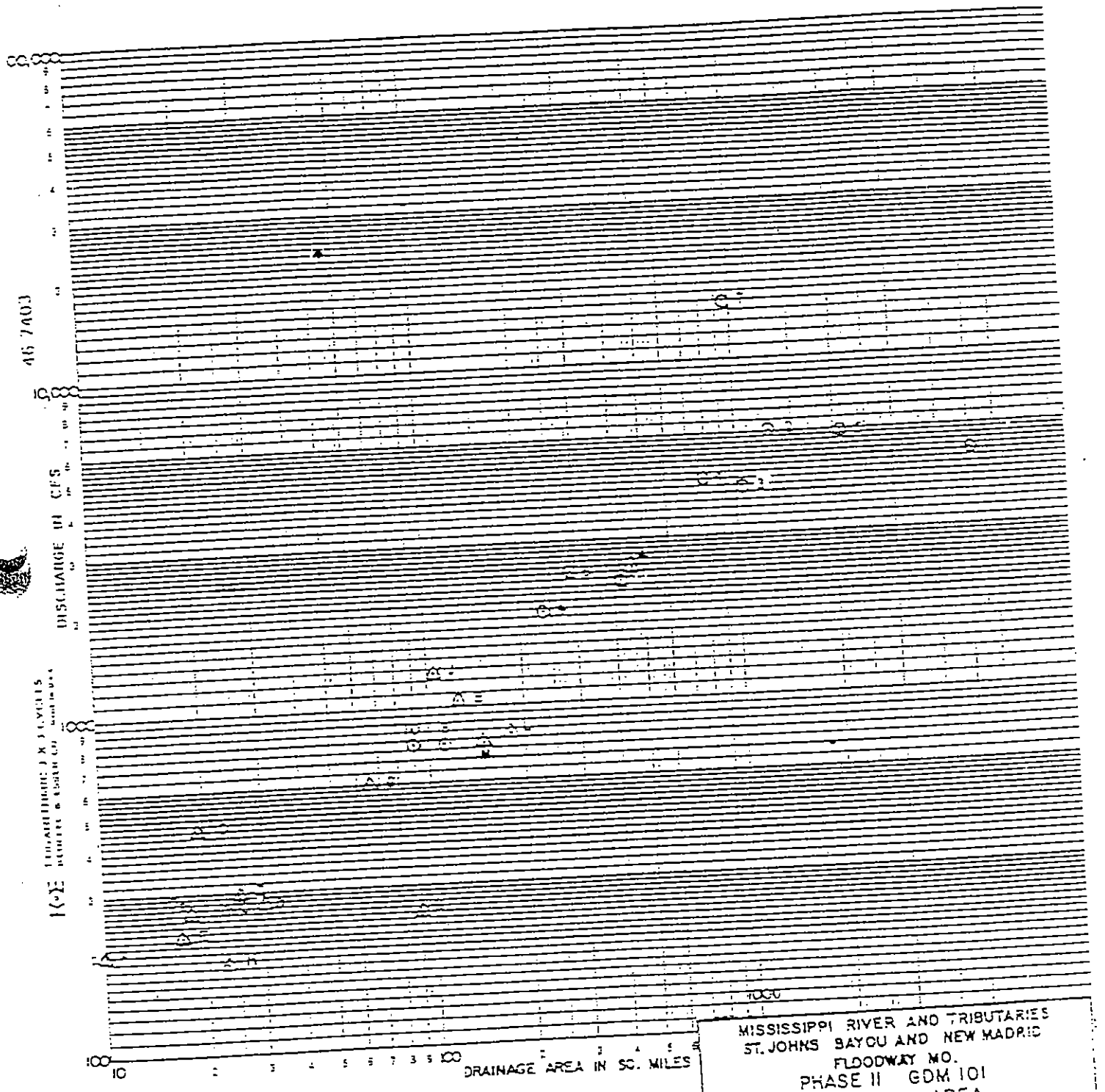

DISCHARGE IN CFS
EXCEEDENCE FREQUENCY PER 100 YEARS
SG-2
MISSISSIPPI RIVER AND TRIBUTARIES
ST. JOHNS BAYOU AND NEW MADRID
FLOODWAY MO.
PHASE II GDM 101
EAST BAYOU DITCH
DISCHARGE-FREQUENCY CURVE
PEAK FLOWS
(EXISTING CONDITIONS)
DEPARTMENT OF THE ARMY
MEMPHIS DISTRICT CORPS OF ENGINEERS

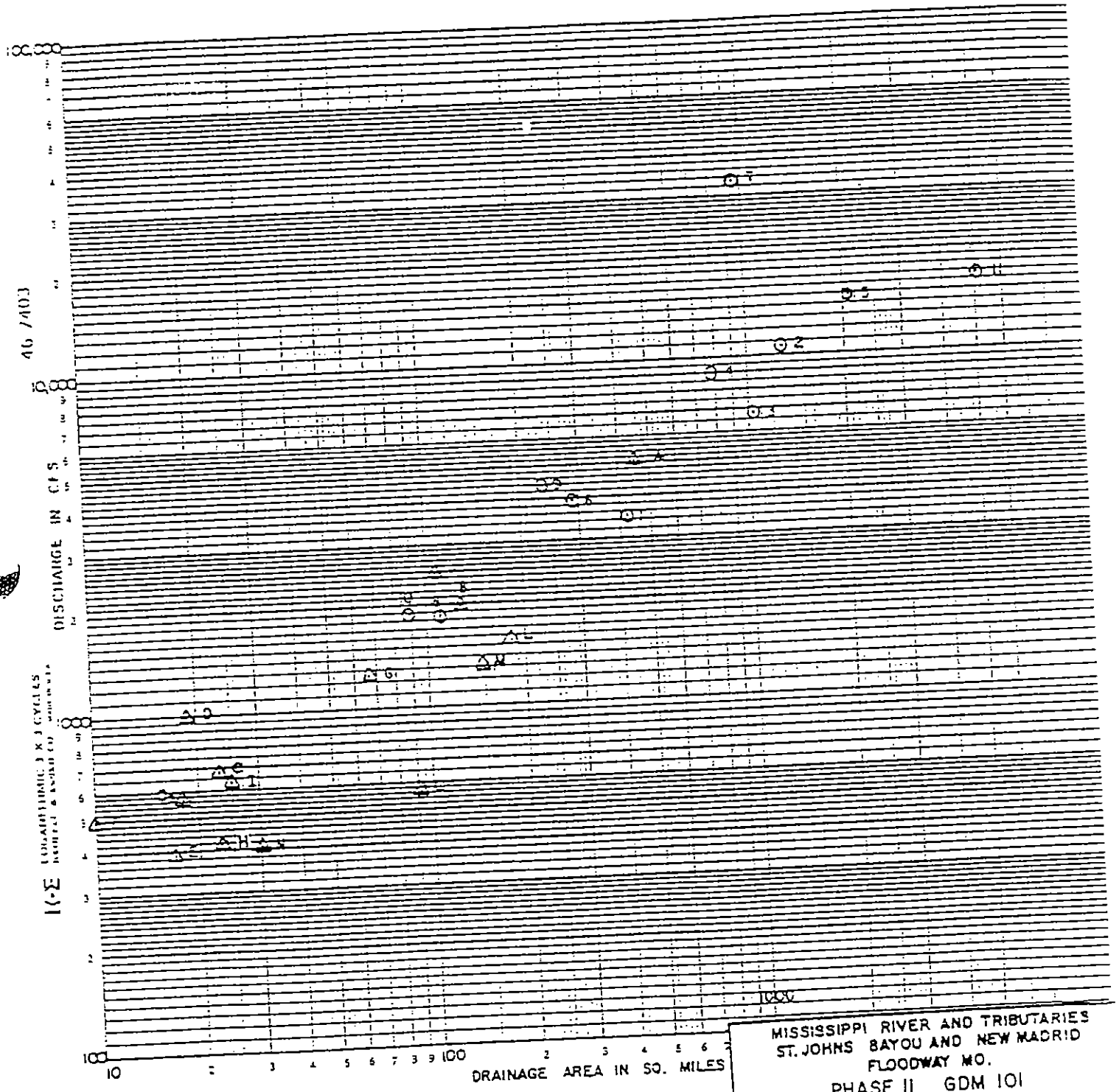
PLATE II-10



MISSISSIPPI RIVER AND TRIBUTARIES
ST. JOHNS BAYOU AND NEW MADRID
FLOODWAY MO.
PHASE II GDM 101
DRAINAGE AREA
VS.
11-YEAR FREQUENCY FLOW
(ARKANSAS & MISSOURI)

MEMPHIS DISTRICT CORPS OF ENGINEERS

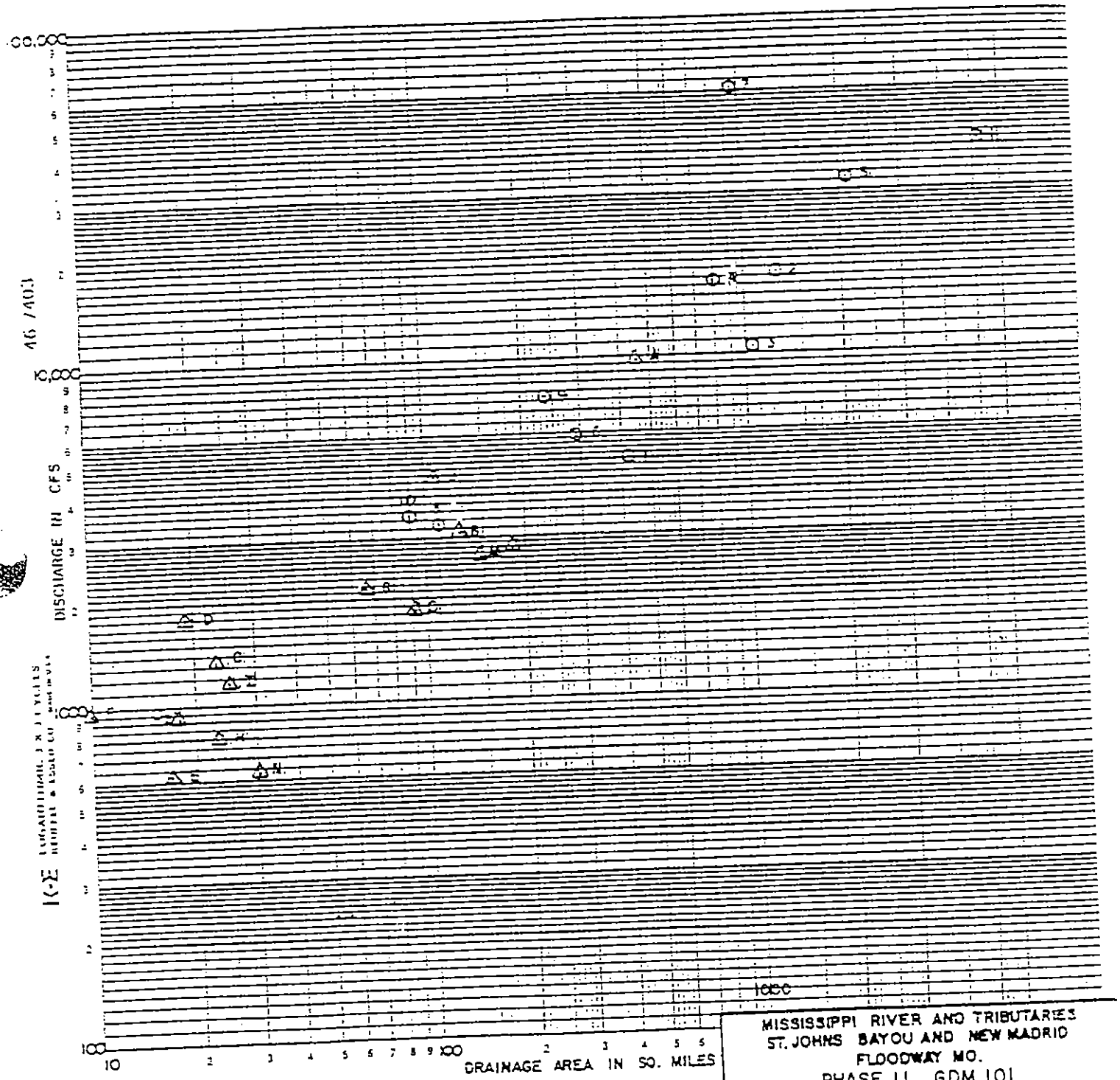
PLATE V-11



MISSISSIPPI RIVER AND TRIBUTARIES
ST. JOHNS BAYOU AND NEW MADRID
FLOODWAY MO.
PHASE II GDM 101
DRAINAGE AREA
VS.
2-YEAR FREQUENCY FLOW
(ARKANSAS & MISSOURI)

DEPT. OF THE ARMY
MEMPHIS DISTRICT CORPS OF ENGINEERS

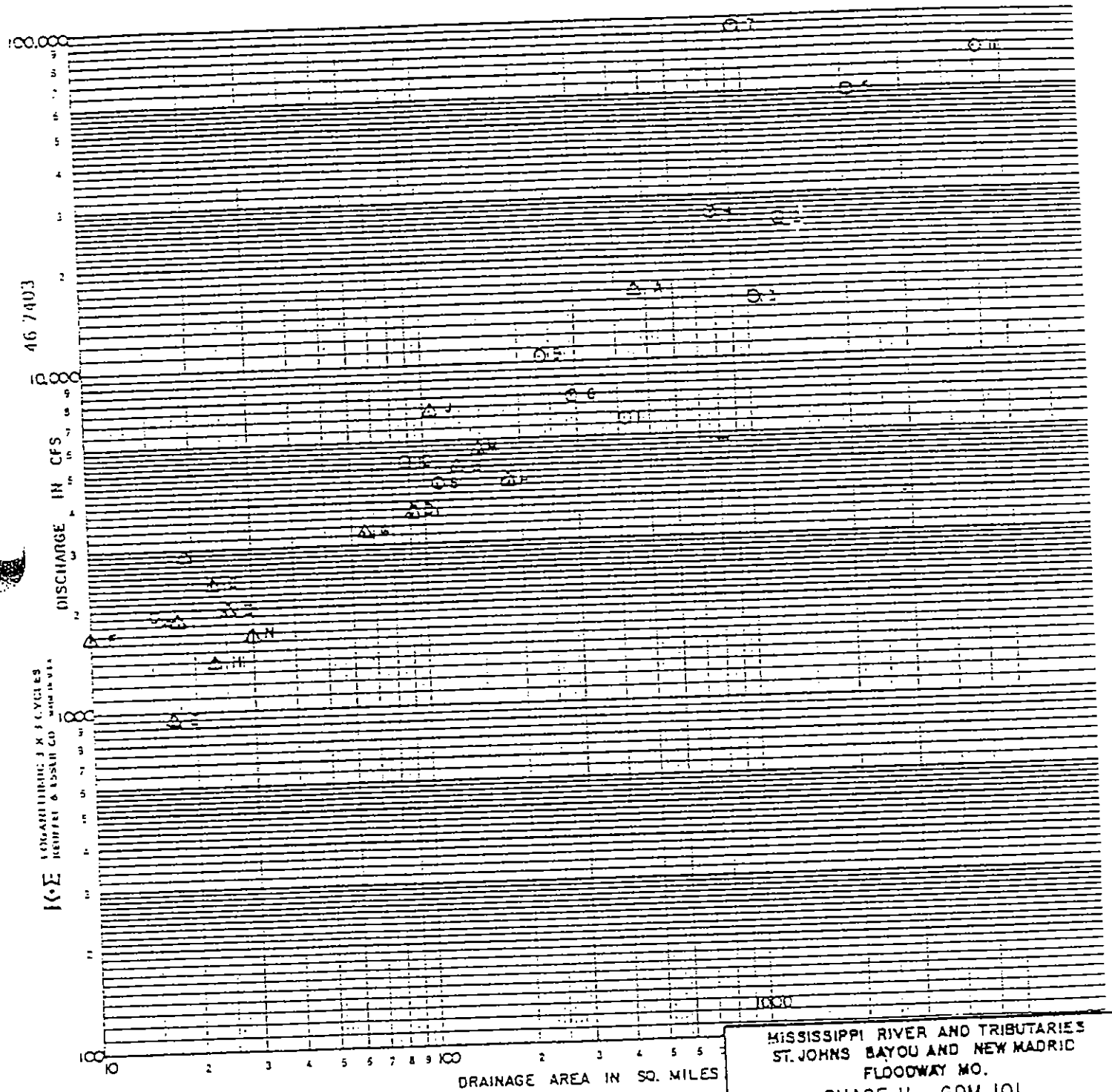
PLATE V-12



MISSISSIPPI RIVER AND TRIBUTARIES
ST. JOHNS BAYOU AND NEW MADRID
FLOODWAY MO.
PHASE II GDM 101
DRAINAGE AREA
VS.
10-YEAR FREQUENCY FLOW
(ARKANSAS & MISSOURI)

DEPARTMENT OF THE ARMY
MEMPHIS DISTRICT CORPS OF ENGINEERS

PLATE X-13



MISSISSIPPI RIVER AND TRIBUTARIES
ST. JOHNS BAYOU AND NEW MADRID
FLOODWAY MO.

PHASE II GDM 101

DRAINAGE AREA
VS.
100-YEAR FREQUENCY FLOW
(ARKANSAS & MISSOURI)

DEPARTMENT OF THE ARMY
MEMPHIS DISTRICT CORPS OF ENGINEERS

PLATE V-14

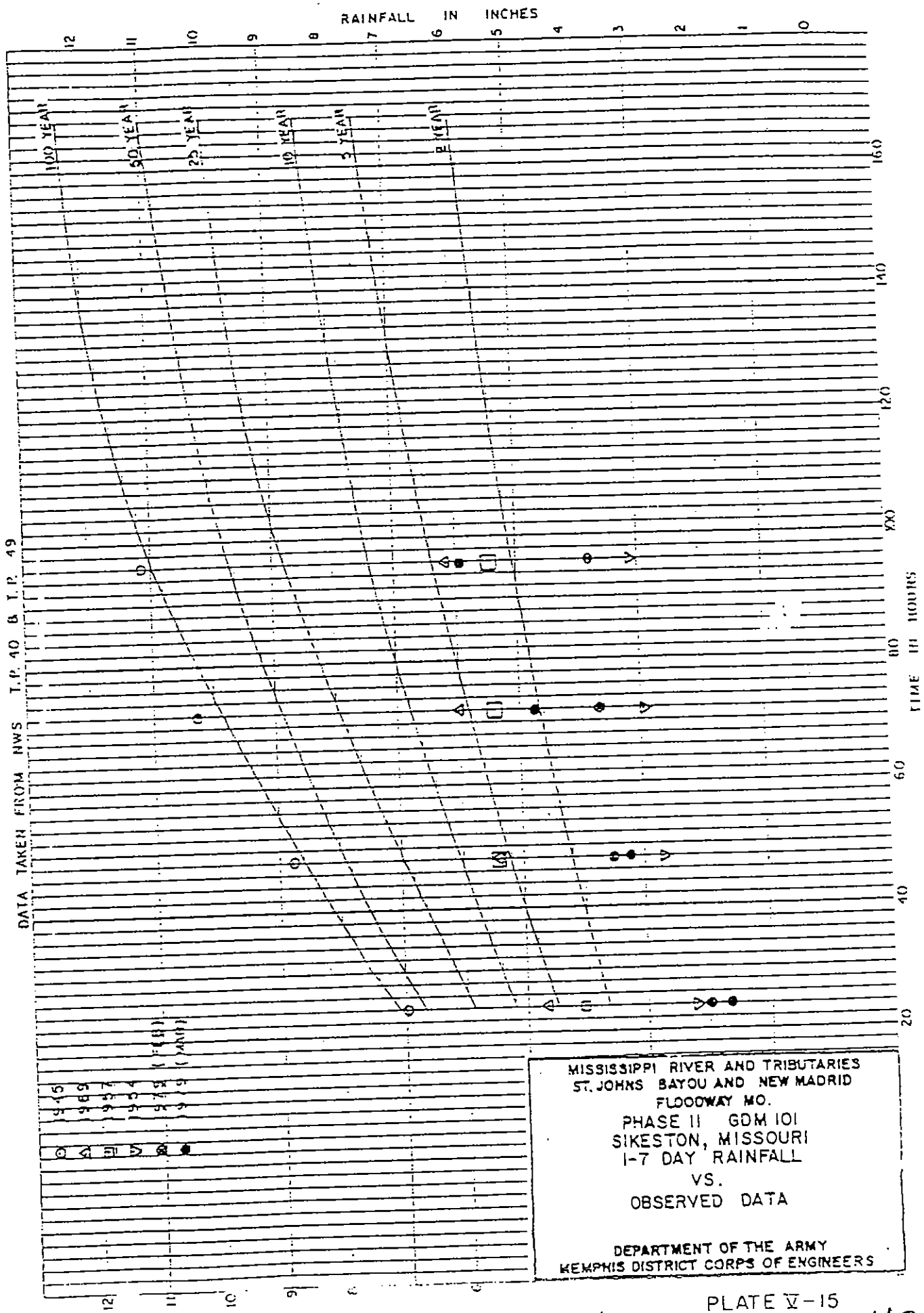
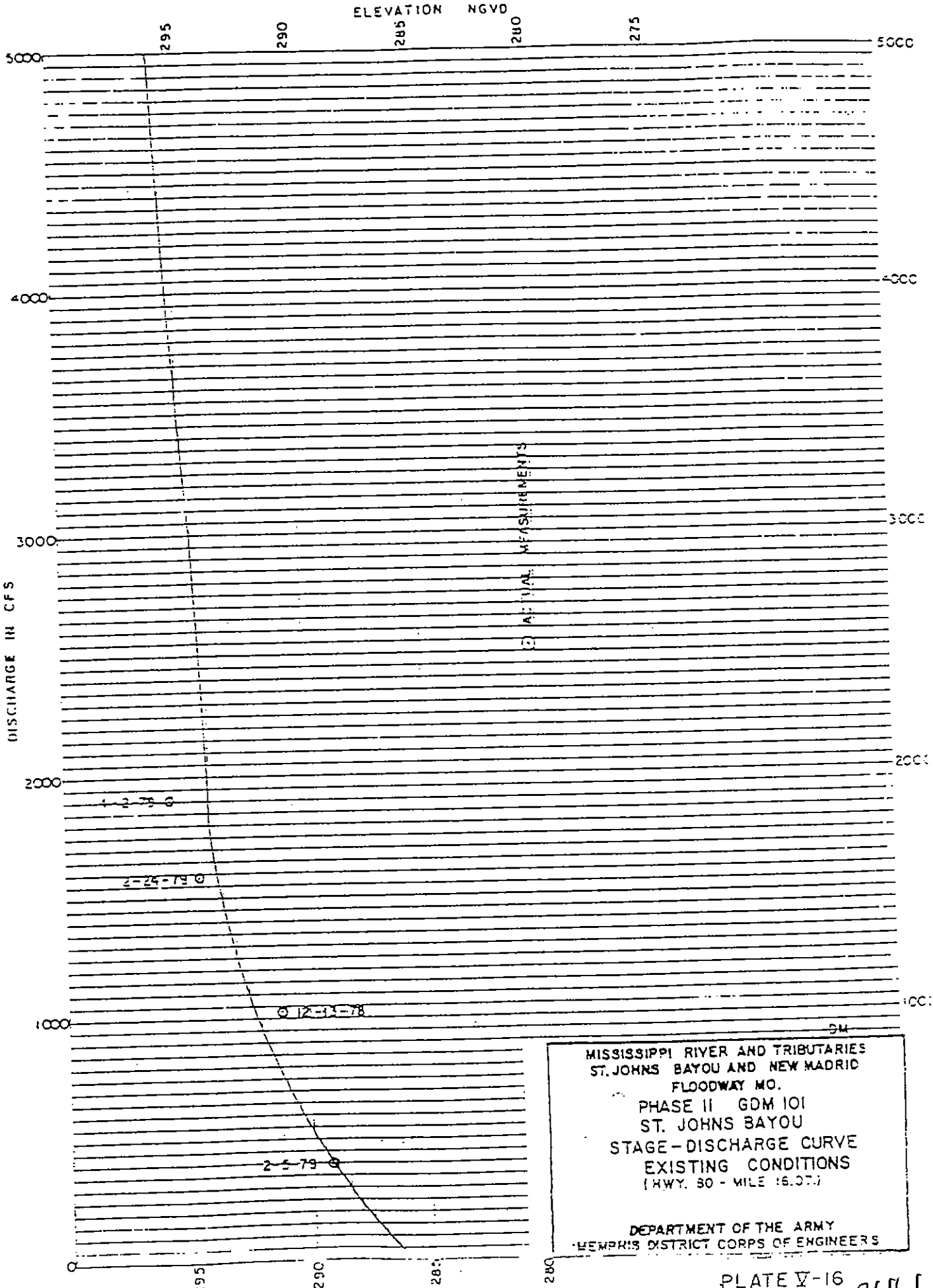

RAINFALL IN INCHES
12
11
10
9
8
7
6
5
4
3
2
1
0
100 YEAR
50 YEAR
25 YEAR
10 YEAR
5 YEAR
2 YEAR
TIME IN HOURS
20
40
60
80
100
120
140
160
DATA TAKEN FROM NWS T.P. 40 & T.P. 49
MISSISSIPPI RIVER AND TRIBUTARIES
ST. JOHNS BAYOU AND NEW MADRID
FLOODWAY MO.
PHASE II GDM 101
SIKESTON, MISSOURI
1-7 DAY RAINFALL
VS.
OBSERVED DATA
DEPARTMENT OF THE ARMY
MEMPHIS DISTRICT CORPS OF ENGINEERS

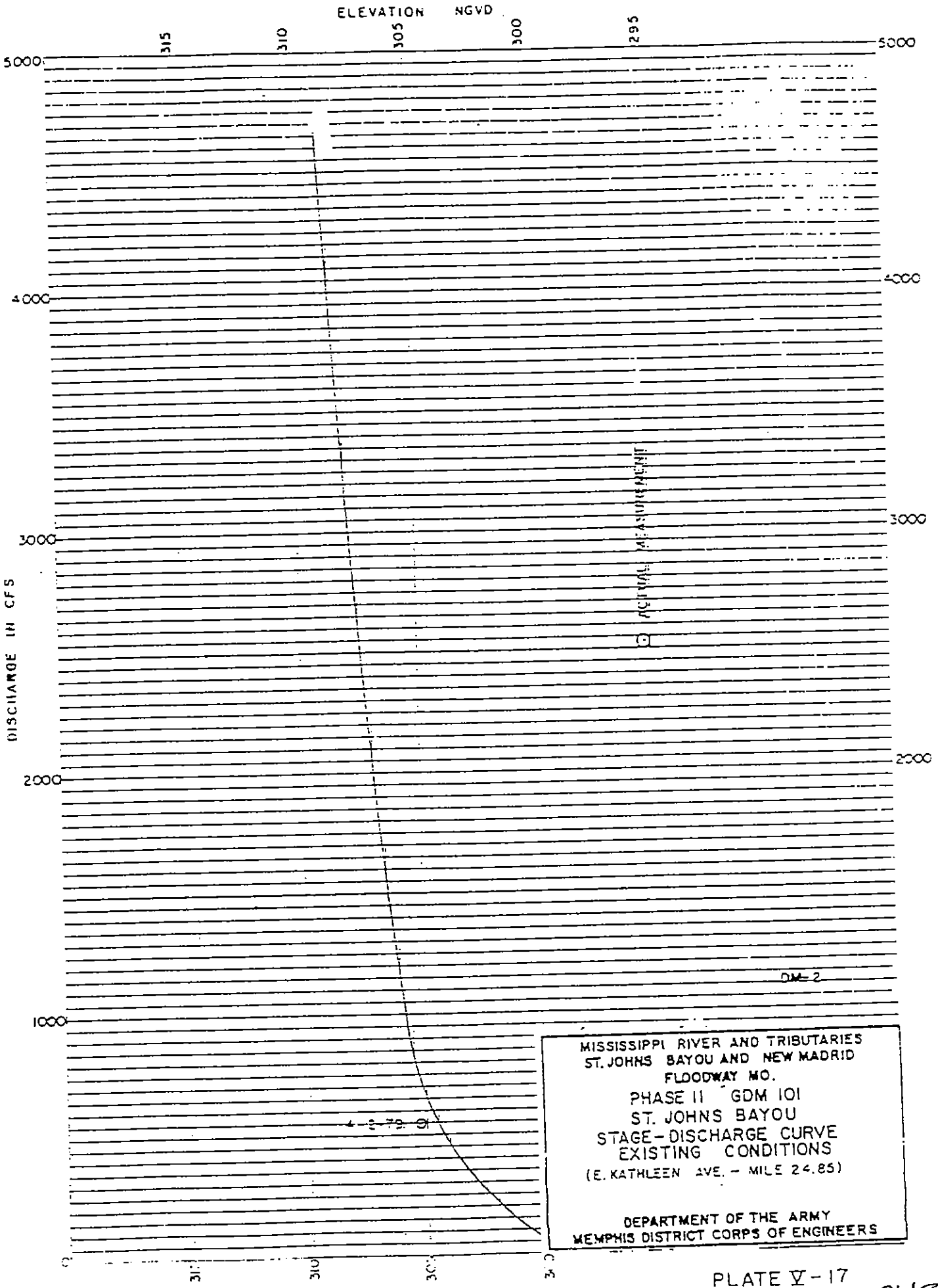
PLATE V-15



MISSISSIPPI RIVER AND TRIBUTARIES
ST. JOHNS BAYOU AND NEW MADRID
FLOODWAY MO.
PHASE II GDM 101
ST. JOHNS BAYOU
STAGE-DISCHARGE CURVE
EXISTING CONDITIONS
(HWY. 80 - MILE 16.07)

DEPARTMENT OF THE ARMY
MEMPHIS DISTRICT CORPS OF ENGINEERS

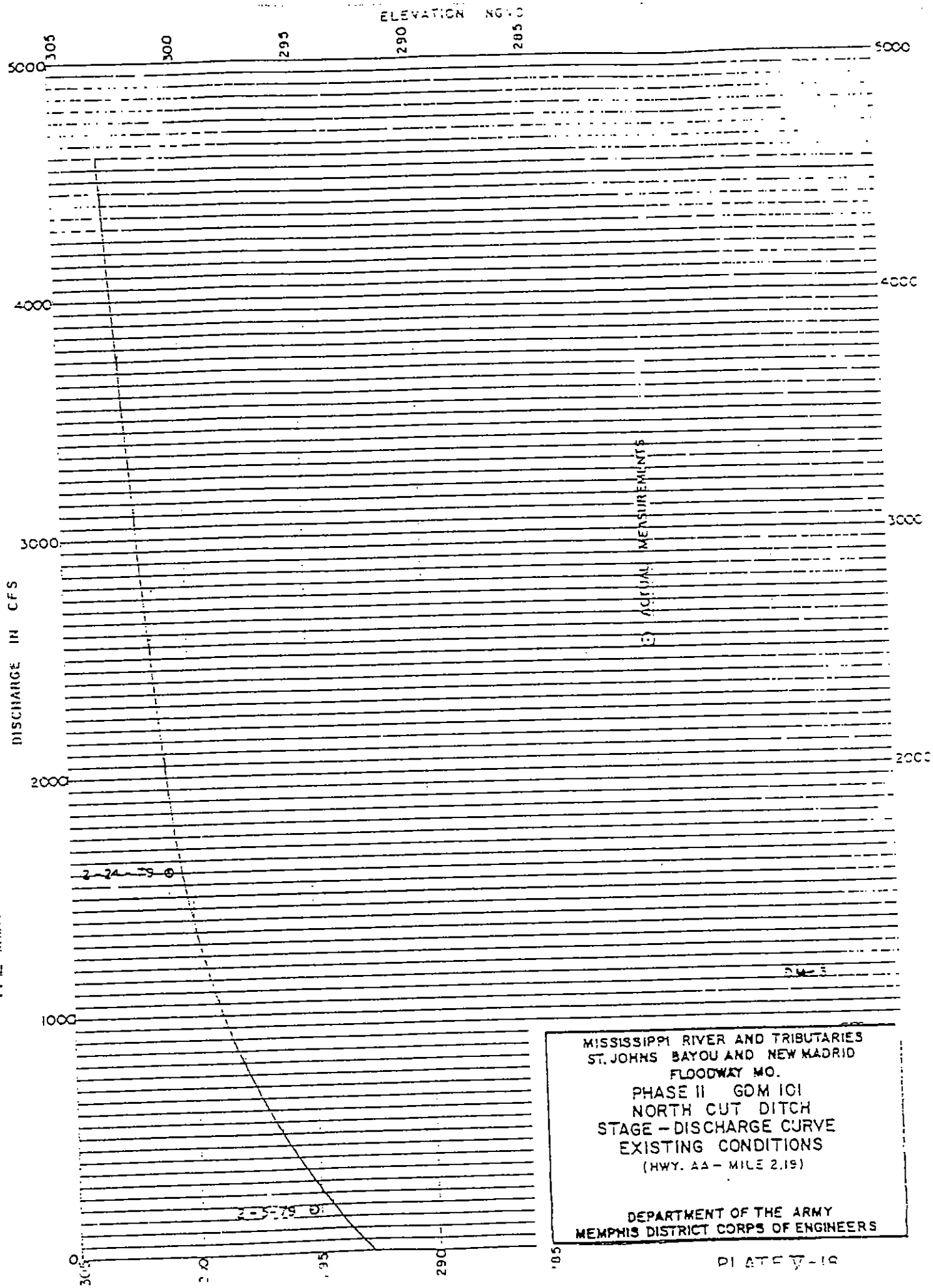
PLATE V-16



MISSISSIPPI RIVER AND TRIBUTARIES
ST. JOHNS BAYOU AND NEW MADRID
FLOODWAY MO.
PHASE II GDM 101
ST. JOHNS BAYOU
STAGE-DISCHARGE CURVE
EXISTING CONDITIONS
(E. KATHLEEN AVE. - MILE 24.85)

DEPARTMENT OF THE ARMY
MEMPHIS DISTRICT CORPS OF ENGINEERS

PLATE V-17

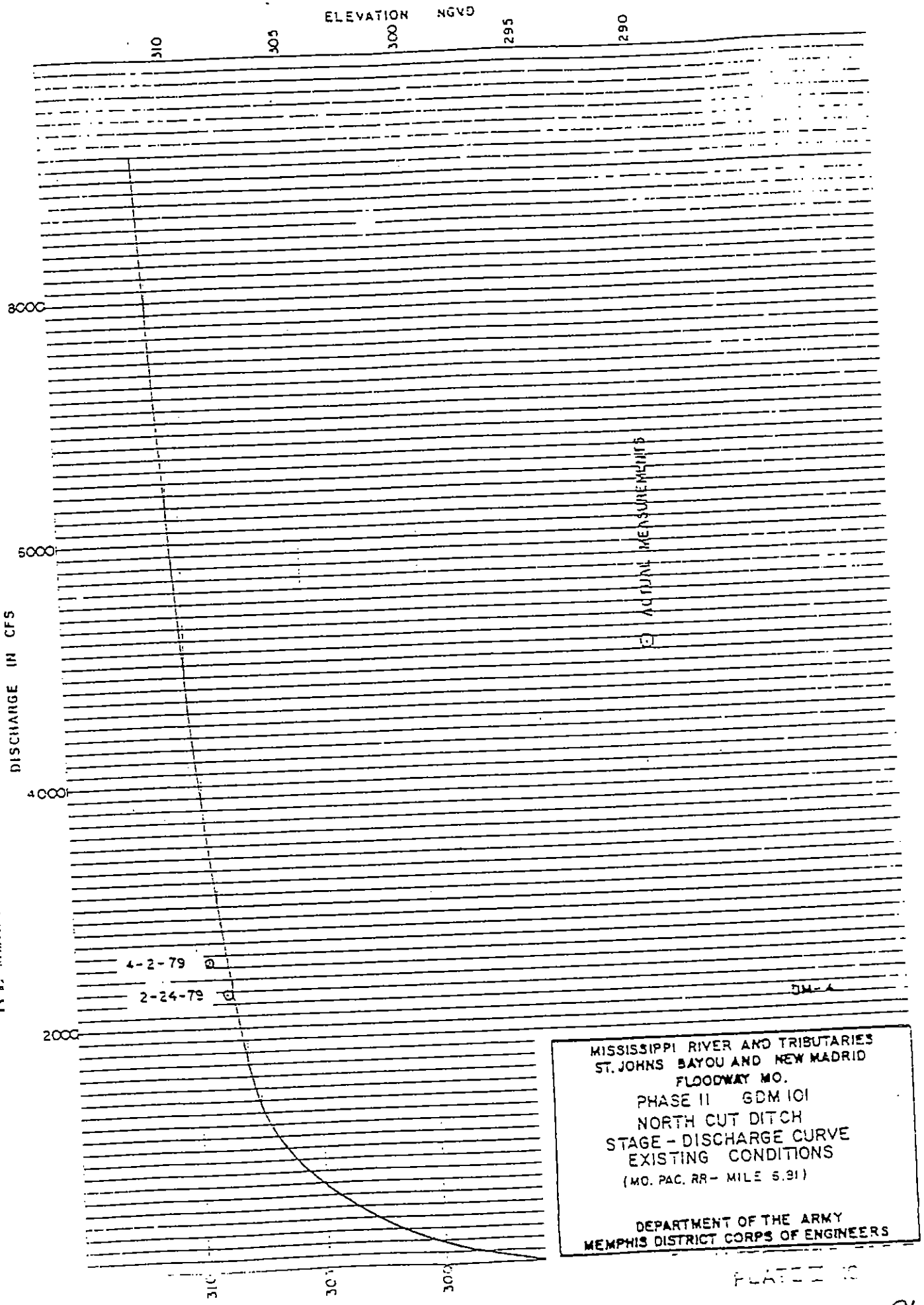


MISSISSIPPI RIVER AND TRIBUTARIES
ST. JOHNS BAYOU AND NEW MADRID
FLOODWAY MO.
PHASE II GDM 101
NORTH CUT DITCH
STAGE – DISCHARGE CURVE
EXISTING CONDITIONS
(HWY. AA – MILE 2.19)

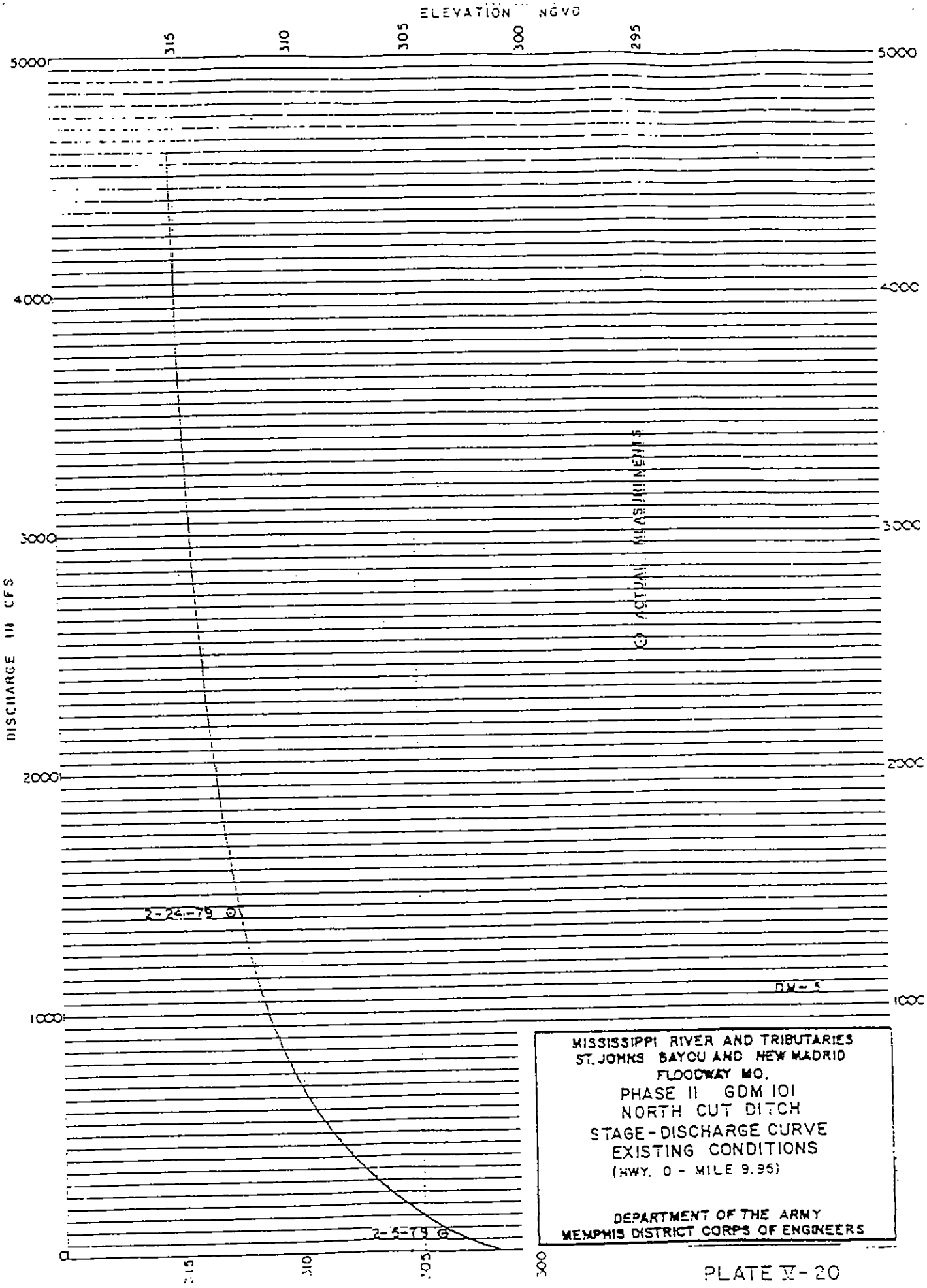
DEPARTMENT OF THE ARMY
MEMPHIS DISTRICT CORPS OF ENGINEERS

PLATE V-19

246


ELEVATION NGVD
310
305
300
295
290
DISCHARGE IN CFS
8000
6000
4000
2000
ACTUAL MEASUREMENTS
4-2-79
2-24-79
DM-A
MISSISSIPPI RIVER AND TRIBUTARIES
ST. JOHNS BAYOU AND NEW MADRID
FLOODWAY MO.
PHASE II GDM 101
NORTH CUT DITCH
STAGE - DISCHARGE CURVE
EXISTING CONDITIONS
(MO. PAC. RR - MILE 5.31)
DEPARTMENT OF THE ARMY
MEMPHIS DISTRICT CORPS OF ENGINEERS

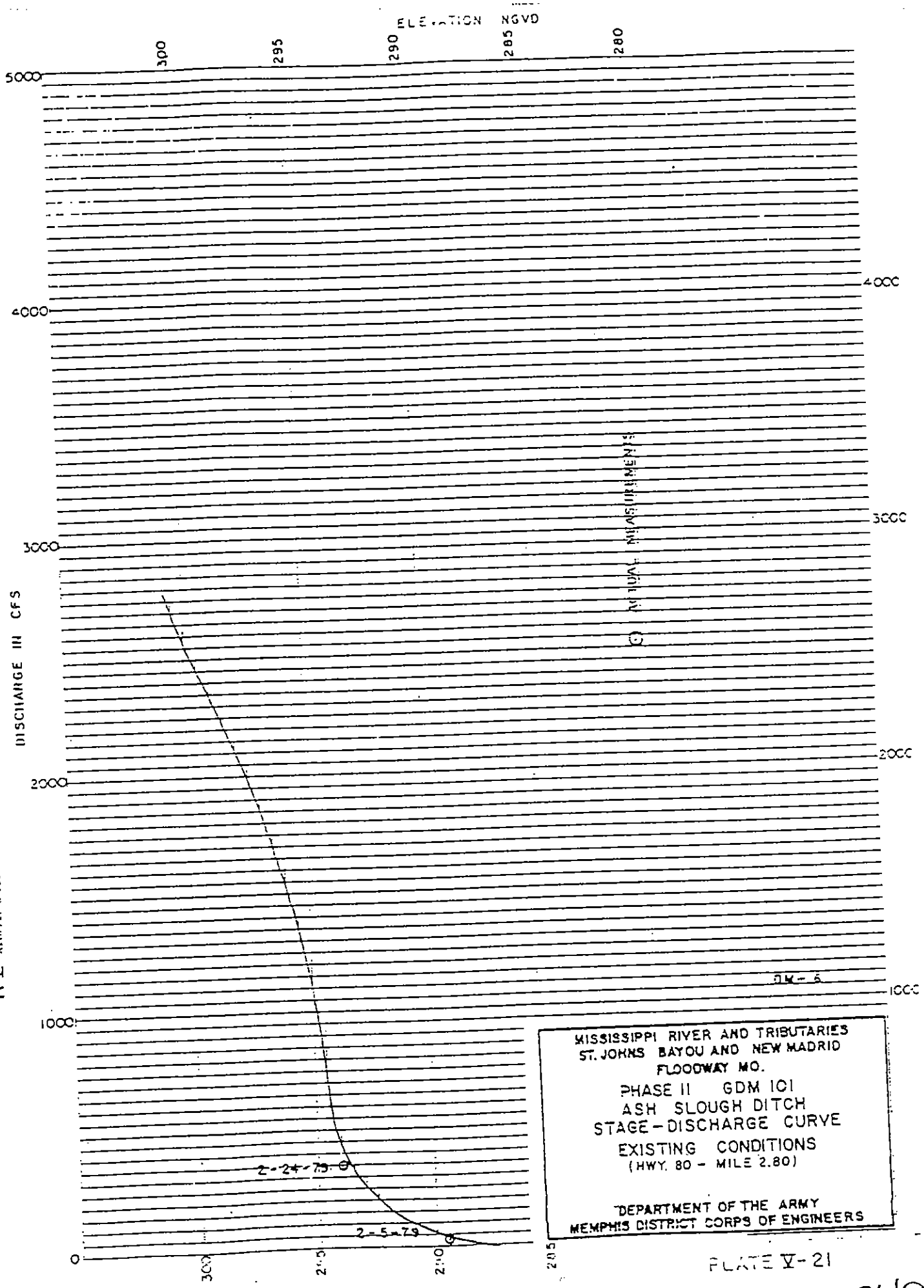
247



MISSISSIPPI RIVER AND TRIBUTARIES
ST. JOHNS BAYOU AND NEW MADRID
FLOODWAY MO.
PHASE II GDM 101
NORTH CUT DITCH
STAGE-DISCHARGE CURVE
EXISTING CONDITIONS
(HWY. O - MILE 9.96)

DEPARTMENT OF THE ARMY
MEMPHIS DISTRICT CORPS OF ENGINEERS

PLATE V-20

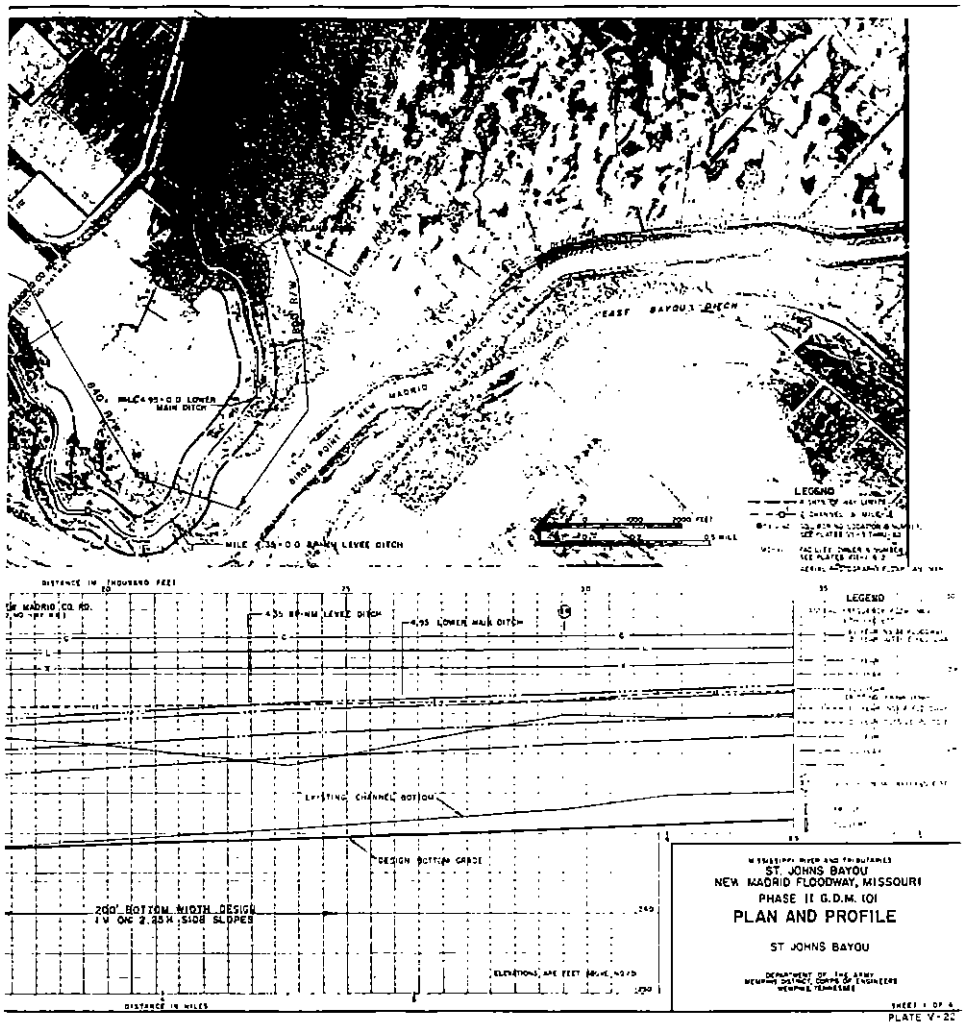


MISSISSIPPI RIVER AND TRIBUTARIES
ST. JOHNS BAYOU AND NEW MADRID
FLOODWAY MO.
PHASE II GDM 101
ASH SLOUGH DITCH
STAGE-DISCHARGE CURVE
EXISTING CONDITIONS
(HWY. 80 - MILE 2.80)

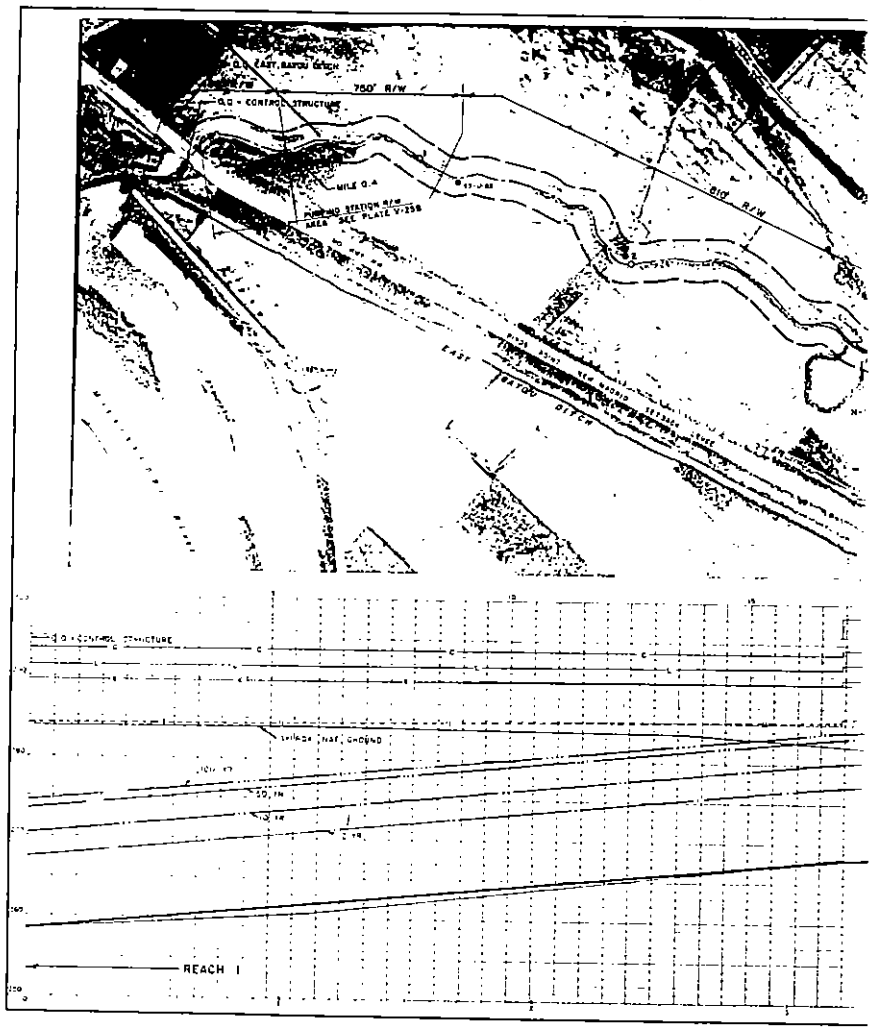
DEPARTMENT OF THE ARMY
MEMPHIS DISTRICT CORPS OF ENGINEERS

PLATE V-21

249


EAST BAYOU DITCH
BIRDS POINT NEW MADRID
MILE 4.95 + 0.0 LOWER MAIN DITCH
MILE 4.35 + 0.0 BP-NM LEVEE DITCH
LEGEND
DISTANCE IN THOUSAND FEET
4.35 BP-NM LEVEE DITCH
4.95 LOWER MAIN DITCH
EXISTING CHANNEL BOTTOM
DESIGN BOTTOM GRADE
200' BOTTOM WIDTH DESIGN
1 V ON 2.25 H SIDE SLOPES
DISTANCE IN MILES
MISSISSIPPI RIVER AND TRIBUTARIES
ST. JOHNS BAYOU
NEW MADRID FLOODWAY, MISSOURI
PHASE II G.D.M. 101
PLAN AND PROFILE
ST JOHNS BAYOU
DEPARTMENT OF THE ARMY
MEMPHIS DISTRICT, CORPS OF ENGINEERS
MEMPHIS, TENNESSEE
SHEET 1 OF 4
PLATE V-22

250


EAST BAYOU DITCH
750' R/W
CONTROL STRUCTURE
MILE 0.4
PUMPING STATION R/W
AREA SEE PLATE V-258
810' R/W
EAST BAYOU DITCH
CONTROL STRUCTURE
NAT. GROUND
REACH I

251

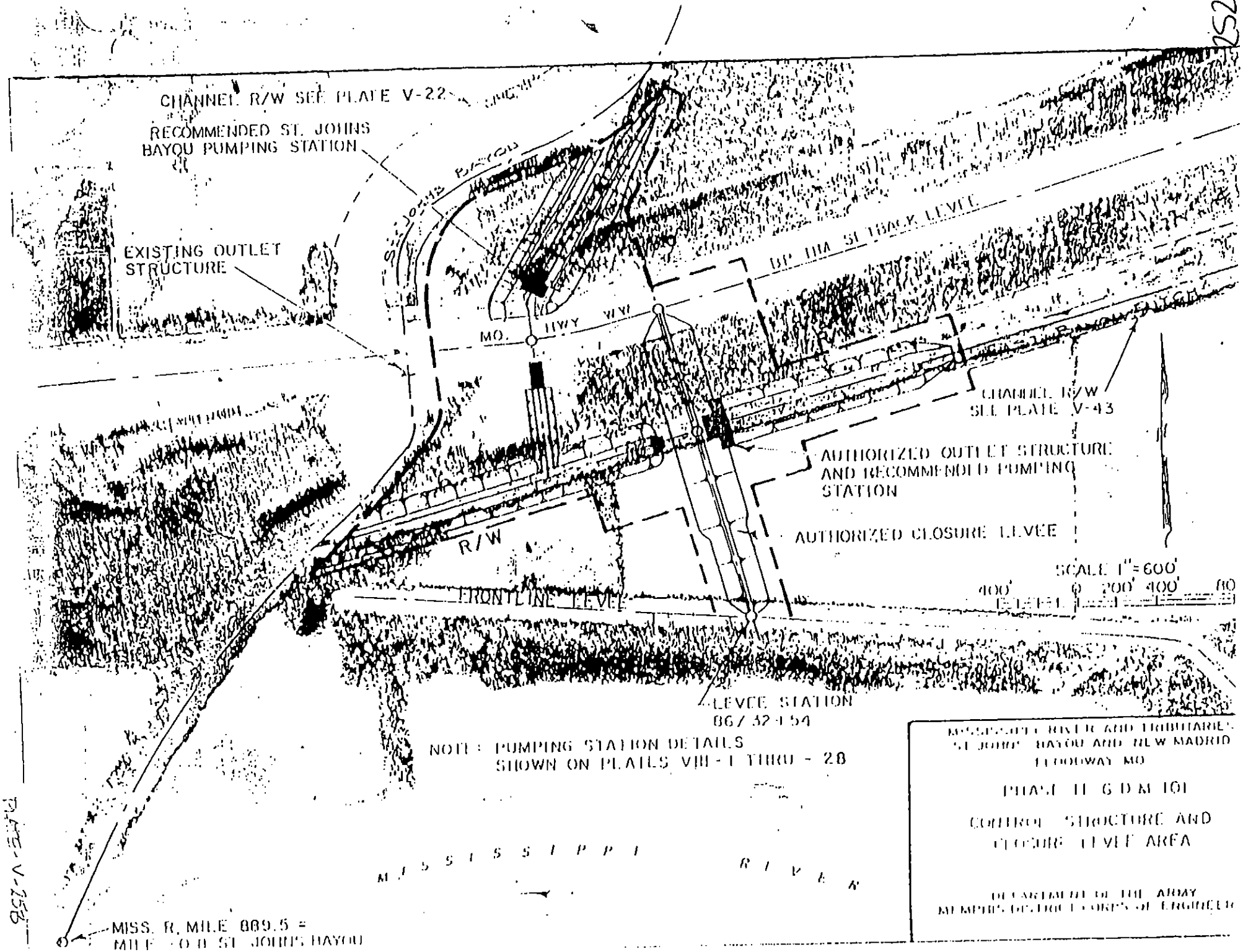
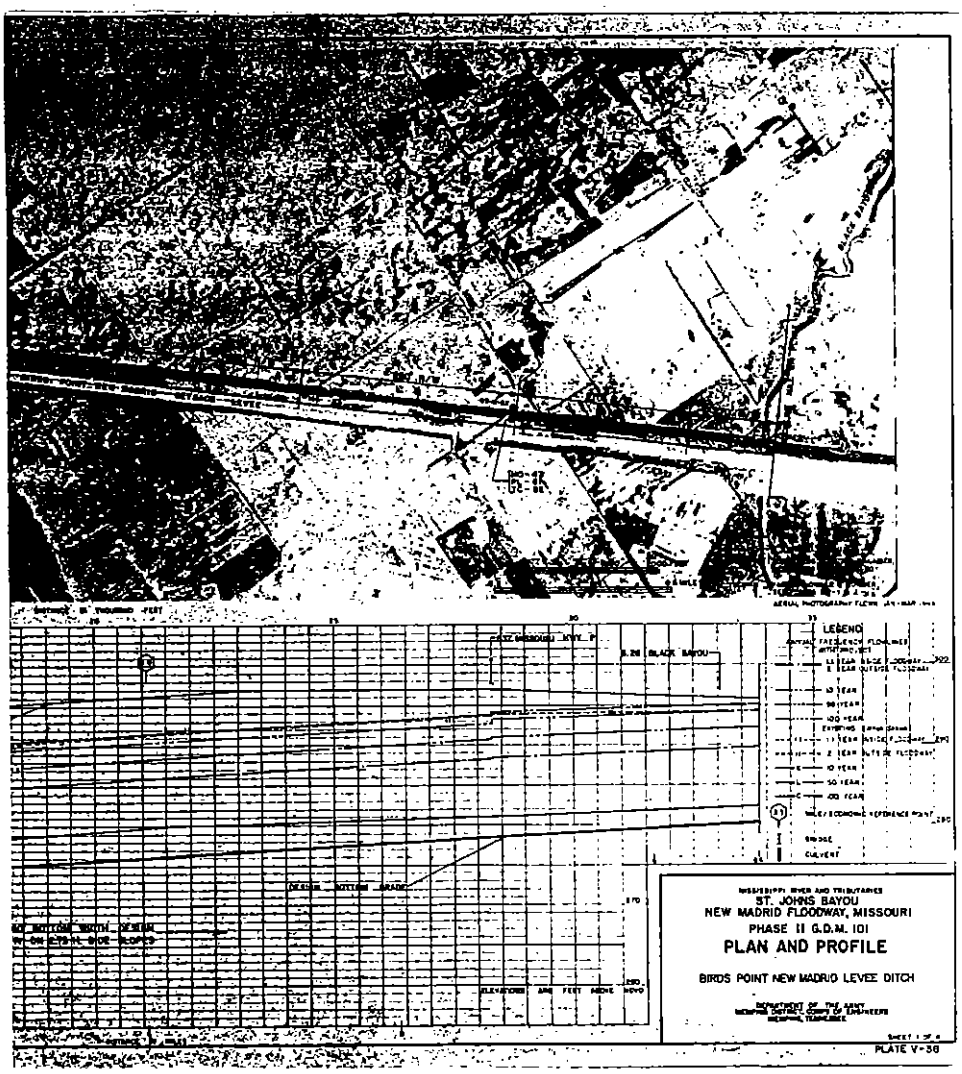
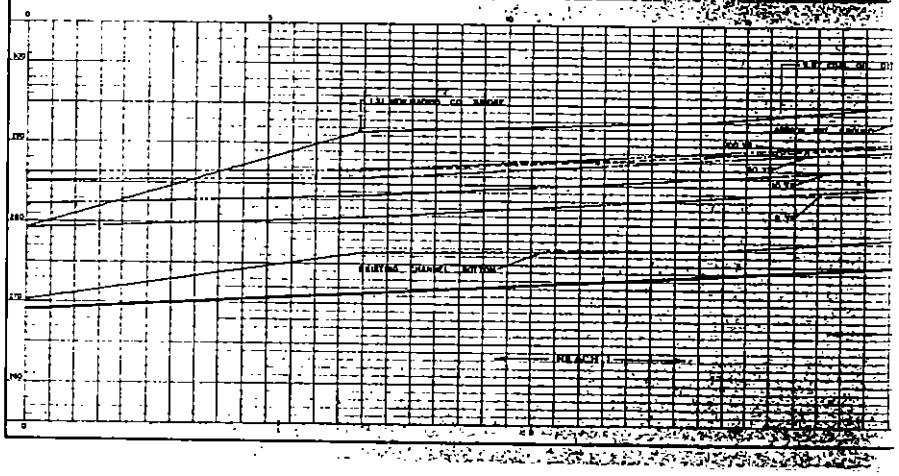
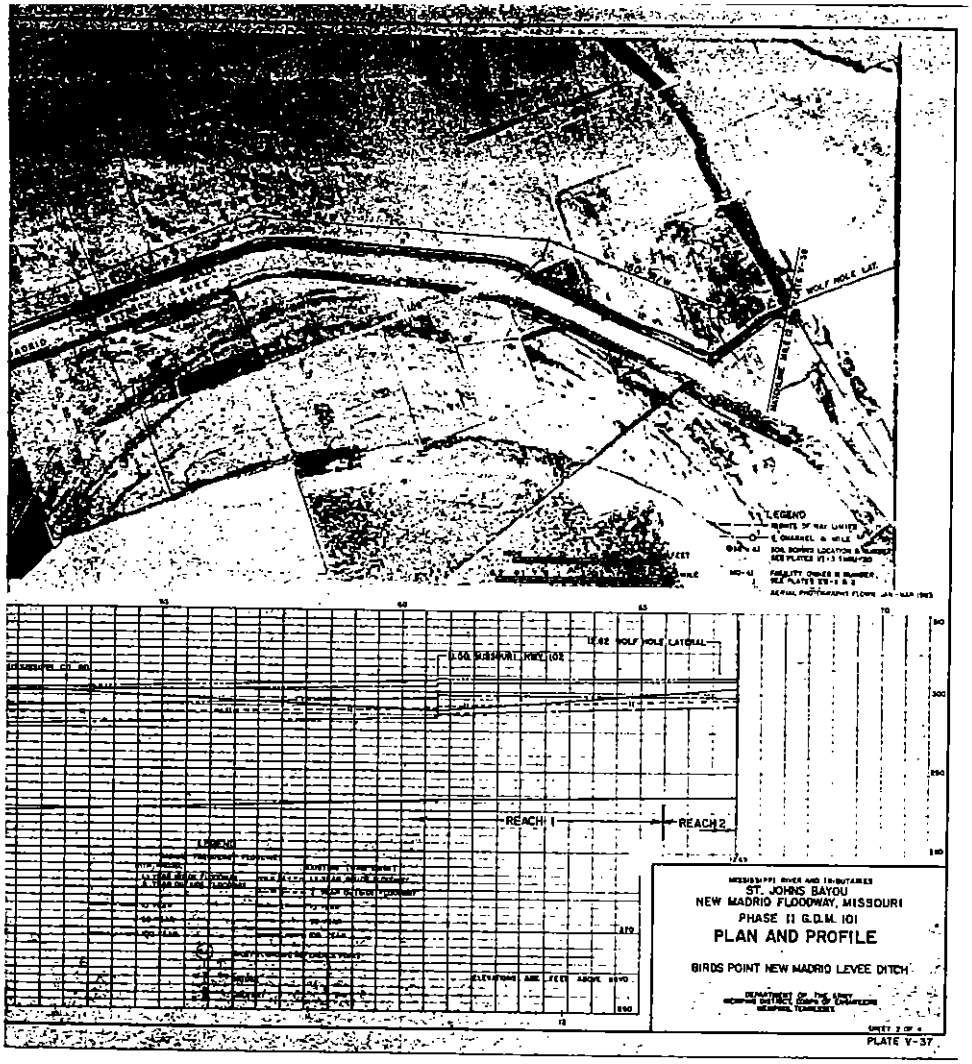

CHANNEL R/W SEE PLATE V-22
RECOMMENDED ST. JOHNS BAYOU PUMPING STATION
EXISTING OUTLET STRUCTURE
ST. JOHNS BAYOU
MO. HWY WW
BP THA SETBACK LEVEE
CHANNEL R/W SEE PLATE V-43
AUTHORIZED OUTLET STRUCTURE AND RECOMMENDED PUMPING STATION
AUTHORIZED CLOSURE LEVEE
R/W
FRONTLINE LEVEE
SCALE 1"=600'
400' 0 200' 400' 80
LEVEE STATION 86/32+54
NOTE: PUMPING STATION DETAILS SHOWN ON PLATES VIII-1 THRU - 28
MISSISSIPPI RIVER
MISS. R. MILE 889.5 = MILE 0.0 ST. JOHNS BAYOU
MISSISSIPPI RIVER AND TRIBUTARIES
ST. JOHNS BAYOU AND NEW MADRID
FLOODWAY MO
PHASE II G D M 101
CONTROL STRUCTURE AND CLOSURE LEVEE AREA
DEPARTMENT OF THE ARMY
MEMPHIS DISTRICT CORPS OF ENGINEERS

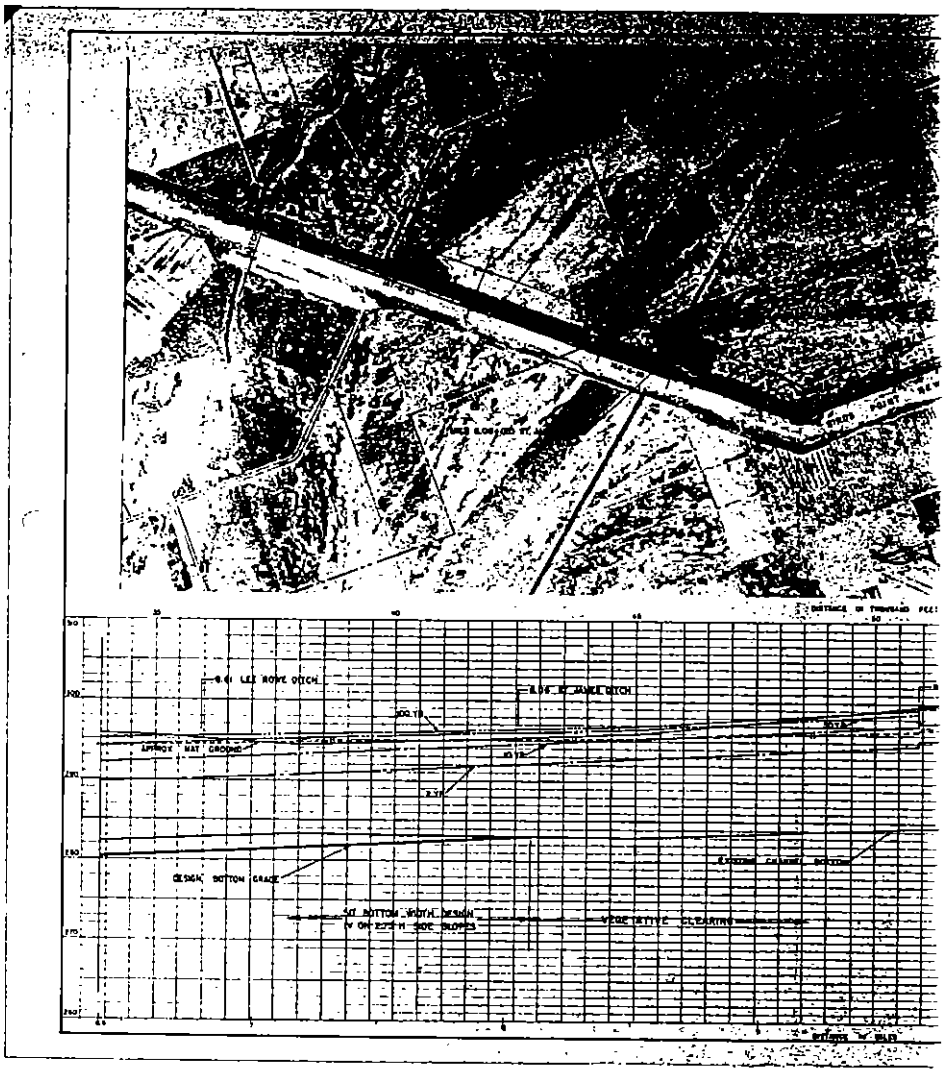
PLATE V-25B

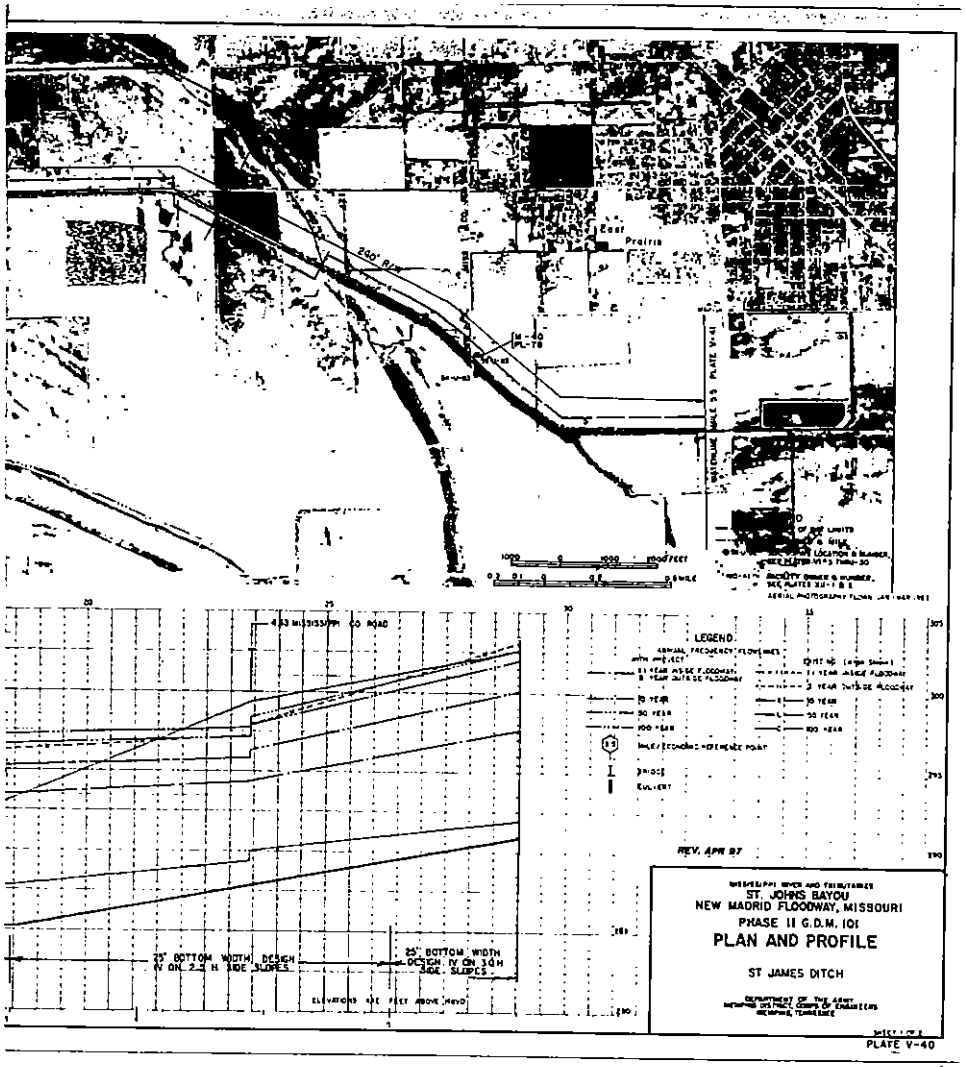

LEGEND
BRIDGE
CULVERT
DESIGN BOTTOM GRADE
ELEVATIONS ARE FEET MSHL NGVD
MISSISSIPPI RIVER AND TRIBUTARIES
ST. JOHNS BAYOU
NEW MADRID FLOODWAY, MISSOURI
PHASE II G.D.M. 101
PLAN AND PROFILE
BIRDS POINT NEW MADRID LEVEE DITCH
DEPARTMENT OF THE ARMY
MEMPHIS DISTRICT, CORPS OF ENGINEERS
MEMPHIS, TENNESSEE
PLATE V-30




LEGEND
WOLF HOLE LAT.
REACH 1
REACH 2
MISSISSIPPI RIVER AND TRIBUTARIES
ST. JOHNS BAYOU
NEW MADRID FLOODWAY, MISSOURI
PHASE II G.D.M. 101
PLAN AND PROFILE
BIRDS POINT NEW MADRID LEVEE DITCH
PLATE V-37

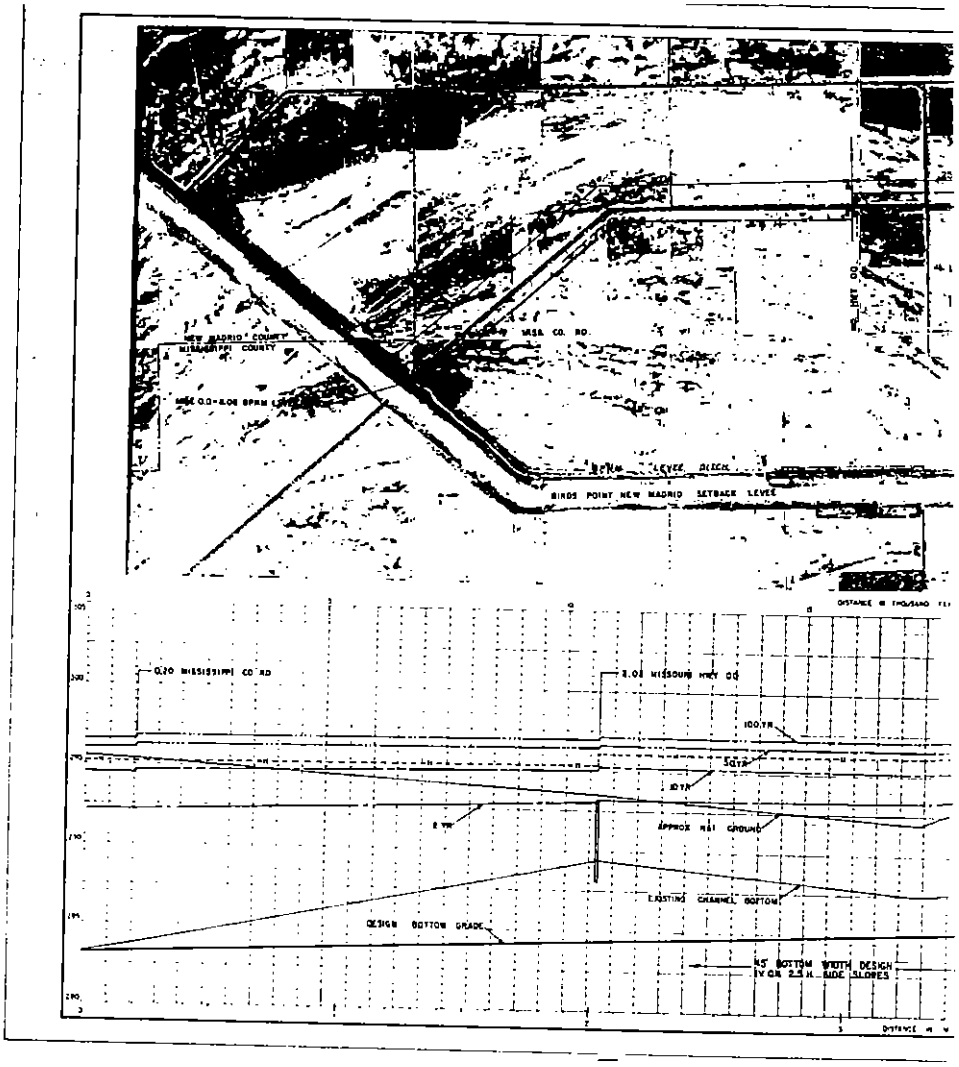
255

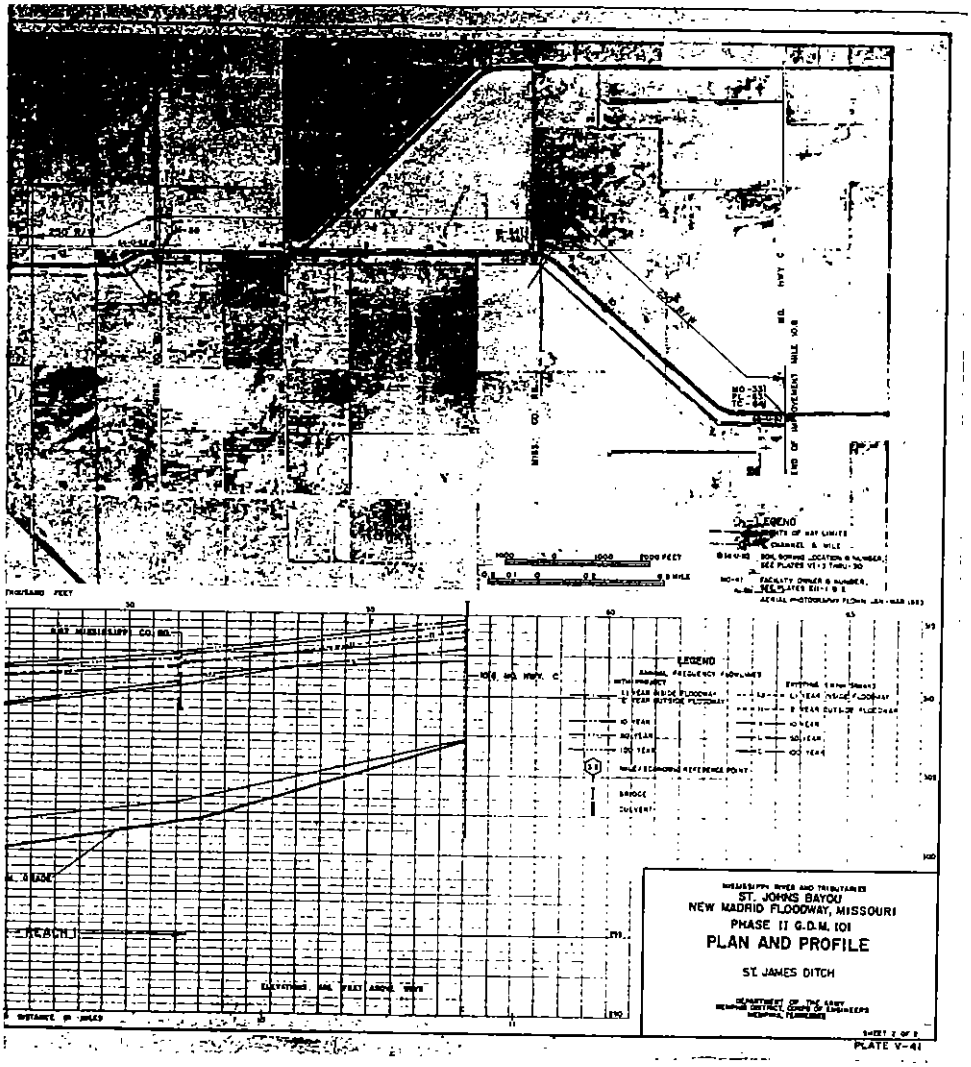

LEE ROWE DITCH
APPROX MAT GROUND
DESIGN BOTTOM GRADE
VEGETATIVE CLEARING



East Prairie
240' R/W
LEGEND
25' BOTTOM WIDTH DESIGN 1V ON 2.5 H SIDE SLOPES
25' BOTTOM WIDTH DESIGN 1V ON 3.0 H SIDE SLOPES
REV. APR 97
ST. JOHNS BAYOU
NEW MADRID FLOODWAY, MISSOURI
PHASE II G.D.M. 101
PLAN AND PROFILE
ST JAMES DITCH
PLATE V-40

257


NEW MADRID COUNTY
MISSISSIPPI COUNTY
MSS. CO. RD.
BIRDS POINT NEW MADRID SETBACK LEVEE
0.20 MISSISSIPPI CO RD
2.05 MISSOURI HWY 00
100 YR
50 YR
10 YR
2 YR
APPROX NAT GROUND
EXISTING CHANNEL BOTTOM
DESIGN BOTTOM GRADE
45' BOTTOM WIDTH DESIGN
1V ON 2.5 H SIDE SLOPES


LEGEND
LEGEND
MISSISSIPPI RIVER AND TRIBUTARIES
ST. JOHNS BAYOU
NEW MADRID FLOODWAY, MISSOURI
PHASE II G.D.M. 101
PLAN AND PROFILE
ST. JAMES DITCH
DEPARTMENT OF THE ARMY
MEMPHIS DISTRICT, CORPS OF ENGINEERS
MEMPHIS, TENNESSEE
PLATE V-41

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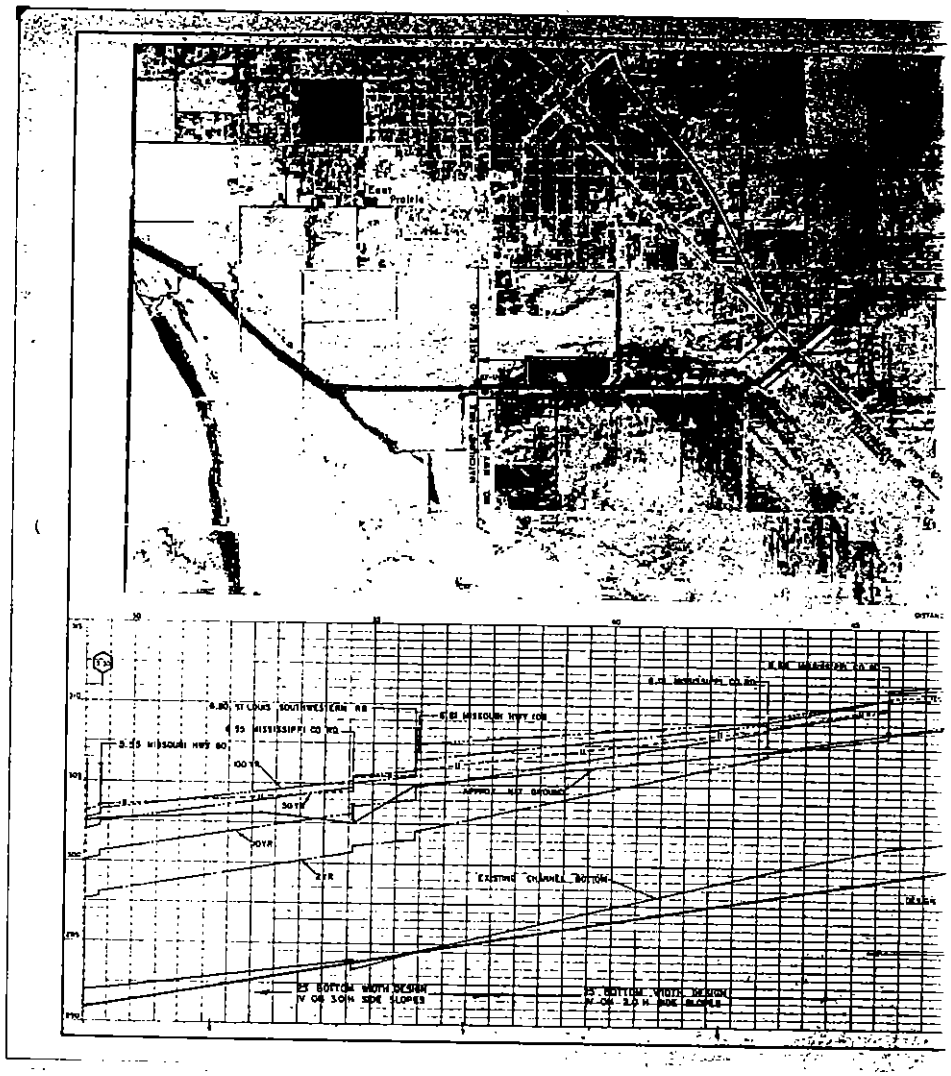

East Prairie
6.80 ST LOUIS SOUTHWESTERN RR
6.55 MISSISSIPPI CO RD
5.55 MISSOURI HWY 80
6.81 MISSOURI HWY 108
100 YR
50 YR
10 YR
2 YR
APPROX NAT GROUND
EXISTING CHANNEL BOTTOM
DESIGN
25 BOTTOM WIDTH DESIGN
1V ON 3.0H SIDE SLOPES
25 BOTTOM WIDTH DESIGN
1V ON 2.0 H SIDE SLOPES

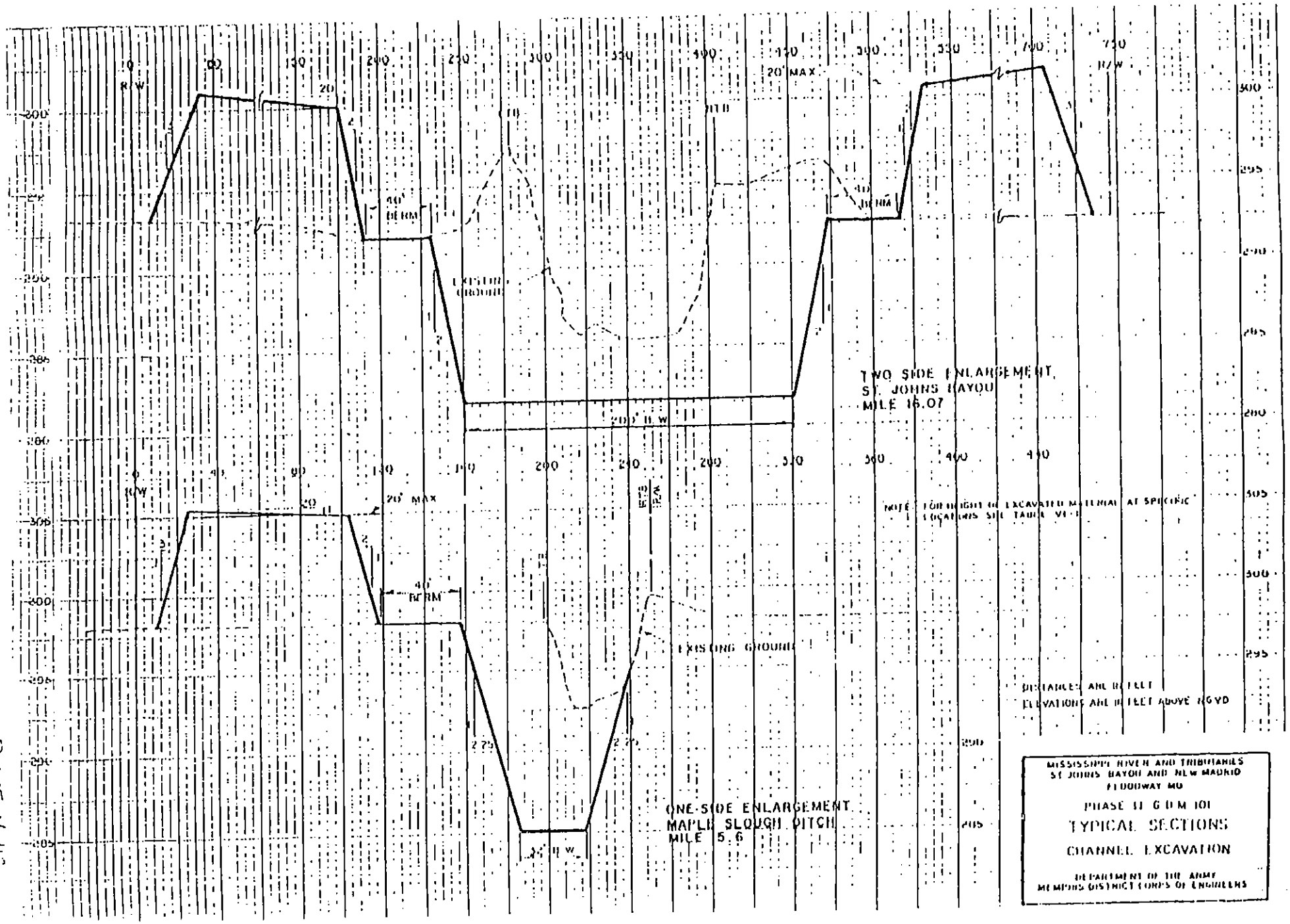
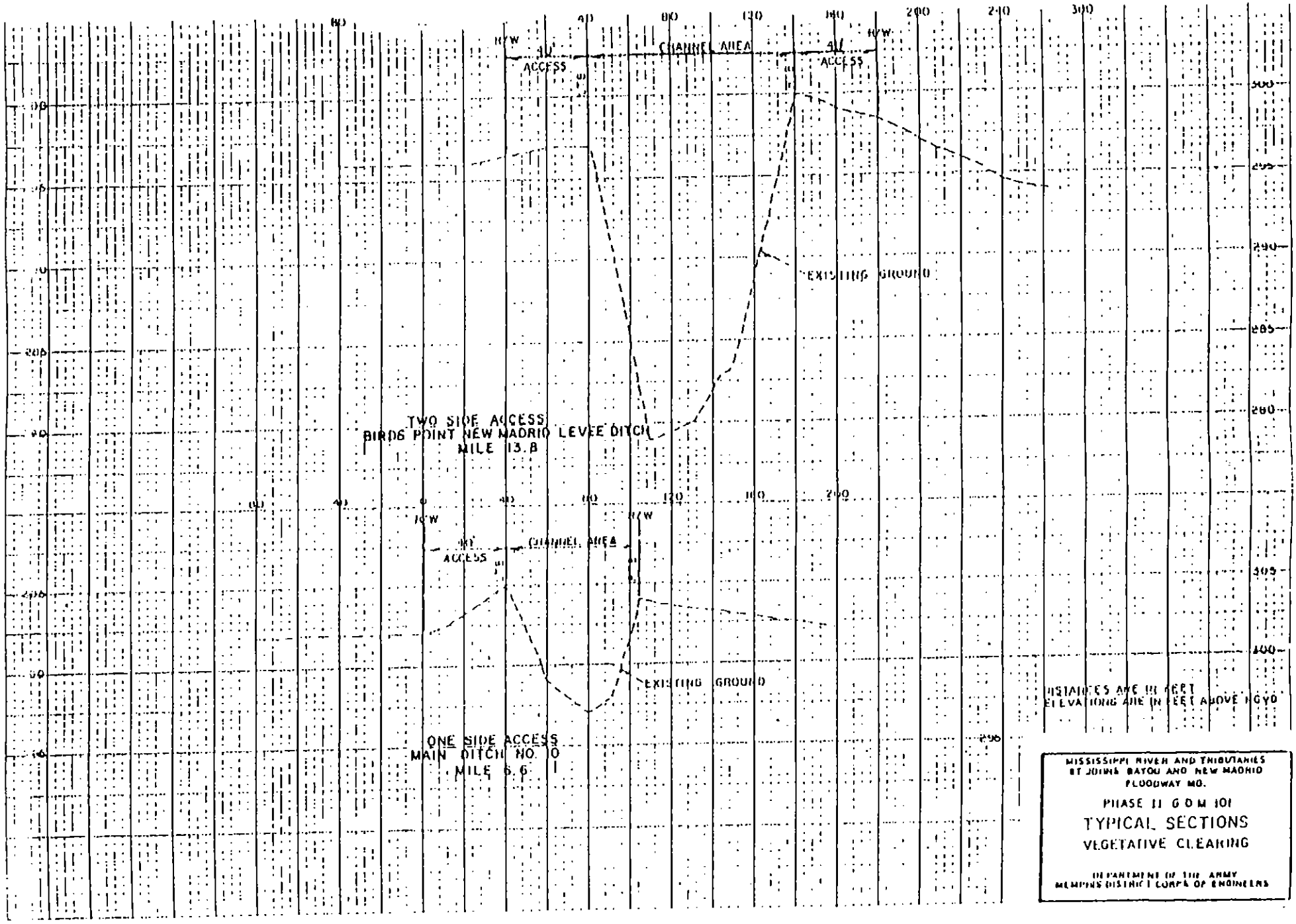


PLATE V-42
2601



MISSISSIPPI RIVER AND TRIBUTARIES
ST JOHNS BAYOU AND NEW MADRID
FLOODWAY MO.

PHASE II G D M 101

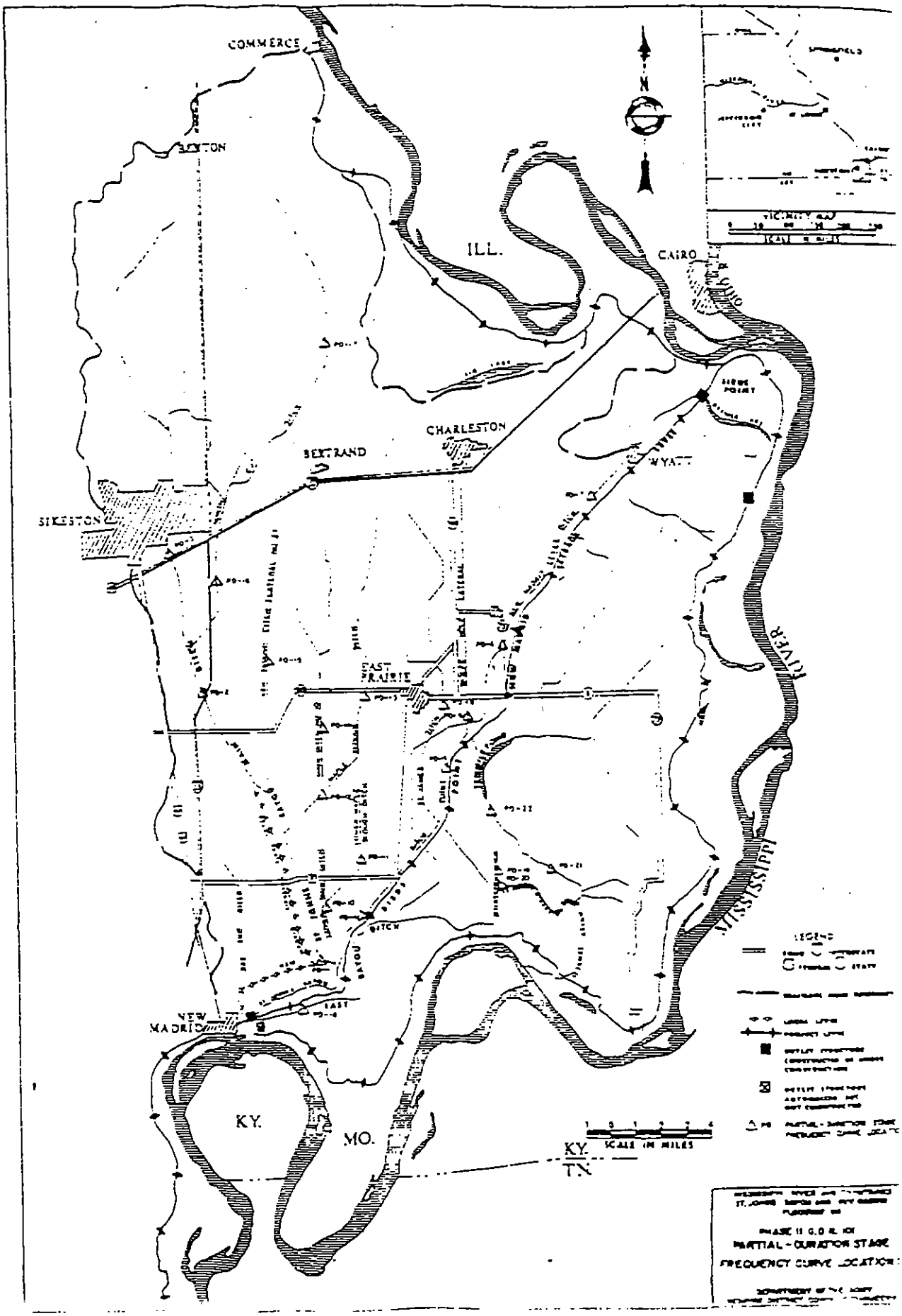
TYPICAL SECTIONS

VEGETATIVE CLEARING

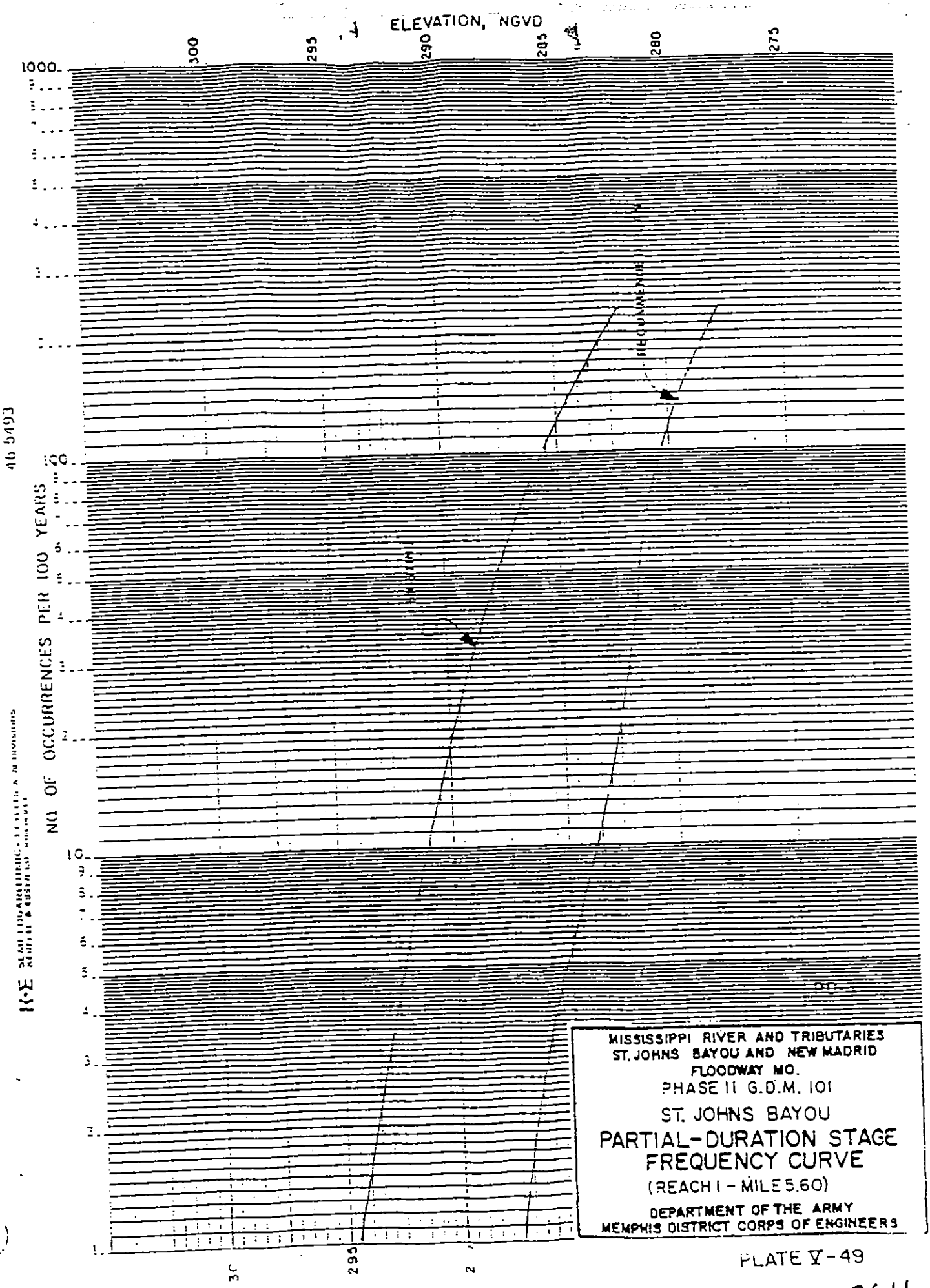
DEPARTMENT OF THE ARMY
MEMPHIS DISTRICT CORPS OF ENGINEERS

PLATE 2-22A

262


COMMERCE
BOXTON
ILL.
CAIRO
OHIO RIVER
CHARLESTON
BERTRAND
WYATT
SIKESTON
EAST PRAIRIE
MISSISSIPPI RIVER
NEW MADRID
KY.
MO.
KY.
TN.
SCALE IN MILES
LEGEND
PHASE II G.D.R. 101
PARTIAL - DURATION STAGE
FREQUENCY CURVE LOCATION

263



MISSISSIPPI RIVER AND TRIBUTARIES
ST. JOHNS BAYOU AND NEW MADRID FLOODWAY MO.
PHASE II G.D.M. 101

ST. JOHNS BAYOU

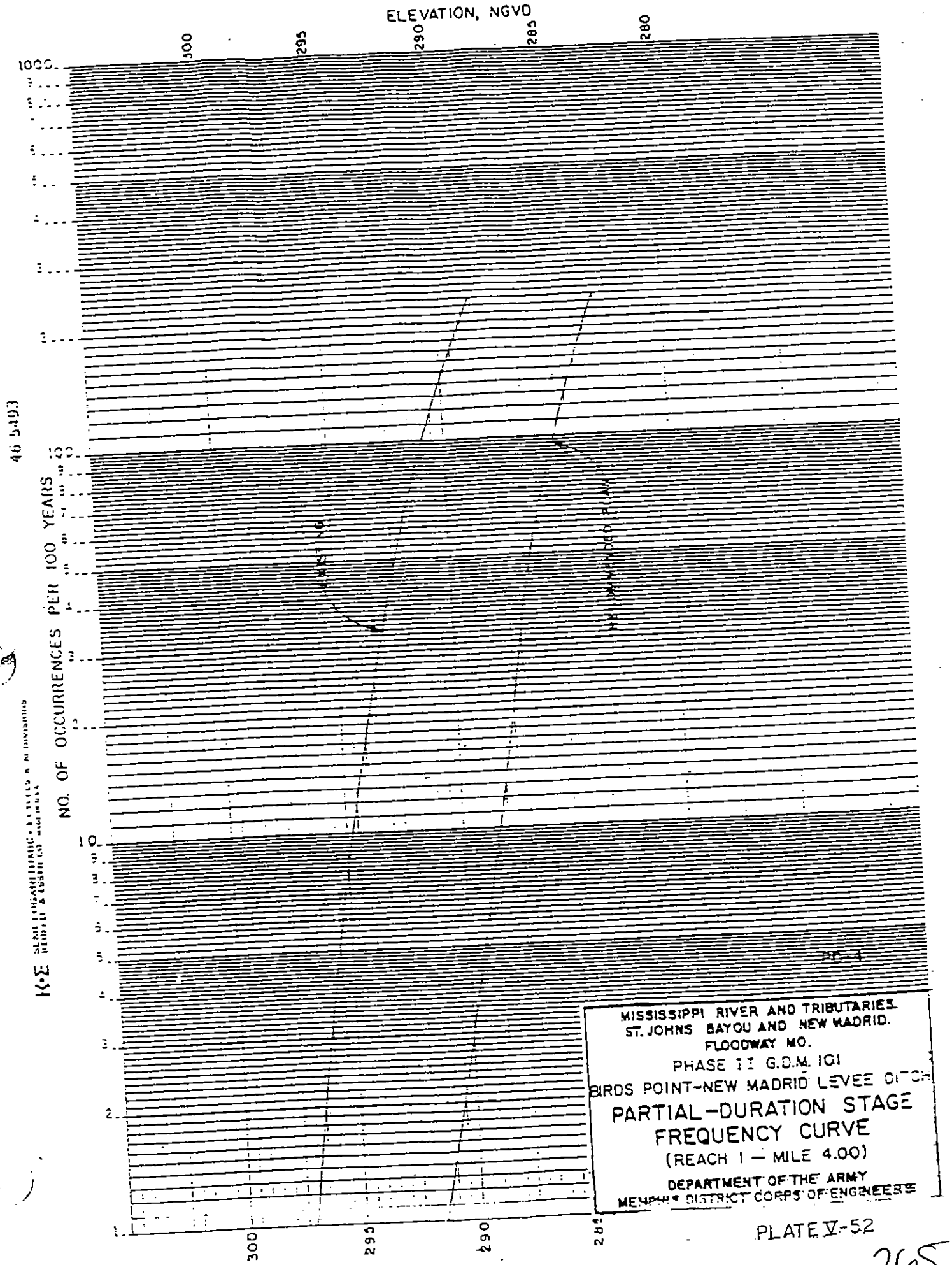
PARTIAL-DURATION STAGE FREQUENCY CURVE

(REACH I - MILE 5.60)

DEPARTMENT OF THE ARMY
MEMPHIS DISTRICT CORPS OF ENGINEERS

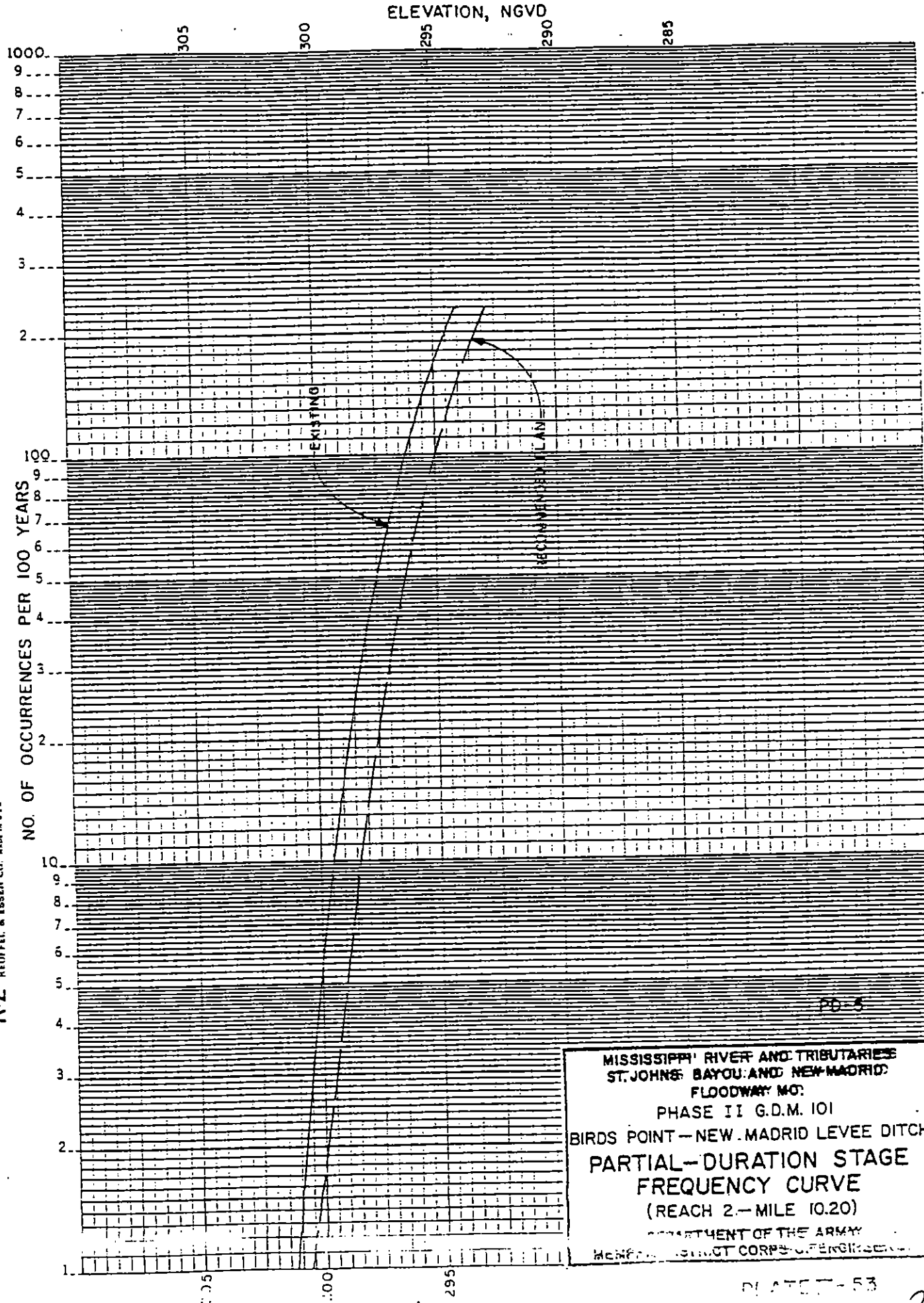
PLATE V-49

264



MISSISSIPPI RIVER AND TRIBUTARIES
ST. JOHNS BAYOU AND NEW MADRID
FLOODWAY MO.
PHASE II G.D.M. 101
BIRDS POINT-NEW MADRID LEVEE DITCH
PARTIAL-DURATION STAGE
FREQUENCY CURVE
(REACH 1 — MILE 4.00)
DEPARTMENT OF THE ARMY
MEMPHIS DISTRICT CORPS OF ENGINEERS

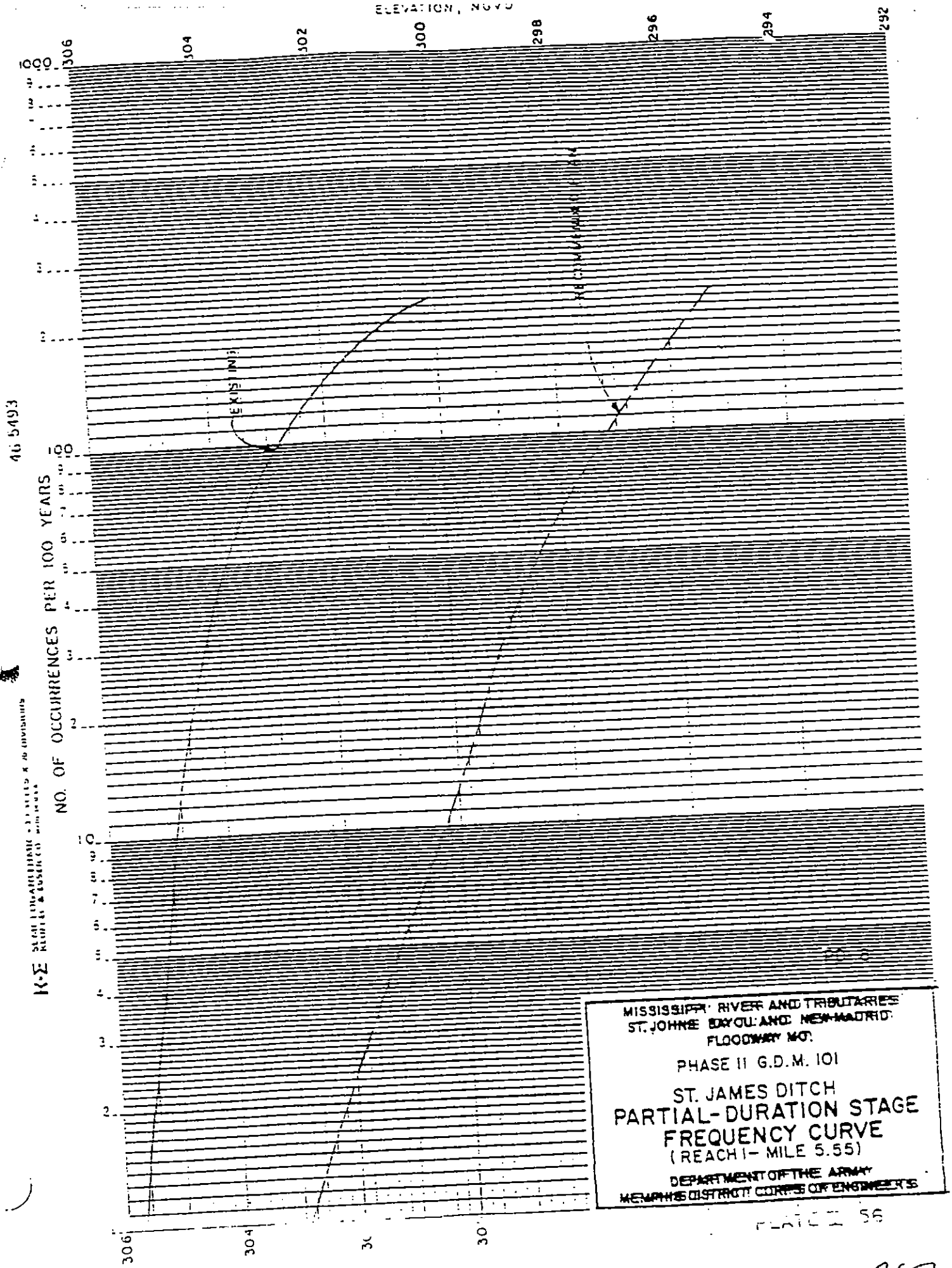
PLATE V-52



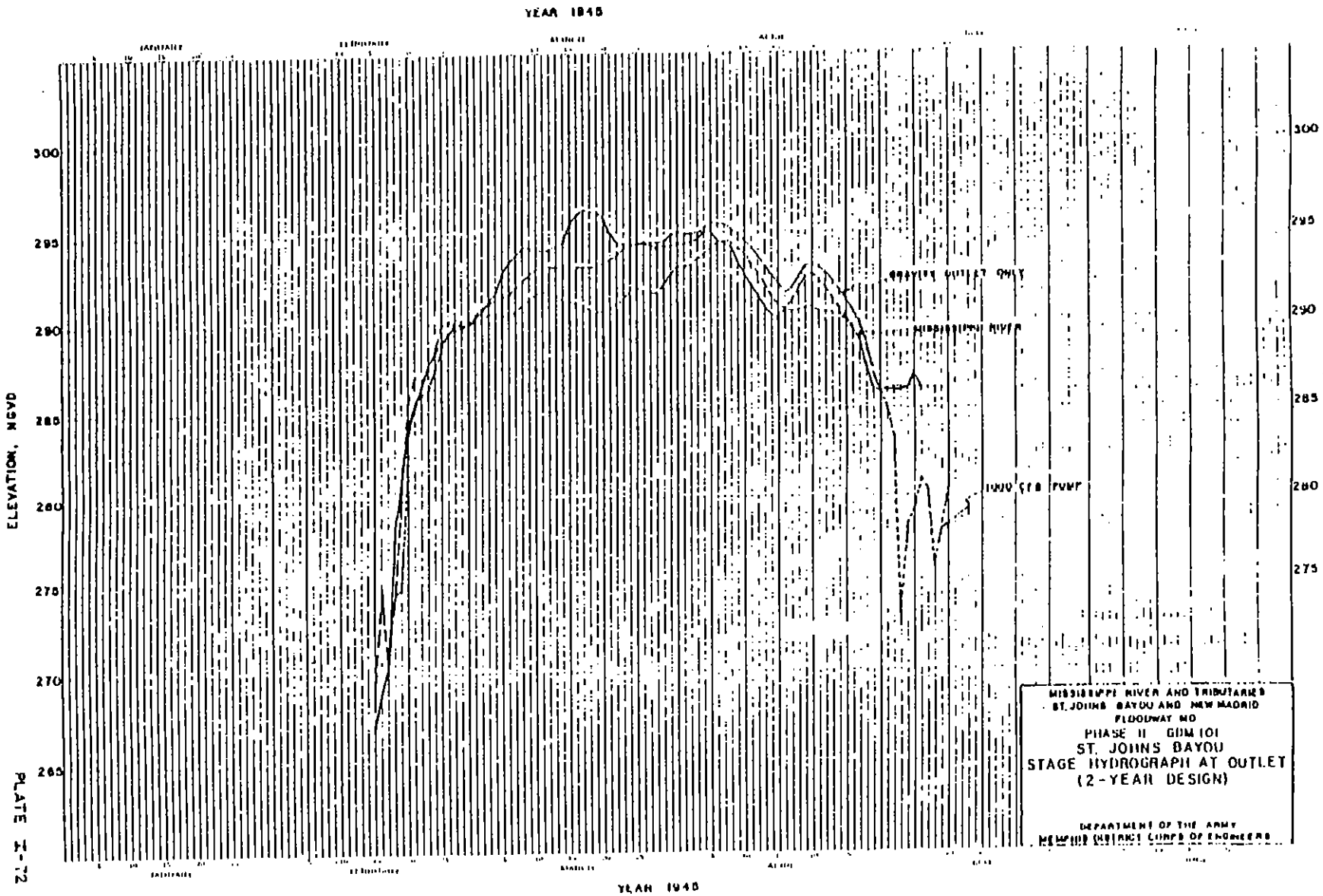
MISSISSIPPI RIVER AND TRIBUTARIES
ST. JOHNS BAYOU AND NEW MADRID
FLOODWAY MO.
PHASE II G.D.M. 101
BIRDS POINT—NEW MADRID LEVEE DITCH
PARTIAL—DURATION STAGE
FREQUENCY CURVE
(REACH 2—MILE 10.20)
DEPARTMENT OF THE ARMY
MEMPHIS DISTRICT CORPS OF ENGINEERS

PLATE II-53

266


ELEVATION, NGVD
306
304
302
300
298
296
294
292
1000
100
10
2
1
NO. OF OCCURRENCES PER 100 YEARS
EXISTING
RECOMMENDED PLAN
46 5493
K+E
MISSISSIPPI RIVER AND TRIBUTARIES
ST. JOHNS BAYOU AND NEW MADRID
FLOODWAY MO.
PHASE II G.D.M. 101
ST. JAMES DITCH
PARTIAL-DURATION STAGE
FREQUENCY CURVE
(REACH I- MILE 5.55)
DEPARTMENT OF THE ARMY
MEMPHIS DISTRICT CORPS OF ENGINEERS

267



MISSISSIPPI RIVER AND TRIBUTARIES
ST. JOHNS BAYOU AND NEW MADRID
FLOODWAY MO
PHASE II GDM 101
ST. JOHNS BAYOU
STAGE HYDROGRAPH AT OUTLET
(2-YEAR DESIGN)

DEPARTMENT OF THE ARMY
MEMPHIS DISTRICT CORPS OF ENGINEERS

PLATE E-72

268

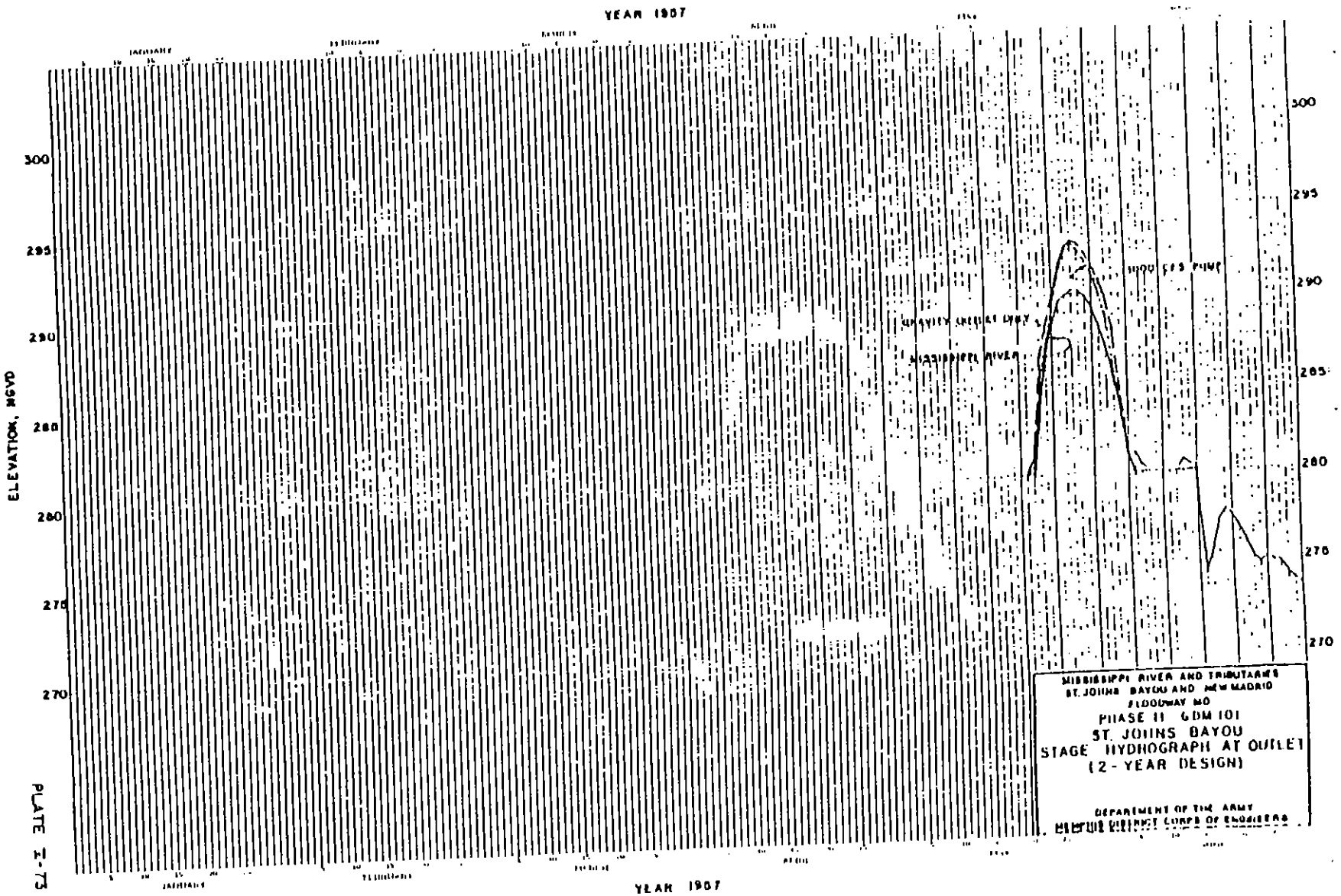


PLATE I-73

269

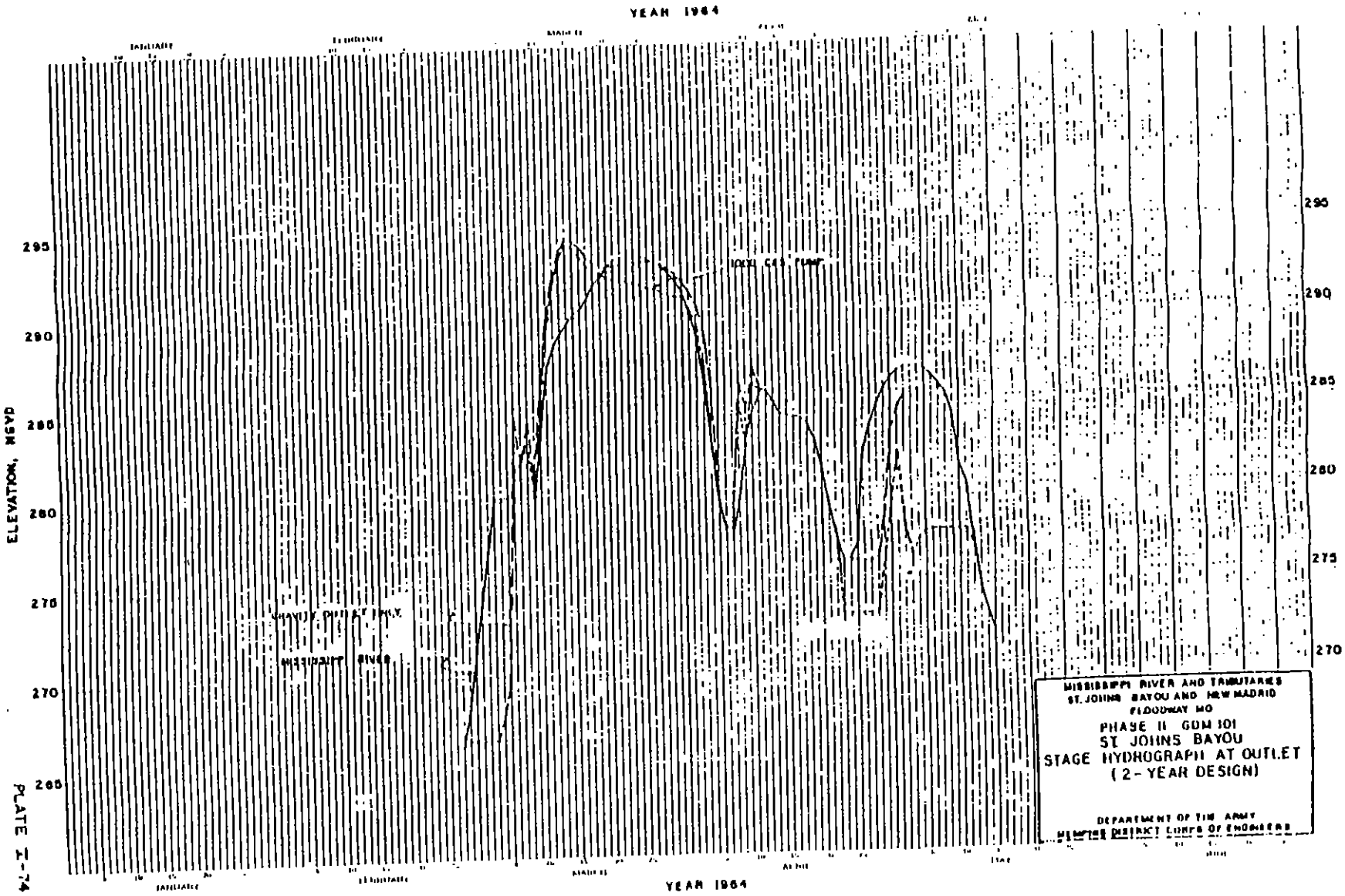
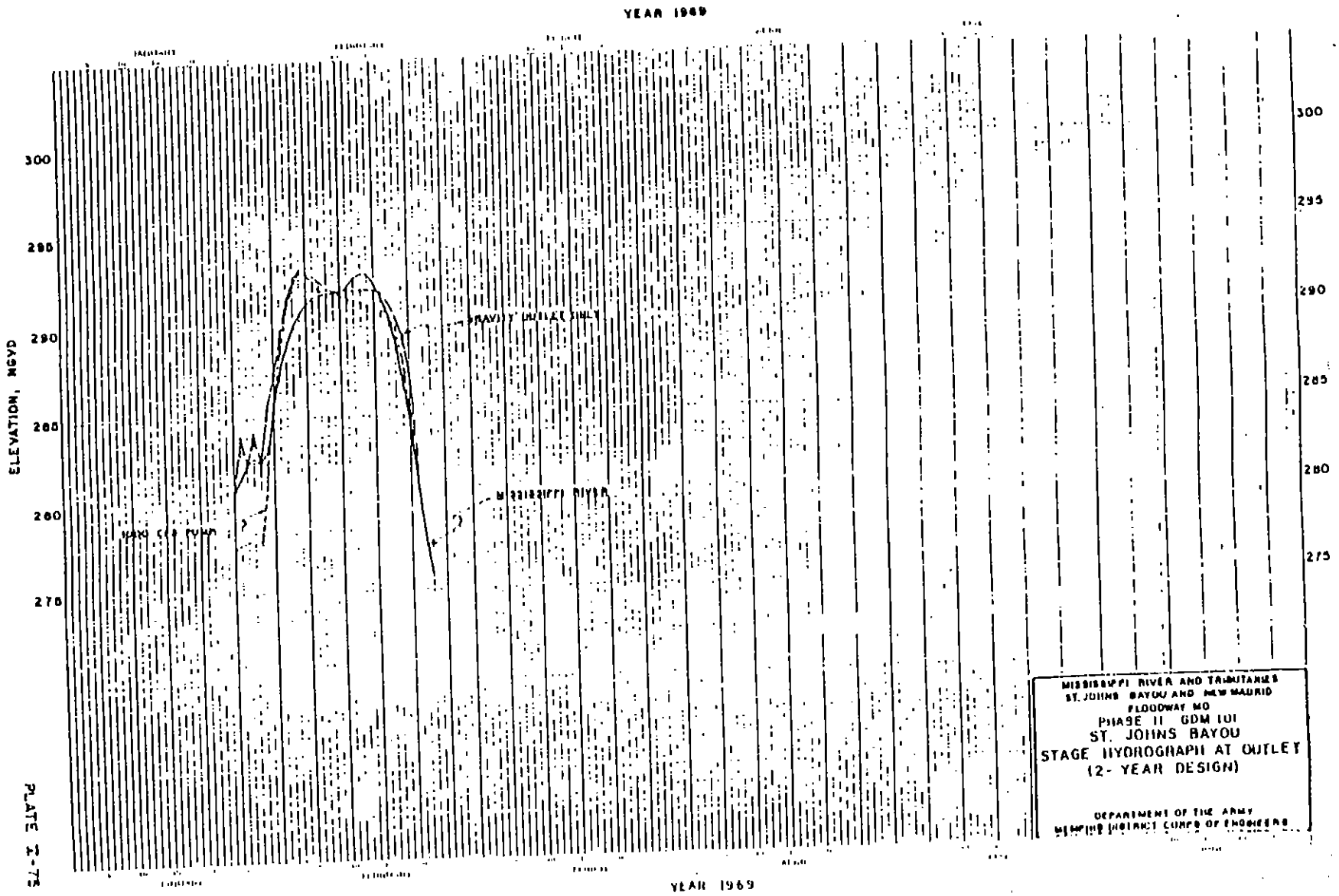

YEAR 1964
ELEVATION, MSVD
295
290
285
280
275
270
265
MISSISSIPPI RIVER
MISSISSIPPI RIVER AND TRIBUTARIES
ST. JOHNS BAYOU AND NEW MADRID
FLOODWAY MO
PHASE II GDM 101
ST JOHNS BAYOU
STAGE HYDROGRAPH AT OUTLET
(2-YEAR DESIGN)
DEPARTMENT OF THE ARMY
MEMPHIS DISTRICT CORPS OF ENGINEERS

PLATE II-74



MISSISSIPPI RIVER AND TRIBUTARIES
ST. JOHNS BAYOU AND NEW MADRID
FLOODWAY MO
PHASE II GDM 101
ST. JOHNS BAYOU
STAGE HYDROGRAPH AT OUTLET
(2- YEAR DESIGN)

DEPARTMENT OF THE ARMY
MEMPHIS DISTRICT CORPS OF ENGINEERS

PLATE I-75

271

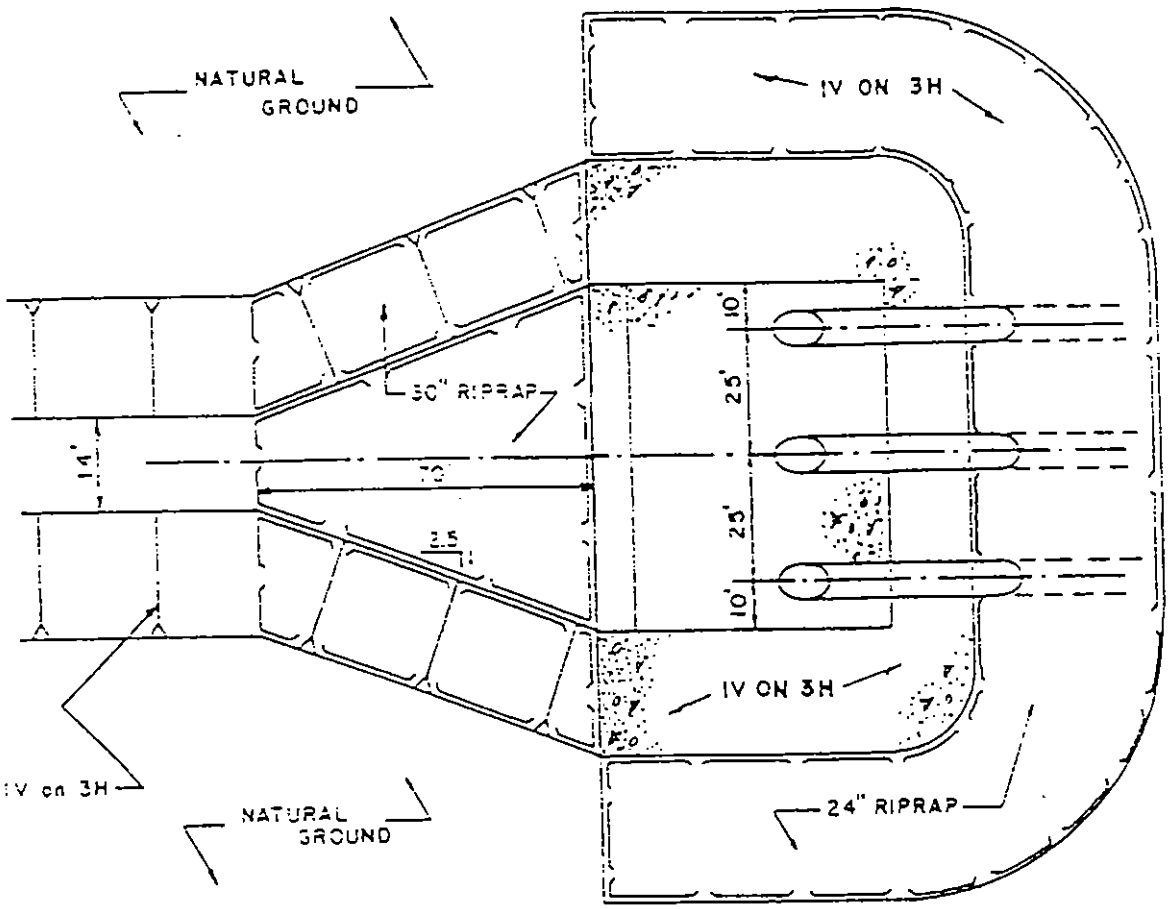
MISSISSIPPI RIVER AND TRIBUTARIES
ST. JOHNS BAYOU AND NEW MADRID
FLOODWAY MO.

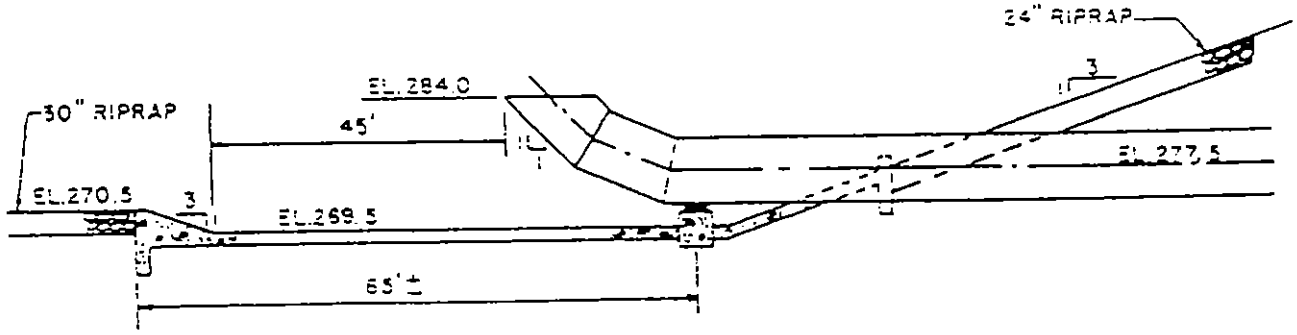
PHASE II G.D.M. 101
ST. JOHNS BAYOU
PUMP ANALYSIS
AT OUTLET
(2-YEAR DESIGN)

DEPARTMENT OF THE ARMY
MEMPHIS DISTRICT CORPS OF ENGINEERS

PLATE

272





NOTE: NOT DRAWN TO SCALE

MISSISSIPPI RIVER AND TRIBUTARIES
ST. JOHNS BAYOU AND NEW MADRID
FLOODWAY MO.

PHASE II G.D.M. 101
ST. JOHNS BAYOU
PUMPING STATION
OUTLET WORKS

DEPARTMENT OF THE ARMY
MEMPHIS DISTRICT CORPS OF ENGINEERS

REVISED MAR. 1987

PLATE V-77

273

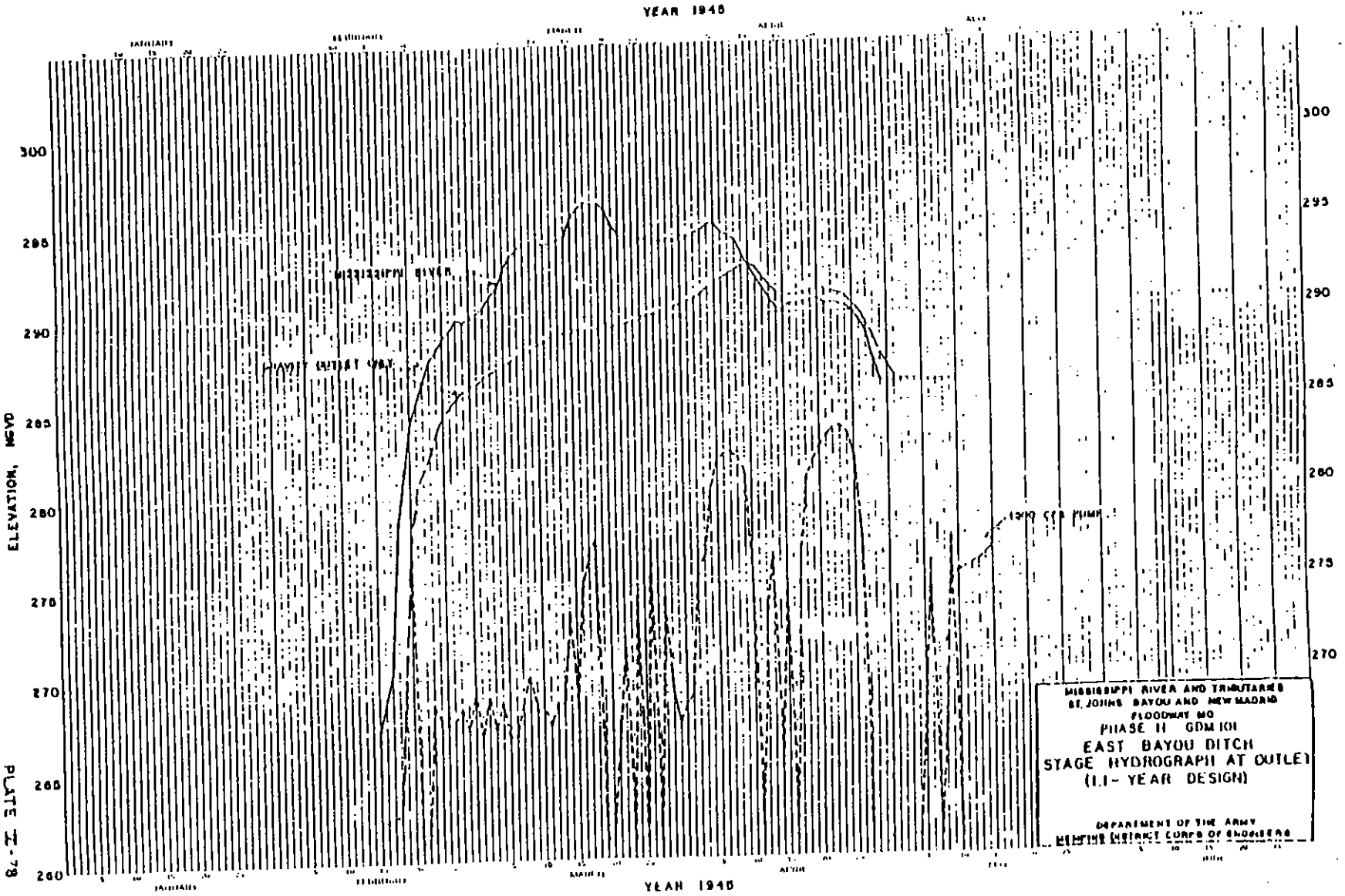
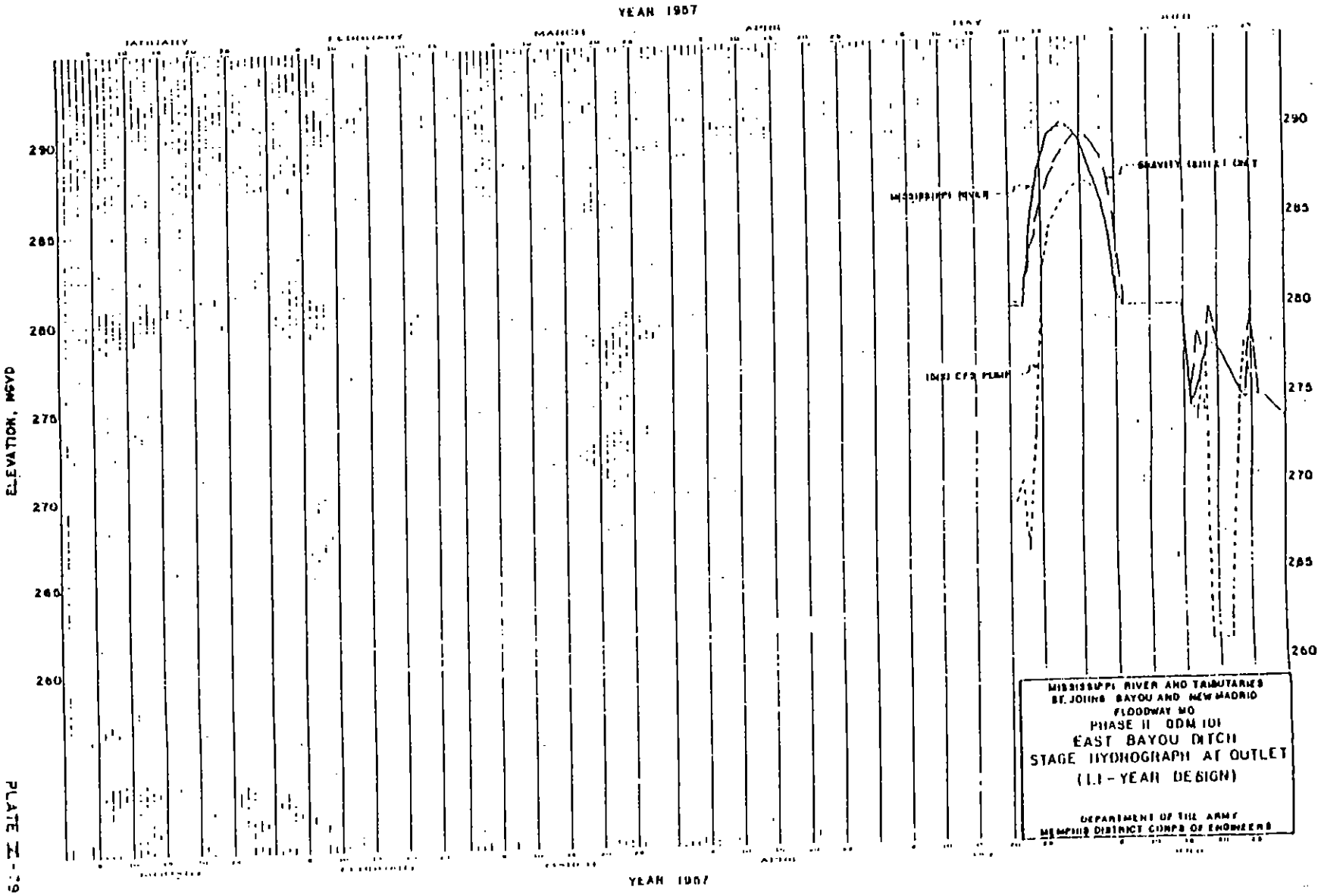


PLATE II-78

274



MISSISSIPPI RIVER AND TRIBUTARIES
ST. JOHNS BAYOU AND NEW MADRID
FLOODWAY MO
PHASE II ODM 101
EAST BAYOU DITCH
STAGE HYDROGRAPH AT OUTLET
(1.1 - YEAR DESIGN)

DEPARTMENT OF THE ARMY
MEMPHIS DISTRICT CORPS OF ENGINEERS

PLATE IV-19

275

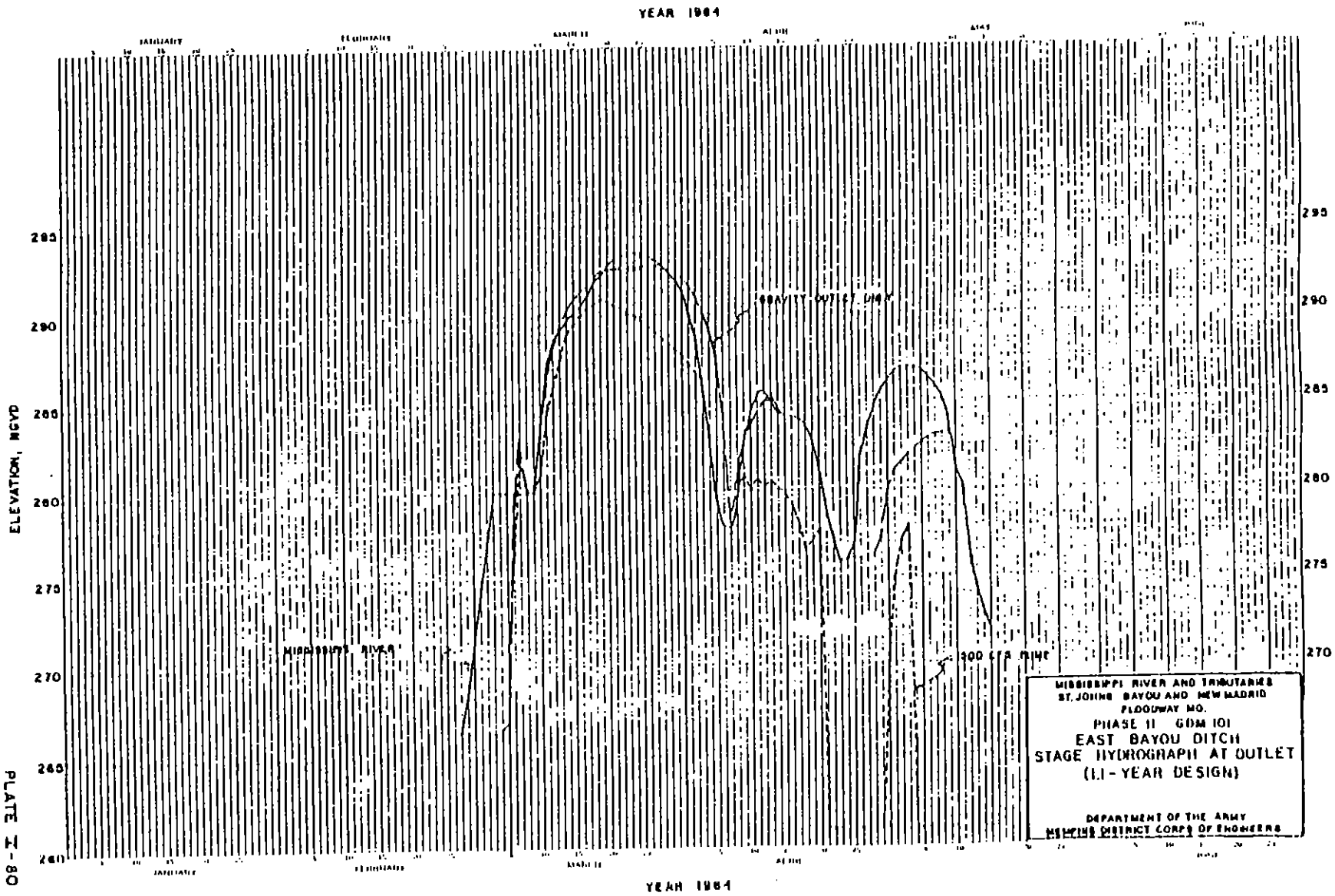

YEAR 1964
ELEVATION, NGVD
295
290
285
280
275
270
265
260
MISSISSIPPI RIVER
GRAVITY OUTLET DMAX
900 CFS TIME
MISSISSIPPI RIVER AND TRIBUTARIES
ST. JOHNS BAYOU AND NEW MADRID
FLOODWAY MO.
PHASE II GDM 101
EAST BAYOU DITCH
STAGE HYDROGRAPH AT OUTLET
(1.1 - YEAR DESIGN)
DEPARTMENT OF THE ARMY
MEMPHIS DISTRICT CORPS OF ENGINEERS

PLATE I-80

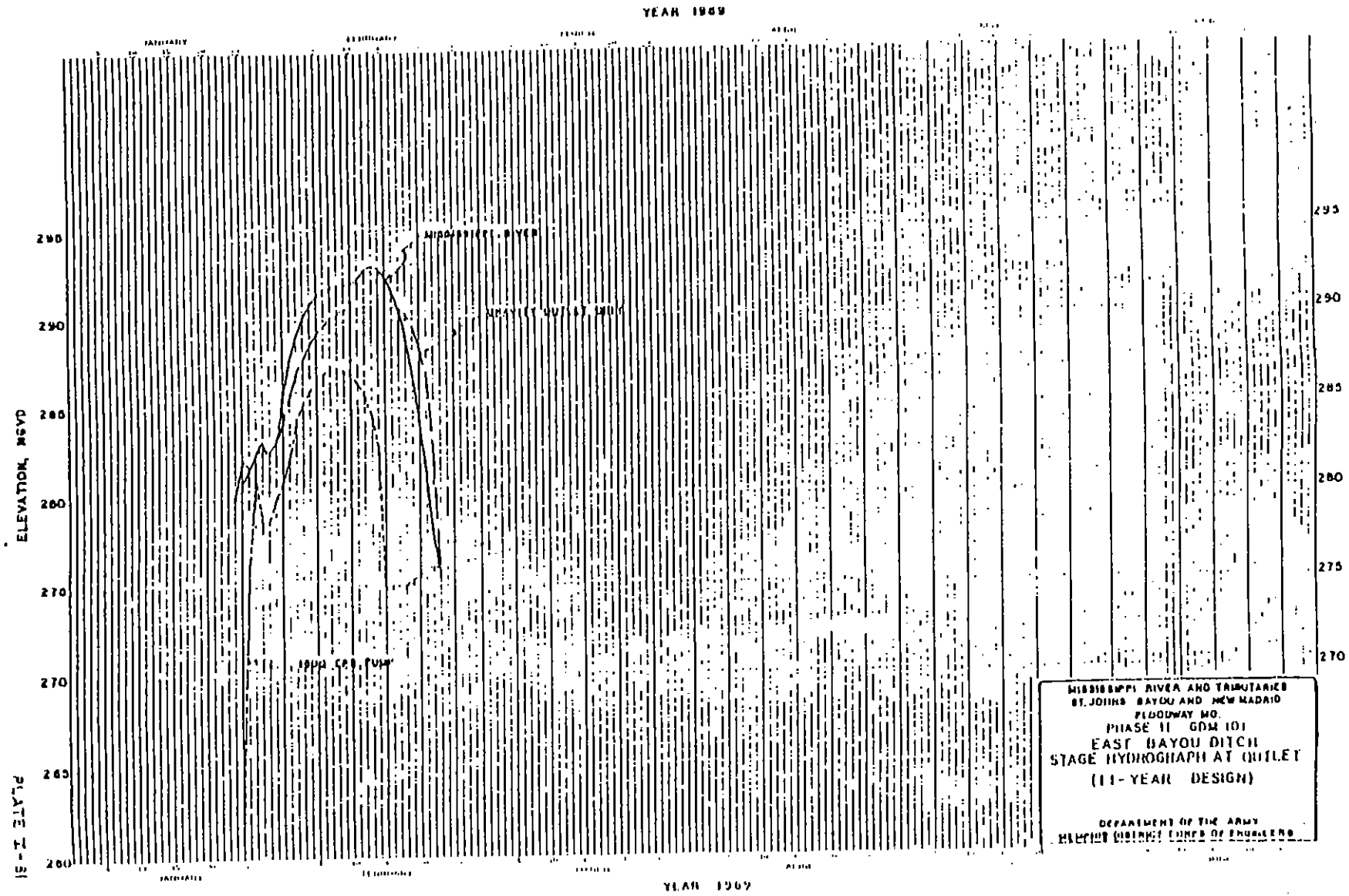
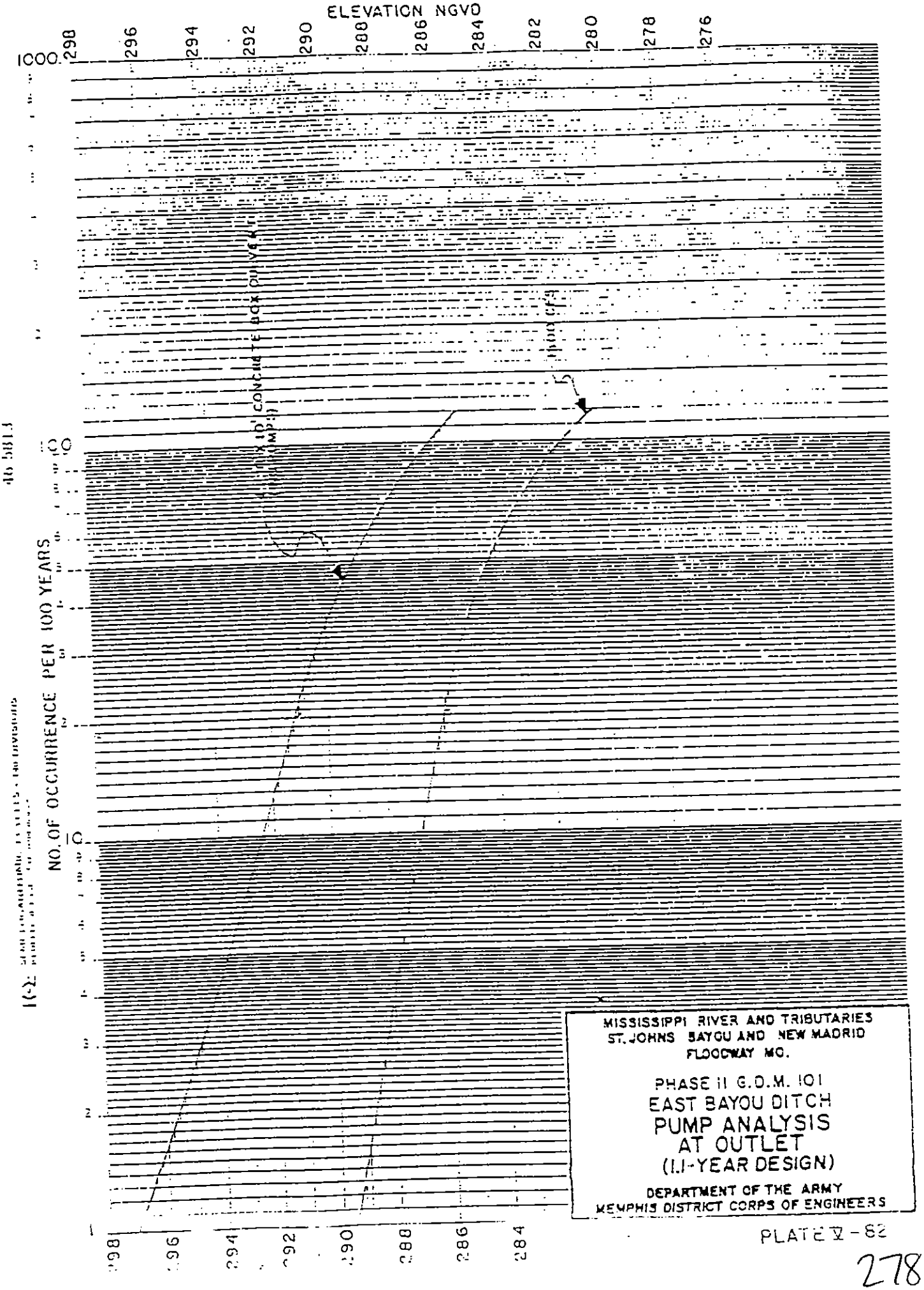


PLATE I-81

277

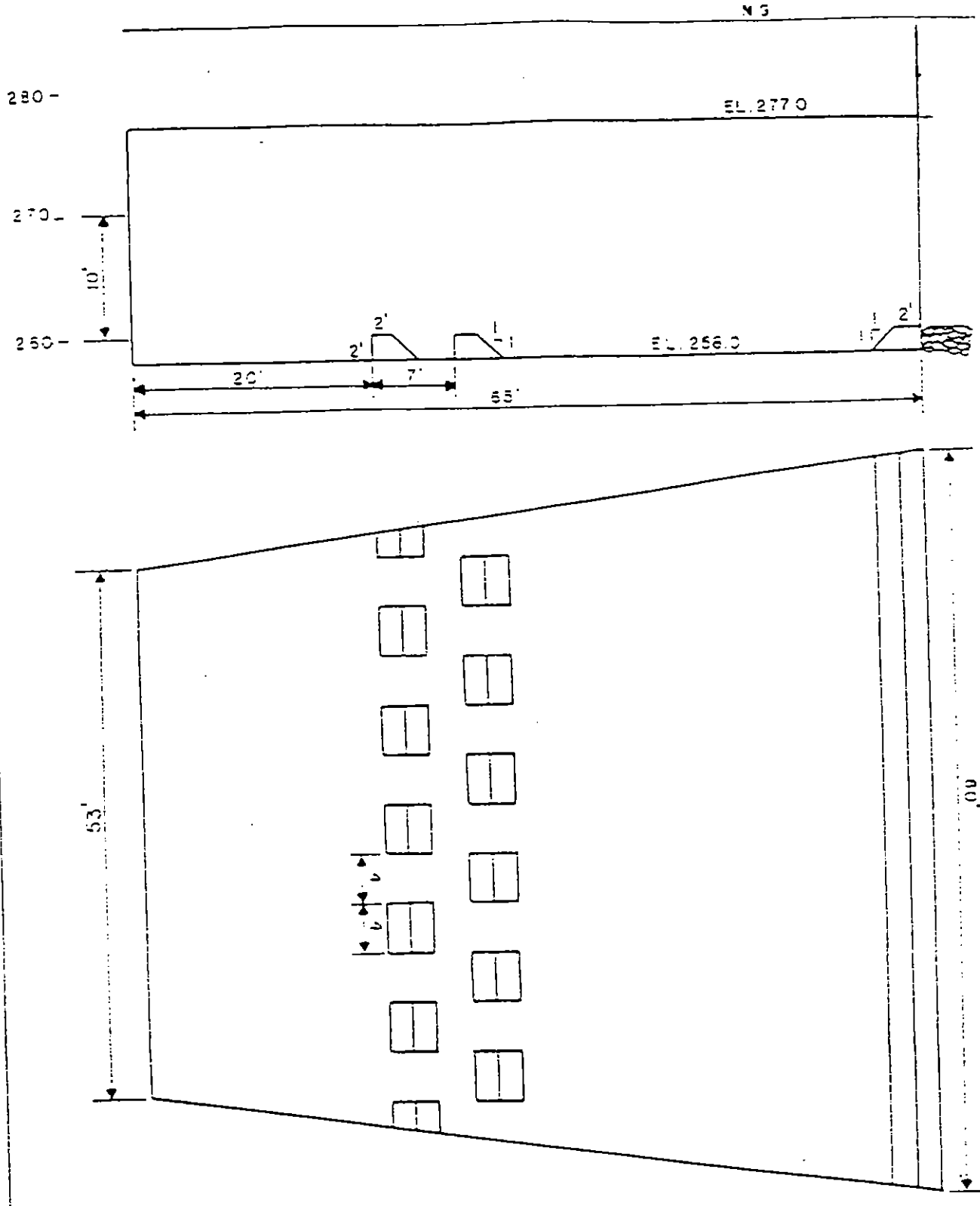


MISSISSIPPI RIVER AND TRIBUTARIES
ST. JOHNS BAYOU AND NEW MADRID
FLOODWAY MO.

PHASE II G.D.M. 101
EAST BAYOU DITCH
PUMP ANALYSIS
AT OUTLET
(1.1-YEAR DESIGN)

DEPARTMENT OF THE ARMY
MEMPHIS DISTRICT CORPS OF ENGINEERS

PLATE V-82



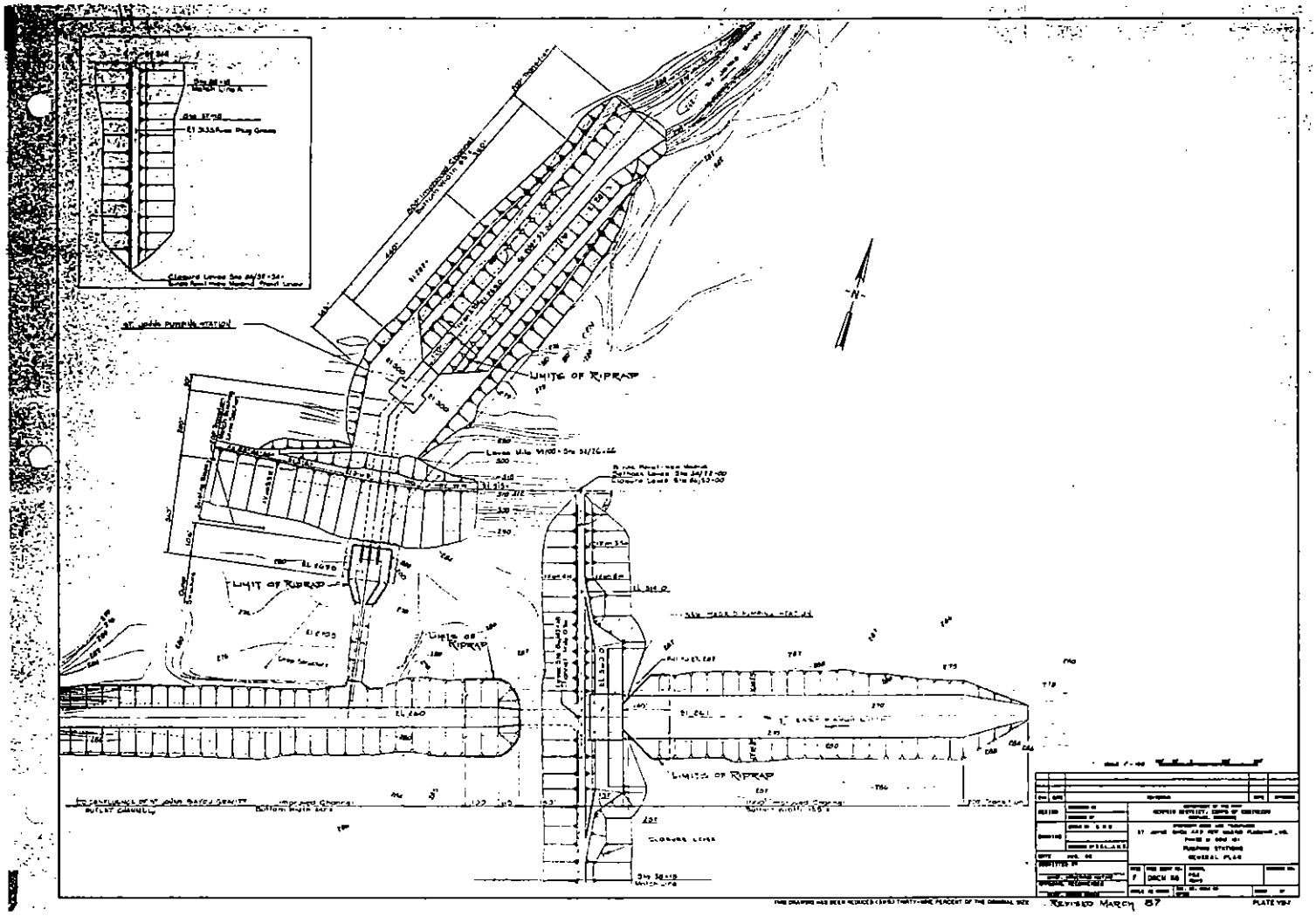
NOTE: NOT DRAWN TO SCALE.

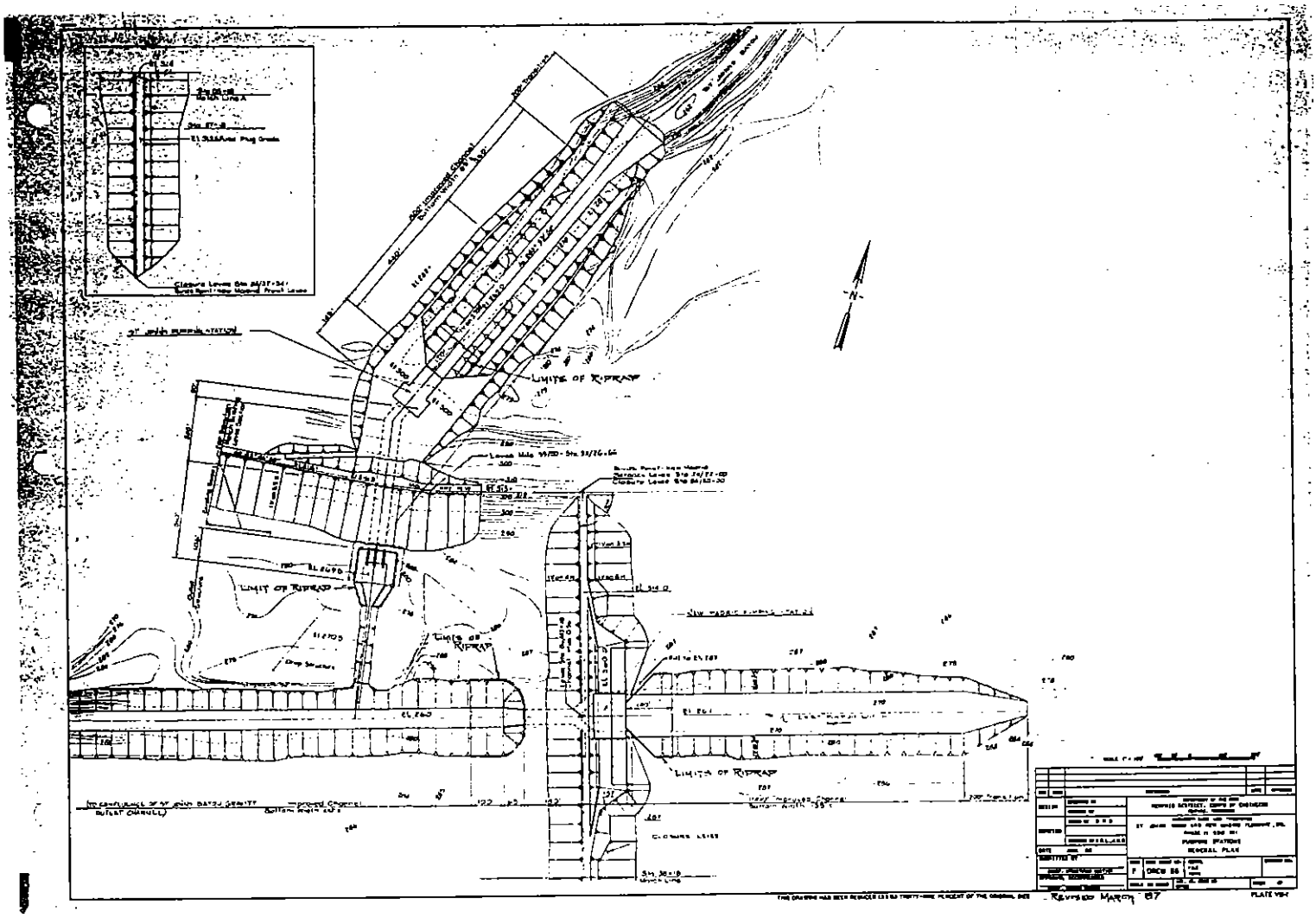
MISSISSIPPI RIVER AND TRIBUTARIES
ST. JOHNS BAYOU AND NEW MADRID
FLOODWAY MO.

PHASE II G.D.M. 101
NEW MADRID FLOODWAY
PUMPING STATION
OUTLET WORKS

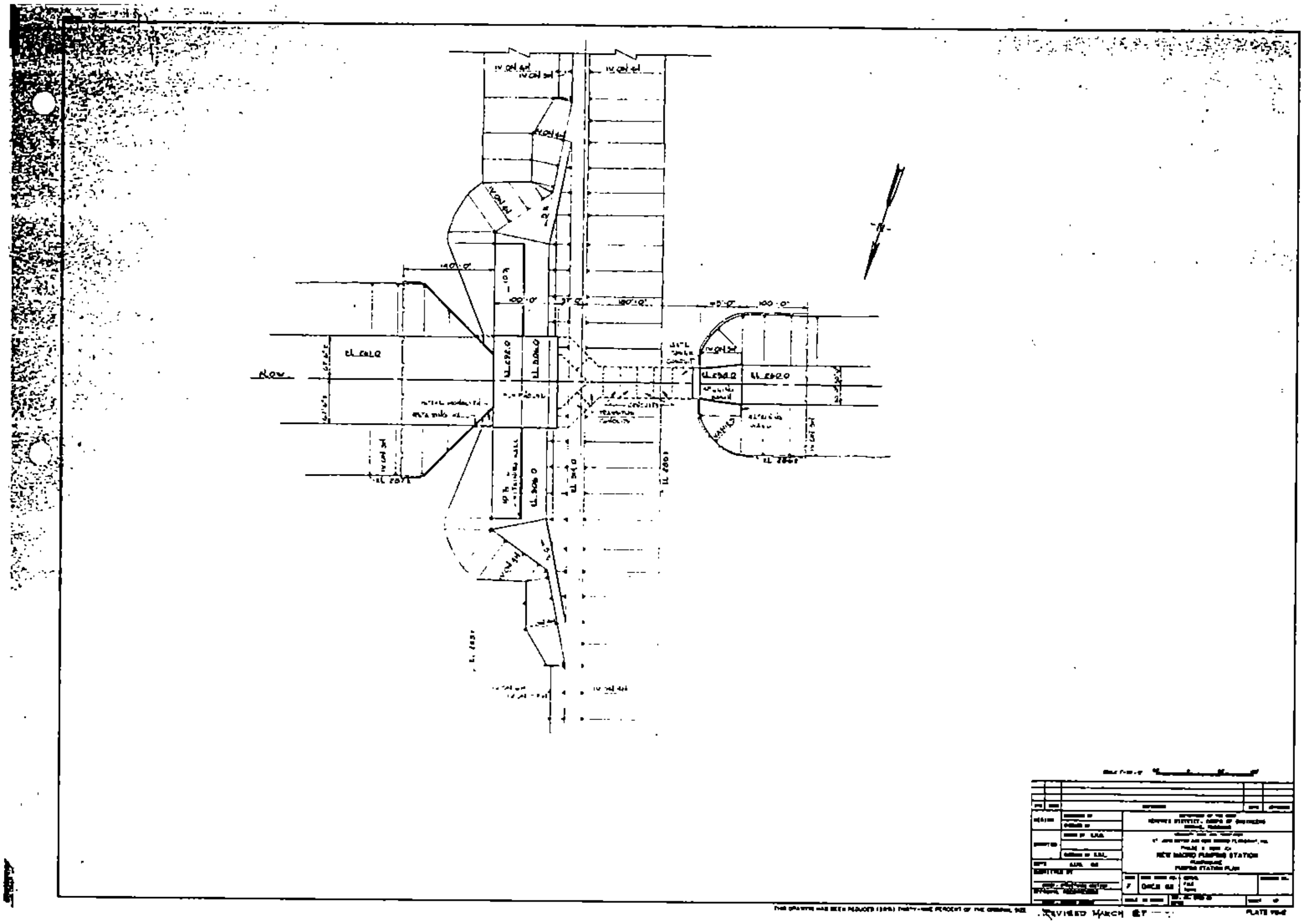
DEPARTMENT OF THE ARMY

PLATE V-83

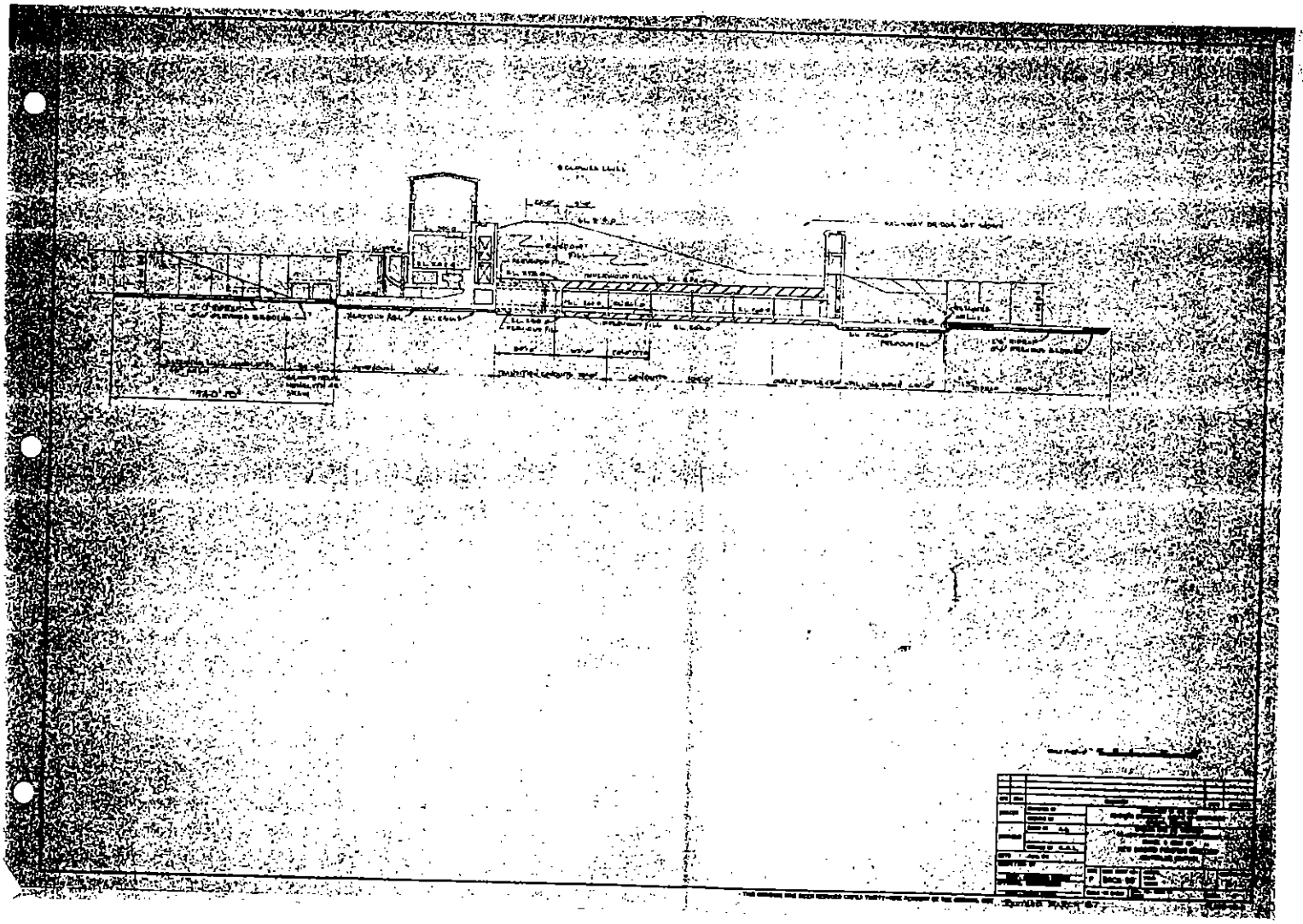

LIMITS OF RIPRAP
LIMIT OF RIPRAP
LIMITS OF RIPRAP
LIMITS OF RIPRAP
CLOSURE LEVEE
REVISED MARCH 87

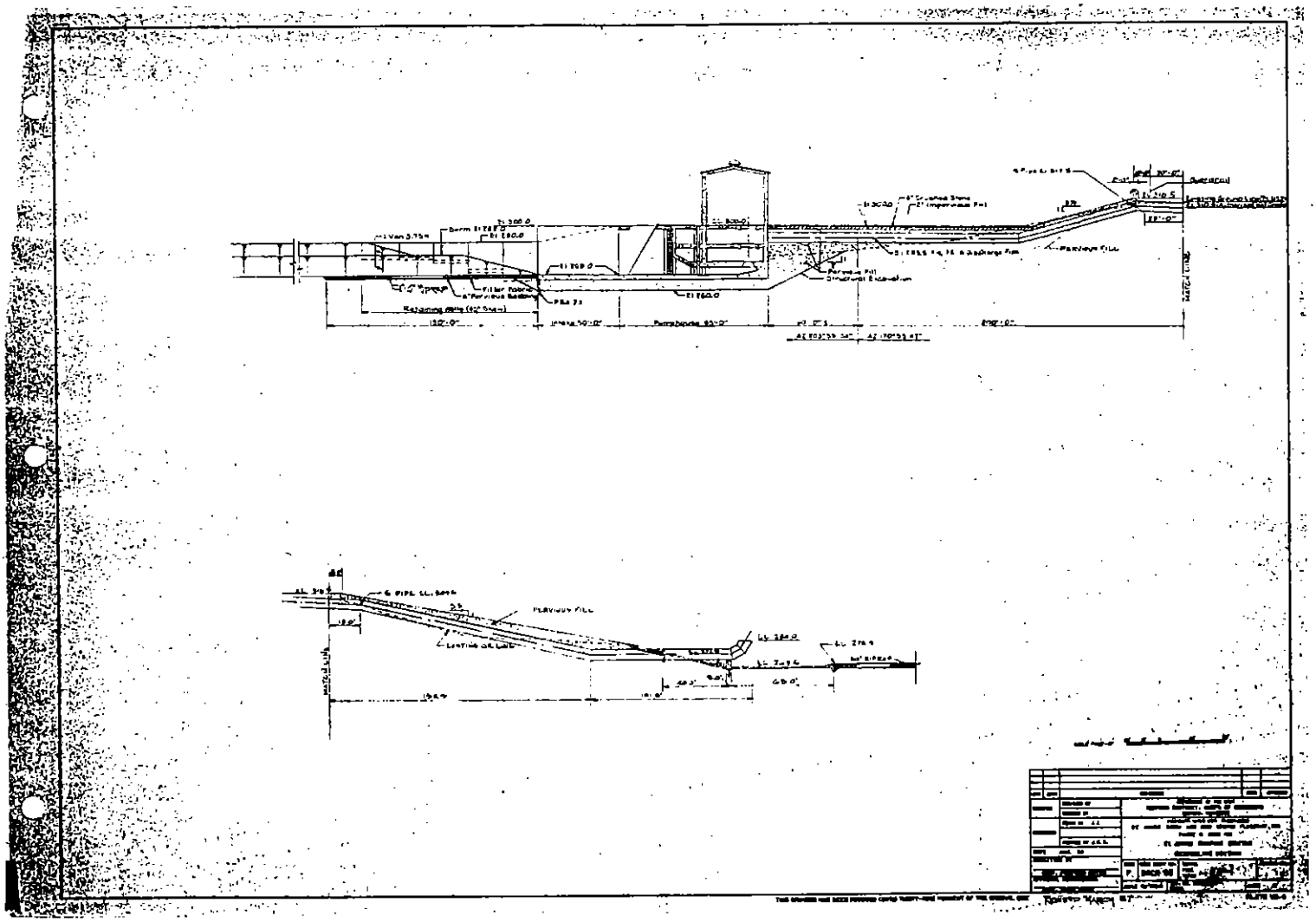

LIMITS OF RIPRAP
LIMITS OF RIPRAP
LIMITS OF RIPRAP
LIMITS OF RIPRAP
PUMPING STATIONS
GENERAL PLAN
REVISED MARCH 87
PLATE VIII

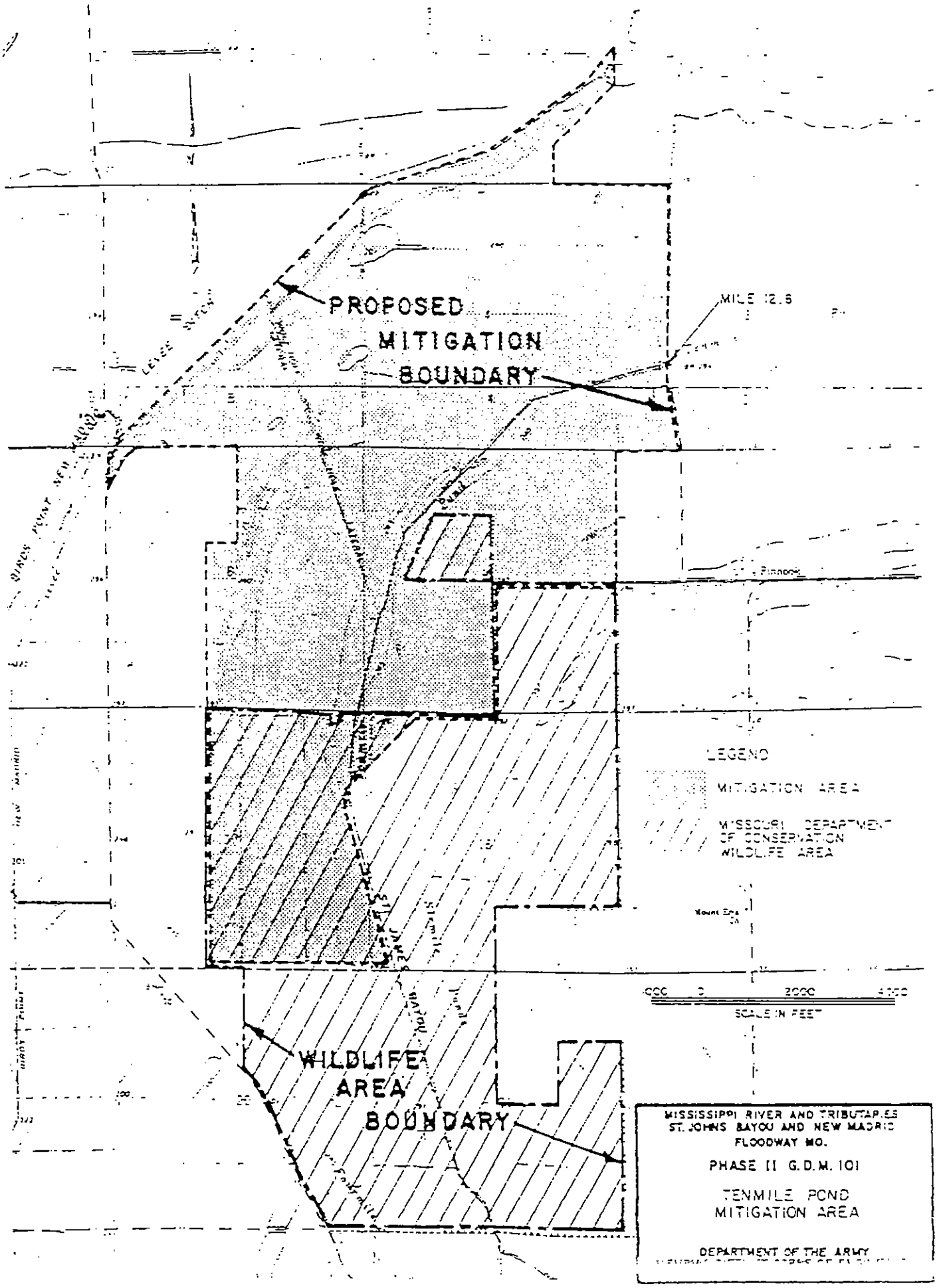
281


FLOW
NEW MADRID PUMPING STATION
PUMPING STATION PLAN
REVISED MARCH

282






PROPOSED
MITIGATION
BOUNDARY
MILE 12.6
LEGEND
MITIGATION AREA
MISSOURI DEPARTMENT OF CONSERVATION WILDLIFE AREA
2000
SCALE IN FEET
WILDLIFE
AREA
BOUNDARY
MISSISSIPPI RIVER AND TRIBUTARIES
ST. JOHNS BAYOU AND NEW MADRID
FLOODWAY MO.
PHASE II G.D.M. 101
TENMILE POND
MITIGATION AREA
DEPARTMENT OF THE ARMY

Facility Number	Owner		Mile	Type Relocation	Existing Condition
		St. Johns Bayou			
M-42	Mississippi County, Missouri	Mississippi County Road	0.20	Replace Bridge, Detour and Approaches	Good
M-41	Missouri Department of Transportation.	Missouri Route OO	2.02	New structure and approaches	Good
PL-[illegible]8	Scott, New Madrid, & Mississippi Coop Association	13.8 kilo-volt Power Line	4.42	Provide Clearance	
TC-[illegible]0	Southwestern Bell Telephone Company	Telephone Cable	4.43	Fit New Channel	
M-[illegible]0	Mississippi County, Missouri	Mississippi County Road	4.43	Replace Bridge and Approaches	Good
MC[illegible]39	Missouri Department of Transportation	Missouri Route 80	5.55	None	Very Good
TC-[illegible]76	Southwestern Bell Telephone Company	Telephone Cable	5.56	Fit New Channel	
PL-[illegible]75	Scott, New Madrid, & Mississippi Coop Association	7.2 kilo-volt Power Line	5.57	Provide Clearance	
G-[illegible]7	Associated Natural Gas Company	4" Gas Line	5.57	Fit New Channel	
M-[illegible]A	Mississippi County, Missouri	Mississippi County Road	6.55	Replace Bridge and Approaches	Fair
TC-[illegible]74	Southwestern Bell Telephone Company	Telepone Cable	6.80	Fit New Channel	
TV-[illegible]73	Cablevision Company	2 Television Cables	6.80	Fit New Channel	
PL-[illegible]73	Missouri Utility Company	22 kilo-volt Power Line	6.80	Provide Clearance	
PL-[illegible]72	Scott, New Madrid, & Mississippi Coop Association	7.2 kilo-volt Power Line	6.80	Provide Clearance	
MC-[illegible]37	Missouri Department of Transportation	Missouri Route 105	6.81	None	Very Good
G-[illegible]1	Associated Natural Gas Company	2" Gas Line	6.83	Fit Channel	
PL-[illegible]69	Scott, New Madrid, & Mississippi Coop Association	7.2 kilo-volt Power Line	8.17	Provide Clearance	
TC-[illegible]70	Southwestern Bell Telephone Company	Telephone Cable	8.17	Fit New Channel	
M-[illegible]6	Mississippi County, Missouri	Mississippi County Road	8.18	Replace Bridge and Approaches	Poor
PL-[illegible]66	M&A Electric Cooperative	33 kilo-volt Power Line	8.65	Provide Clearance	
PL-[illegible]67	Scott, New Madrid, & Mississippi Coop Association	7.2 kilo-volt Power Line	8.65	Provide Clearance	
TC-[illegible]68	Southwestern Bell Telephone Company	Telephone Cable	8.66	Fit New Channel	
M-[illegible]5	Mississippi County, Missouri	Mississippi County Road	8.66	Replace Bridge and Approaches	Good
PL-[illegible]65	Scott, New Madrid, & Mississippi Coop Association	7.2 kilo-volt Power Line	9.67	Provide Clearance	
M-[illegible]4	Mississippi County, Missouri	Mississippi County Road	9.67	Replace Bridge and Approaches	Fair
PL-[illegible]63	Scott, New Madrid, & Mississippi Coop Association	7.2 kilo-volt Power Line	10.83	Provide Clearance	
TC-[illegible]64	Southwestern Bell Telephone Company	Telephone Cable	10.84	Fit New Channel	
MC-[illegible]33	Missouri Department of Transportation	Missouri Route C	10.84	None	Very Good
		Birds Point - New Madrid Levee Ditch			
N-[illegible]A	New Madrid County, Missouri	New Madrid County Road	1.31	Structural Modification	Fair
PL-[illegible]81	Scott, New Madrid, & Mississippi Coop Association	7.2 kilo-volt Power Line	5.36	Provide Clearance	
TC-[illegible]82	Southwestern Bell Telephone Company	Telephone Cable	5.36	Fit New Channel	
M-[illegible]-43	Missouri Department of Transportation	Missouri Route P	5.36	None	Excellent
MC-[illegible]38A	Missouri Department of Transportation	Missouri Route 422	6.55	None	
		St. Johns Bayou Main Ditch			
[illegible]	New Madrid County, Missouri	New Madrid County Road	3.21	Replace Bridge and Approaches	Fair

280

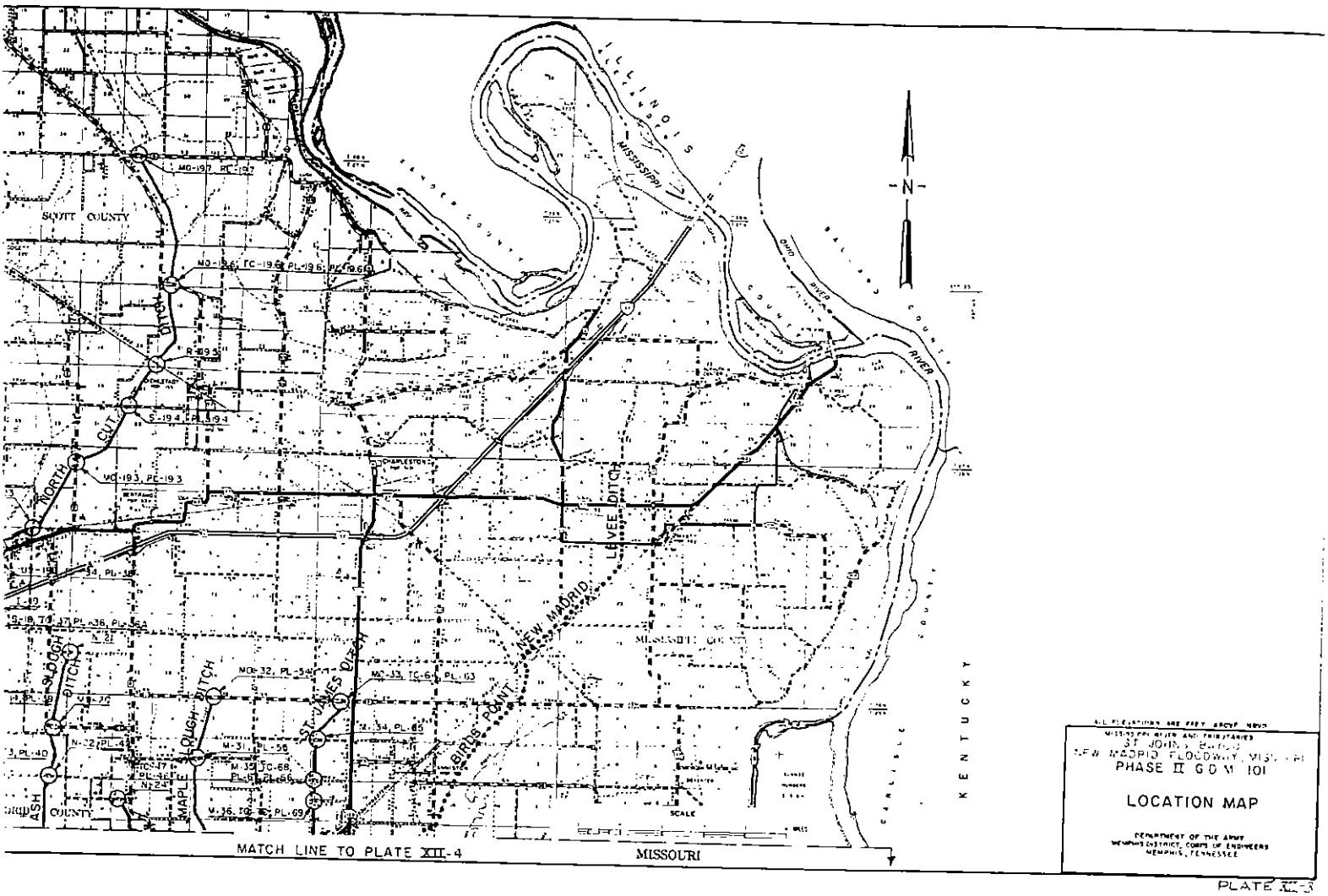
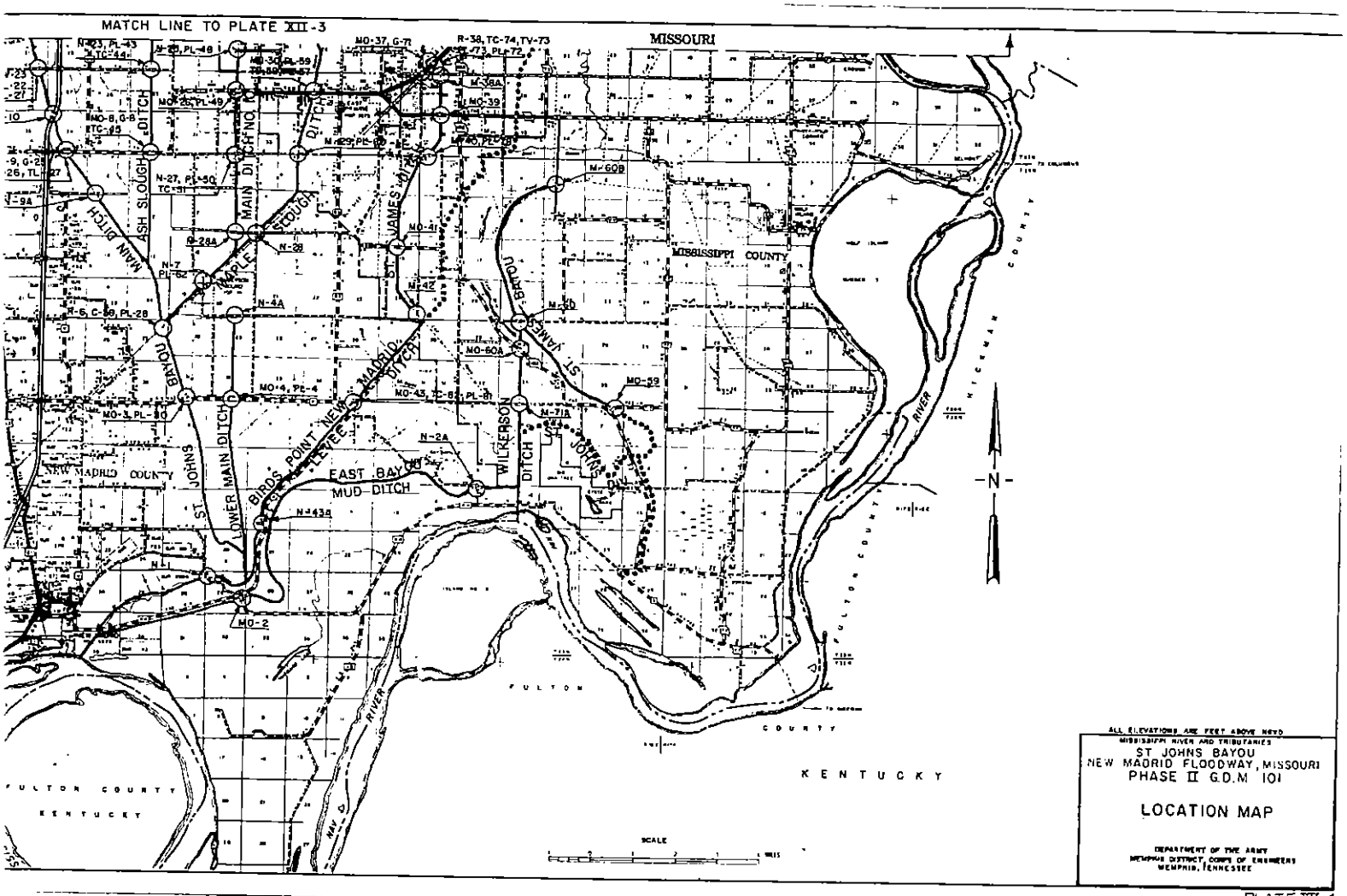

SCOTT COUNTY
MISSISSIPPI
ILLINOIS
OHIO RIVER
RIVER
N
NORTH CUT DITCH
LEVEE DITCH
NEW MADRID
BIRDS POINT
ST. JAMES DITCH
MAPLE SLOUGH DITCH
SLOUGH DITCH
MISSISSIPPI COUNTY
KENTUCKY
MATCH LINE TO PLATE XII-4
MISSOURI
SCALE
ALL ELEVATIONS ARE FEET ABOVE NGVD
MISSISSIPPI RIVER AND TRIBUTARIES
ST JOHNS BAYOU
NEW MADRID FLOODWAY, MISSOURI
PHASE II G D M 101
LOCATION MAP
DEPARTMENT OF THE ARMY
MEMPHIS DISTRICT, CORPS OF ENGINEERS
MEMPHIS, TENNESSEE

PLATE XII-3



ALL ELEVATIONS ARE FEET ABOVE NGVD
MISSISSIPPI RIVER AND TRIBUTARIES
ST JOHNS BAYOU
NEW MADRID FLOODWAY, MISSOURI
PHASE II G.D.M 101

LOCATION MAP

DEPARTMENT OF THE ARMY
MEMPHIS DISTRICT, CORPS OF ENGINEERS
MEMPHIS, TENNESSEE

PLATE XII-4